

## **INSTRUCTION MANUAL**

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**HITACHI**  
**SPECTROPHOTOMETER**  
**UV SOLUTIONS 4.2**  
**PROGRAM**  
**(OPERATION MANUAL)**

This product is intended for research use only. It is not to be used for reporting patient diagnostic or therapeutic results.



- Before using the instrument, read the safety instructions and precautions carefully.
- Be sure to observe the safety instructions in this manual and the WARNING/CAUTION labels on the instrument.
- Keep this manual in a safe place nearby so it can be referred to whenever needed.

**NOTICE:**

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3. Hitachi High-Tech Science Corporation assumes no liability for any direct, indirect, or consequential damages arising from use not described in this manual.  
Utmost care must be exercised when using the instrument.
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## PREFACE

We thank you for purchasing the Hitachi Spectrophotometer.

The instrument is specifically designed for measuring absorbance and transmittance of samples spectrophotometrically.

Note that samples that may have been infected with bacteria or viruses are not applicable to the instrument

**This instrument is intended for use by persons having a basic knowledge of chemical analysis procedures.**

**Keep in mind that improper use of analytical instruments, chemicals or samples would result not only in wrong analytical data but also in consequences adverse to safety.**

**Note that it is allowed only for persons having a basic knowledge of chemical analysis procedures to use this instrument.**

Please read this instrument manual carefully before attempting operation and acquaint yourself with this instrument for its correct use.

Be sure to read Hitachi Spectrophotometer's instruction manual also to ensure correct use of this instrument.

## **ABOUT THIS MANUAL**

The instruction documentation for this product comprises the following two volumes:

- Instruction Manual for Hitachi Spectrophotometer (each model)
- Instruction Manual – Hitachi Spectrophotometer – UV Solutions Program (Operation Manual)

This instruction manual has been prepared for the user of Hitachi Spectrophotometer.

**First of all, be sure to read “IMPORTANT” and “SAFETY SUMMARY” at the beginning of this manual.**

And, general safety-related matters are described in the instruction manual for each spectrophotometer model, so be sure to read through the relevant manual prior to use.

The contents of “IMPORTANT” and “SAFETY SUMMARY” described hereafter apply to the accessories of this instrument also.

# **IMPORTANT**

## **Warranty on Product**

This product, inclusive of its accessories, is warranted to be free from defects in material or workmanship under normal use within the product specifications indicated in this manual and under conditions given below.

This warranty is void if the instrument is not used according to the instruction manual.

### **(1) Scope of Warranty**

Any parts that prove to be defective in design or workmanship during the warranty period will be repaired, adjusted or replaced without charge. A substitute part may be used for repair, or replacement with an equivalent product may be made instead of repair. Such system components as a personal computer and printer to be updated frequently for improvement may not be available in original versions at the time of replacement.

The manufacturer assumes no liability for any damage to data or application software due to any possible fault or failure of this instrument.

### **(2) Warranty Period**

One year from the date of initial installation

(In case a separate warranty document has been issued, the warranty period indicated in it takes precedence over the above period)

### (3) Limitations and Exclusions on Warranty

Note that the following cases are excluded from the scope of this warranty, i.e., these cases are beyond the coverage of free-of-charge repair even during the warranty period indicated above.

- (a) Failure due to operation at a place not meeting the installation requirements specified by the manufacturer.
- (b) Failure due to power supply voltage/frequency other than specified by the manufacturer or due to abnormality in power supply.
- (c) Corrosion or deterioration of the piping due to impurities contained in gas, compressed air or cooling water supplied by the user.
- (d) Corrosion of the electric circuits or deterioration of the optical elements due to highly corrosive atmospheric gas.
- (e) Failure due to use of software, hardware or spare parts not supplied by the manufacturer.
- (f) Failure due to use not described in the manual or improper repair not approved by the manufacturer.
- (g) Failure due to maintenance or repair by other than service engineer qualified by the manufacturer.
- (h) Failure due to relocation or transport conducted not under the supervision of the manufacturer after the initial installation of the instrument.
- (i) Failure due to disassembly, modification or relocation not approved by the manufacturer.
- (j) Failure due to acts of God, including fire, earthquake, storm, flood, lightning, social disturbance, riot, crime, insurrection, terrorism, war (declared or undeclared), radioactive pollution, contamination with harmful substances, etc.

- (k) Failure of the hardware, or damage to the system software, application software or data due to computer virus infection.
  - (l) After disposal of this instrument, after its resale without prior approval from the manufacturer, consumable parts, and failure of any part that has reached the end of its service life.
  - (m) Failure due to a life-limited part that has exceeded the end of its useful lifetime.
- (4) Disclaimer of Warranty

THE MANUFACTURER MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EXCEPT AS PROVIDED HEREIN, INCLUDING WITHOUT LIMITATION THEREOF, WARRANTIES AS TO MARKETABILITY, MERCHANTABILITY, FOR A PARTICULAR PURPOSE OR USE, OR AGAINST INFRINGEMENT OF ANY PATENT. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT OR THE USE OF ANY PRODUCT.  
NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY THE MANUFACTURER, ITS DEALERS, DISTRIBUTORS, AGENTS OR EMPLOYEES SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY.

## **Service Life of This Instrument**

This instrument has a useful service life of seven years after the date of its initial use (installation), which is estimated under the condition that periodic maintenance, checkup, replacement of life-limited parts, and repair of worn parts are carried out as specified in the present instruction manual.

(In use of the instrument under standard operating conditions  
(8 h/day, 20 days/month))

For using the instrument beyond the useful service life, it shall be checked for safety by Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative. (This safety check will be available on a chargeable basis.)

If use of the instrument is continued without receiving the safety check, the instrument might become faulty and cause a danger. Note that replacement may be recommended as a result of the safety check.

## **Installation, Relocation and After-sale Technical Service**

### **(1) Installation and Relocation**

- (a) Installation at delivery shall not be carried out by the user. It shall be carried out by our sales representative or the engineers who have been trained and qualified for this purpose by us in order to use the instrument safely and accurately.
- (b) Before installation, the user shall make preparations for satisfying the installation requirements in accordance with this instruction manual.
- (c) If relocation becomes necessary after initial installation (delivery), please contact the dealer from whom you purchased the instrument or our sales representative.

### **(2) After-sales Service**

- (a) For after-sales service, contact our sales representative or service office of our sales representative.

- (b) For service after the warranty period, consult our sales representative or service office of our sales representative with regard to a maintenance and inspection service contract. (Service will be available on a chargeable basis.)
- (c) The maintenance and consumables of the instrument can be supplied within the useful service life of the instrument (7 years). Even after the period of useful service life, the parts and units can be supplied (within 10 years after the date of initial use) so far as they are obtainable. However, this measure will not lead to an extension of the 7-year useful service life which is assured by the manufacturer. And, if a part or unit is unavailable due to the discontinuance of its manufacture, a substitute part or unit may be supplied, for which we request your understanding.
- (d) It may be impossible to supply the main unit components other than the maintenance parts and consumables due to the discontinuance of main-unit manufacture, etc. If the instrument becomes faulty, it might be irreparable due to lack of such components. In this case, the user is requested to stop operation and replace the instrument with a new one.

### **Technical Seminars and Training Courses for Users**

We offer technical seminars and training courses at either our or the user's facilities to ensure proper and safe operation of the analytical instrument to its full performance. For further information, contact our sales representative. (Applicants will be charged.)

## **Other Precautions**

### **1. Handling of Chemicals and Samples**

- (1) The user is responsible for following relevant legal standards and regulations in handling, storage and disposal of chemicals and samples used in analytical operations with this instrument.
- (2) Reagents, standard solutions and accuracy-control samples shall be handled, stored and discarded as instructed by the respective suppliers.
- (3) Samples that may have been infected with bacteria or viruses are not applicable to the instrument.)

### **2. Trademark Acknowledgments**

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# SAFETY SUMMARY



## General Safety Guidelines

Before using Hitachi Spectrophotometer, be sure to read the following safety instructions carefully.

The hazard warnings which appear on the warning labels on the product or in the manual have one of the following alert headings consisting of a safety alert symbol and a signal word DANGER, WARNING or CAUTION.



: A safety alert symbol. Precedes every signal word for hazard warnings, and appears in safety related descriptions in the manual. Be sure to observe all the safety messages following this symbol. Failure to do so could result in serious injury or even death.



**DANGER** : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** : Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.



**CAUTION** : Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.

**NOTICE**

: Indicates a hazardous situation which, if not avoided, can result in damage to property.

In addition to the above, the following signal word is used to indicate instructions for ensuring proper use of the product.

**NOTE:**

Indicates an instruction for ensuring correct use of the product and accurate analysis therewith.



# SAFETY SUMMARY

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## Common Safety Precautions

### Prior to Use

- Before using the instrument, be sure to read this instruction manual carefully to attain a full understanding of its operations.
- Keep the instruction manual handy nearby so it can be referred to whenever needed.
- Be sure to observe the procedures specified in the manual.
- Be sure to understand and follow all the safety instructions given in the manual.
- Be sure to observe all the hazard warnings attached to the instrument or provided in the manual. Failure to do so could result in personal injury or damage to the instrument.
- Be sure to follow all the methods of use instructed in the manual for proper application of the product.
- Absolutely avoid modifying the product, using non-specified parts, or removing safety devices as it could be hazardous.
- Do not perform any operation or action other than described in the manual.  
On occurrence of any trouble in the instrument, notify your nearest Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative.
- When using chemicals for the instrument, be sure to provide proper ventilation of the room. Inadequate ventilation could endanger human health. Checking the relevant Safety Data Sheets (SDS), handle each chemical properly. Wear appropriate safety goggles and protective gear so that chemicals will not come into direct contact with the eye or skin.



# SAFETY SUMMARY

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## Common Safety Precautions (Continued)

- Keep in mind that the hazard warnings in the manuals or on the product cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand. Always be alert and use your common sense.

### In Use

- If an abnormality such as unusual noise, odor, fuming or gas leakage occurs during operation of the instrument, immediately disconnect power to the instrument, and take proper safety measures as required. Then, notify your nearest Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative.

### Installation, Maintenance, and Relocation

- At the time of delivery, installation of the instrument shall be carried out by or under supervision of qualified service personnel of the manufacturer or its authorized service agent for ensuring safety and high accuracy in operation of the instrument. It is not permitted for the user to carry out installation.
- After completion of installation, check that all the standard parts are equipped. If the instrument is made active with any one of the standard parts not equipped, a failure could occur to result in a hazardous condition.  
If any item is missing or damaged or if you have any question, notify the installation personnel at site or your nearest Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative.



# SAFETY SUMMARY

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## Common Safety Precautions (Continued)

- The maintenance and checkup procedures to be taken by the user are only those described in the manual. When taking the maintenance and checkup procedures described in the manual, attain a clear understanding of them.  
Do not perform other maintenance and checkup procedures to avoid jeopardizing safety and causing troubles in the instrument.
- After installation, do not relocate the instrument. If the instrument is relocated, vibration or impact applied during relocation could cause a malfunction in the optical components that have been adjusted precisely.
- If any warning/caution label has become illegible due to deterioration with age or has been damaged due to any cause, notify your nearest Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative for replacement with a new one.
- The parts having a useful lifetime indicated in this manual must be replaced periodically as specified. If the instrument continues to be operated without replacing the life-limited parts as specified, the instrument might become faulty due to deterioration of parts, etc., causing a leak, fuming, combustion or other safety-related trouble.  
For other than the replacement procedures instructed in this manual, contact your nearest Hitachi High-Tech Science Corporation sales representative or service office of Hitachi High-Tech Science Corporation sales representative.
- For reducing a risk of trouble occurrence due to physical deterioration, it is requested to carry out the safety check (available on a chargeable basis) or replacement with a new one when the instrument has reached the end of its useful service life.



# SAFETY SUMMARY

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## Safety Instructions in This Manual

Shown below are the safety instructions contained in this manual and their relevant sections in it.

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### DANGER Indications

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The indication "⚠ DANGER" does not apply to this instrument.

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### WARNING Indications

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The indication "⚠ WARNING" does not apply to this instrument.

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### CAUTION Indications

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#### Fatigue due to Long Hours of Operation

- If you keep working with the display monitor and keyboard in the same posture for long hours, your eyes and body will be fatigued to jeopardize your health. When working with the display monitor for a long time, take a break for 10 to 15 minutes per hour for health of your eyes and body.

(Sections 1.1)



# SAFETY SUMMARY

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## NOTICE

### Electricity

- Make sure that power supply to the spectrophotometer is 100 V AC, 1 kVA or more (50 or 60 Hz). Fluctuation in voltage or noise on the power line would not only affect the spectrophotometer main unit adversely but may also cause an accident.
- Be sure to prepare a grounding wire together with power cables and confirm that the wire has a ground resistance of 100 Ω or less (Class D grounding construction in Electric Facility Technical Standards). If grounding is improper, the spectrophotometer is easily affected by external noise and floating voltage generated in it endangers physical safety.
- A high voltage circuit is built in the spectrophotometer. Never remove the covers other than required for operation.

### Fire

- Avoid smoking or using a flame in the vicinity of the spectrophotometer.

### Data Backup

- Data may become unusable in case of instrument failure or misoperation.  
It is recommended to transfer data on the hard disk to a medium such as floppy disk, MO disk, CD-R etc. periodically. The transfer of data is called backup.  
To avoid misoperation, secure a free space of 100 MB or so on the hard disk as a software work area at all times.



# SAFETY SUMMARY

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## NOTICE (Continued)

### Personal Computer (PC)

- Do not turn off the PC power supply alone. If the PC power supply is turned off during access to the hard disk or floppy disk, the PC may malfunction and the data or software stored in it may be destroyed. To turn off the PC power supply, be sure to complete the spectrophotometer control and data processing program (UV Solutions program) before taking the shutdown procedure for the system software (on PC control).

### Computer Viruses

- If programs or data has suddenly been destroyed, if an unexpected operation takes place or if an abnormal display appears on the screen, your personal computer may have been infiltrated by a computer virus. The computer virus is a rogue program that secretly invades a personal computer and operates it willfully while destroying memorized data.  
A program for eliminating the virus is called vaccine program. There is a possibility of contamination with a computer virus by downloading through communication a program including a computer virus, or by using an exchangeable recording medium such as a floppy disk that contains a computer virus. Also, it is possible to transmit the virus from one personal computer to another via communication or recording media. So avoid using a program or recording medium that might include a virus.  
Carry out check using a vaccine program if there is a possibility of contamination with a virus. But depending on the type of vaccine program, it may be impossible to eliminate the virus.  
It is therefore recommended to back up the contents of the hard disk beforehand. During measurement operation, do not use a vaccine program.  
Note that the preparation of a vaccine program and the elimination of a computer virus must be carried out by the user.



# SAFETY SUMMARY

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## NOTICE (Continued)

### Power Interruption

- A power failure or momentary voltage drop of the power supply due to lightning, etc. may cause failure of the personal computer used with the instrument and also damage the system software, application software and other data. To avoid such problems, it is recommended to use an AC uninterruptible power source (stated according to the Japanese Electronic Industry Development Association guidelines for protection against momentary power voltage drop in personal computers).

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APPENDIX G	PARAMETER SETTING RANGES FOR ANALYSIS METHOD .....
APPENDIX H	SAMPLING INTERVALS .....
APPENDIX I	PARAMETER SETTING RANGES FOR OPTIONS WINDOW.....
APPENDIX J	ERROR MESSAGE LIST .....
<b>INDEX.....</b>	<b>INDEX-1</b>

# 1. FUNCTIONS AND WINDOW CONFIGURATION

## 1.1 Functions

### CAUTION

#### Fatigue due to long hours of operation!

If you continue working with the display monitor in the same posture for long hours, your eyes and body will become fatigued to jeopardize your health. So when working with the monitor for a long time, take a break for 10 to 15 minutes every hour for the health of your eyes and body.

This program has the following measurement modes.

- Wavelength scan
- Time scan
- Photometry

#### [Wavelength scan]

- (1) Data in the specified wavelength intervals or at up to 12 specified wavelengths can be printed.
- (2) Measurement can be performed in the following data modes; transmittance (%T), absorbance (Abs), reflectance (%R)\*, sample-side energy (E(S))\* and reference-side energy (E(R))\*.  
(\* These modes are available only on certain models of spectrophotometer.)
- (3) The function of each function key in the wavelength scan mode can be used.  
Measurement: **F4**, stop: **F6**
- (4) Wavelength scan measurement can be repeated up to 99 times. Repetition interval is also settable.

#### [Time scan]

- (1) Rate calculation (kinetics) is performed.
- (2) Data in the specified time intervals or at up to 12 specified time points can be printed.

## 1.1 Functions

### [Photometry]

- (1) Calculation can be performed by the following methods; specified wavelength, area, peak height and peak area. A maximum of 20 standards are measured to prepare a calibration curve by polygonal line connection approximation or a regression curve by least squares method.  
A calibration curve can also be prepared according to the mean value in max. 20 standard measurements.
- (2) A calibration curve can be prepared again through remeasurement of specific standards.  
The calibration curve in the window can be graphically displayed and each point can be read with the cursor.
- (3) A calibration curve can be printed.  
A calibration curve can be prepared with its factor value entered.
- (4) Both measurement window and calibration curve are displayed on the same screen, so measurement can be carried out while watching the calibration curve.
- (5) According to the automatically calculated decisive factor value, the goodness of fit between the standard values and calibration curve can be judged.
- (6) Statistical calculation can be performed.  
The mean value and standard deviation (SD) of measured data can be calculated.
- (7) The upper and lower limit values can be judged.
- (8) Spectrum display in quantitative measurement  
Wavelength scan spectra can be displayed under data measurement by a photometric calculation method, peak height, peak area or differentiation.

### [Secondary processing of data]

The measured data can be saved. The saved data can be subjected to various data processings.

- (1) Spectrum tracing  
The photometric value at the cursor position selected on the presently displayed spectrum can be read.
- (2) Peak detection  
The peak and valley of the presently displayed spectrum are automatically detected.
- (3) Scale change  
The measured spectrum is expanded or contracted with its ordinate/abscissa scale changed.

- (4) Smoothing  
The measured spectrum is smoothed. This is effective for noise suppression.
- (5) Differentiation  
Spectral data is differentiated. The derivative order, smoothing order and number of data points are settable.
- (6) Spectrum calculation  
Spectra are subjected to four basic arithmetic calculations or a displayed spectrum is multiplied by a factor.
- (7) Area  
The area value of the specified spectrum region is calculated. Mean value is also calculable.
- (8) File conversion  
Data can be converted into an ASCII text file (\*.txt) or JCAMP-DX (\*.dx) file. Spectra and calibration curve graph can be saved in a Windows meta-file (\*.wmf).
- (9) Display and printout font setting  
Display and printout font, style and size are changeable.
- (10) Data reading  
Photometric value data in the data processing window and monitor window can be read.  
A maximum of 100 data can be read.
- (11) Collective specification of print items  
Print item setting for overlaid spectra is collectively specifiable.
- (12) Print item specification  
Items in the peak table are selectable for printout.
- (13) Setting of vertical or horizontal printing direction  
Data can be printed in the vertical or horizontal direction.
- (14) Collective spectrum printing  
Spectrum can be printed just by specifying a file.
- (15) Selection of spectra to be displayed  
Spectra to be overlaid are selectable.
- (16) Auto save mode ON/OFF setting  
This is settable in the sample name/comment input window.  
Whenever a sample table is used, the auto save mode is activated.
- (17) Data in each mode can be transferred to a Microsoft Excel program (provided that Microsoft Excel 2007 has been installed in your PC).
- (18) Spectral data, after copying to commercially available software such as Microsoft Word, can be subjected to change of scale, type of lines, color, etc. in a Microsoft Word program.
- (19) A Report Generator (sold separately) can be used.

## 1.2 Installation of UV Solutions Program

### 1.2 Installation of UV Solutions Program

#### 1.2.1 Specification of Personal Computer

In order to operate the UV Solutions 4.2 program software by way of Microsoft Windows 7 Professional (32bit/64bit) and Microsoft Windows 10 Pro (64bit), the following specification is required for the personal computer.

OS	:	Microsoft Windows 7 Professional (32bit/ 64bit) Microsoft Windows 10 Pro (64bit)
CPU	:	A CPU capable of operating the above OS
Main memory	:	2 GB or more (Windows 7) 4 GB or more (Windows 10)
Hard disk	:	Empty space of 5 GB or more
CD-ROM drive	:	Speed of 24× or higher
Interface	:	USB1.1 or USB2.0 × 1 minimum, or RS-232C × 1 minimum (dependent on connection method with instrument)
Compatible Office :		Microsoft Office 2007/2010/2013/2016

#### 1.2.2 Setup of UV Solutions Program

Take the following procedure for installing the program.

**NOTE:** Install the program before connecting the spectrophotometer.

##### (1) In case of Windows 7

After inserting the CD for installation into the drive, click the **Start** button of Windows 7 on the desktop window and select “Computer”.

##### In case of Windows 10

Click Start button of Windows 10 on the desktop window, click “File Explorer” with the right-hand button of the mouse.

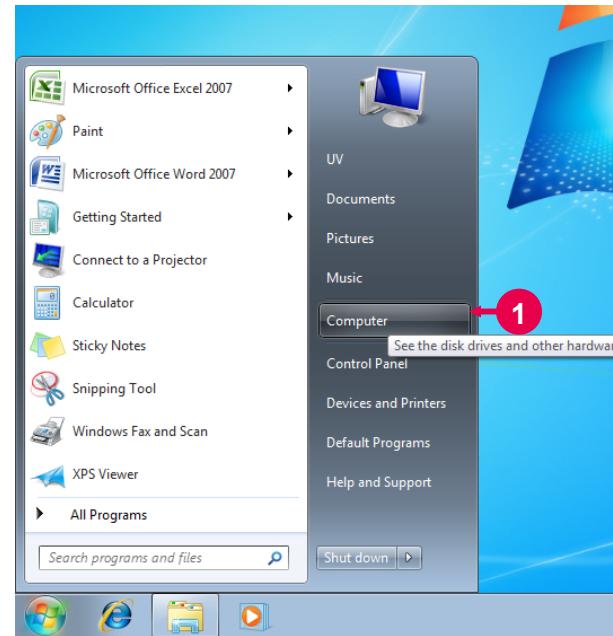


Fig. 1-1 (Windows 7)

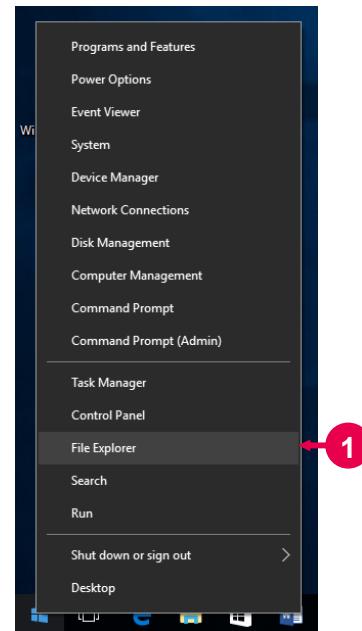


Fig. 1-1 (Windows 10)

## 1.2 Installation of UV Solutions Program

(2) The Computer window will appear.

Select the drive in which the CD is inserted (“DVD/CD-RW drive (D:)” of “Devices with Removable Storage (1)” in Fig. 1-2).

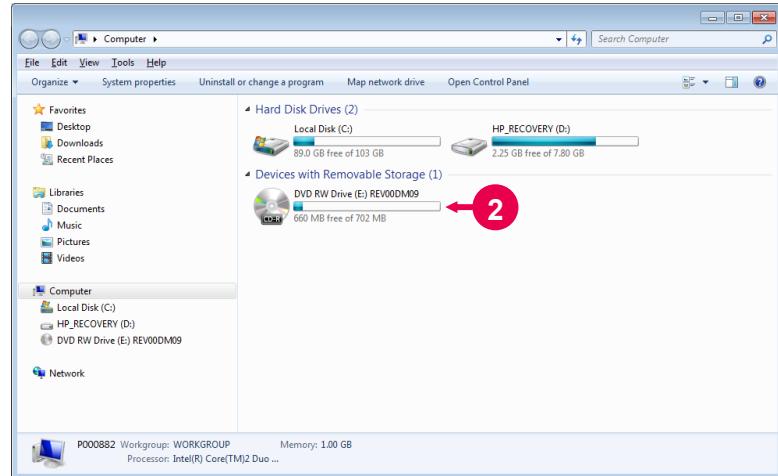


Fig. 1-2 (Windows 7)

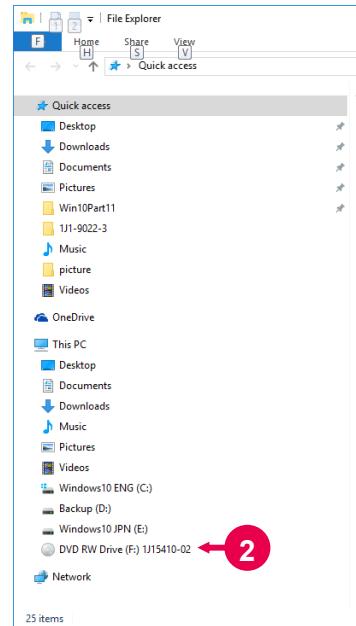


Fig. 1-2 (Windows 10)

- (3) The contents of the CD-ROM will now appear.  
Double-click the “UV Solutions 4.2” folder.

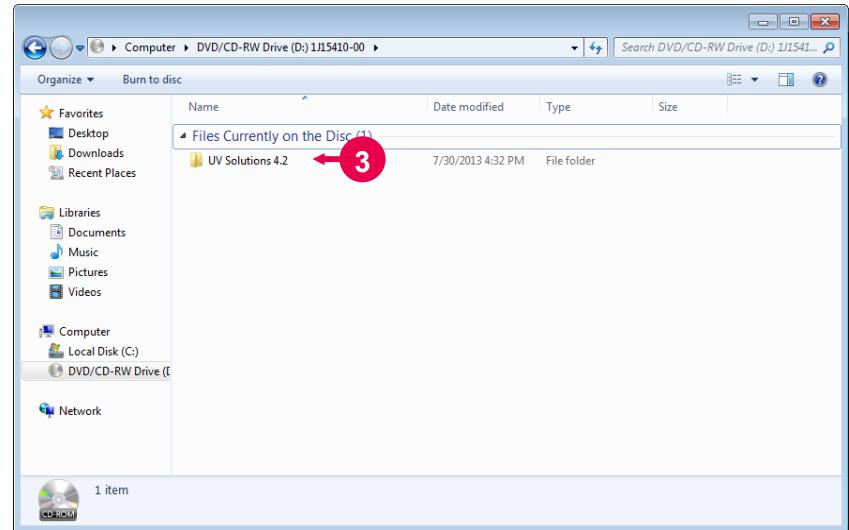


Fig. 1-3 (Windows 7)

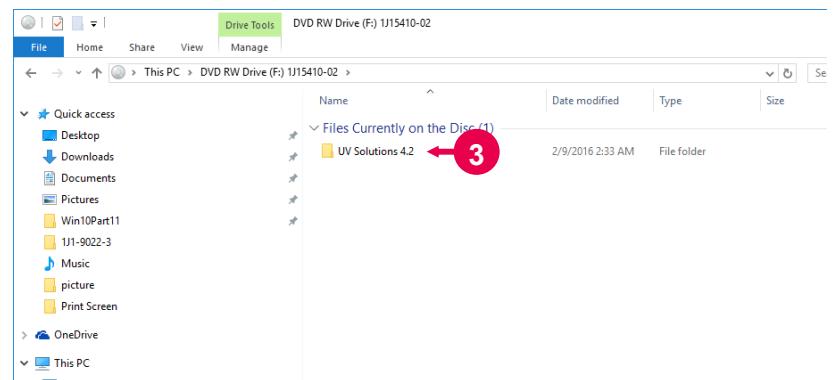


Fig.1-3 (Windows 10)

## 1.2 Installation of UV Solutions Program

- (4) The contents of the folder will appear.  
Double-click “setup.exe”.

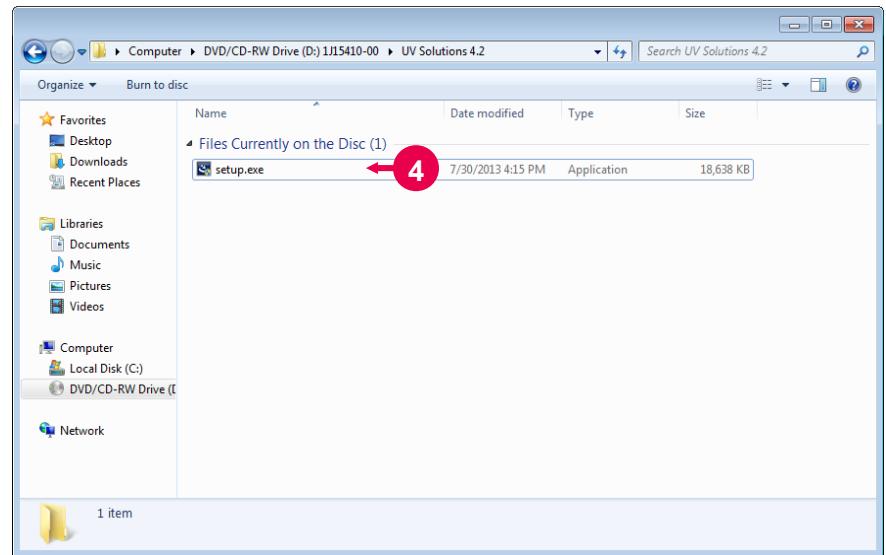


Fig. 1-4 (Windows 7)

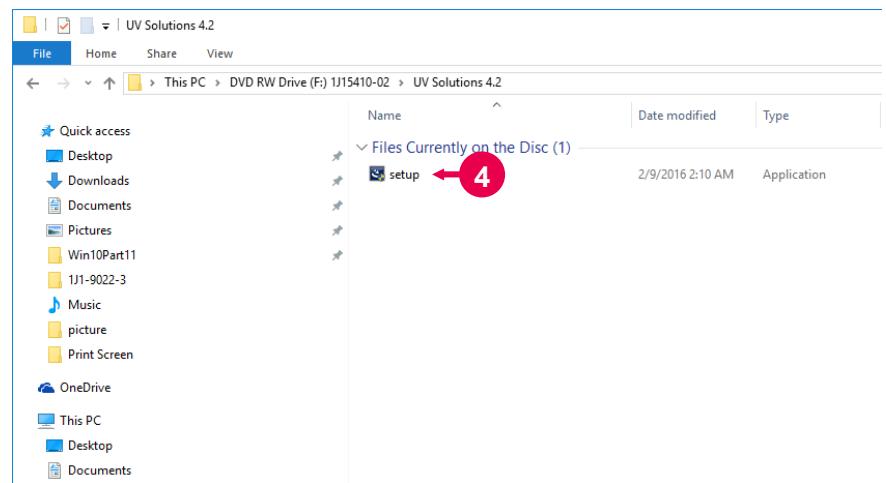


Fig. 1-4 (Windows 10)

- (5) The Setup window for UV Solutions 4.2 will appear.  
(When the “User Account Control” dialog appears, select **Yes.**)

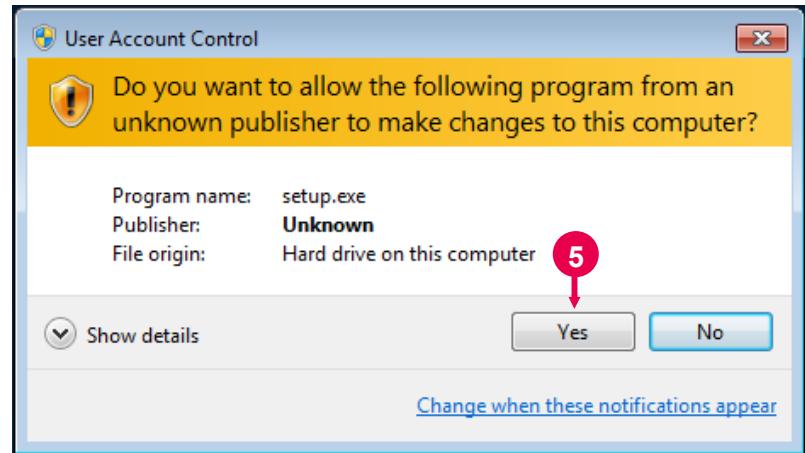


Fig. 1-5 (Windows 7)

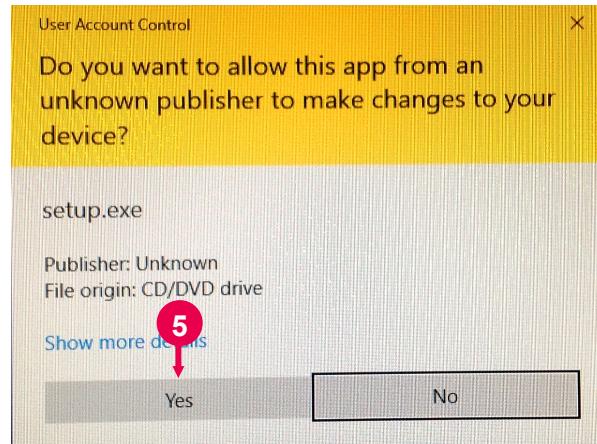
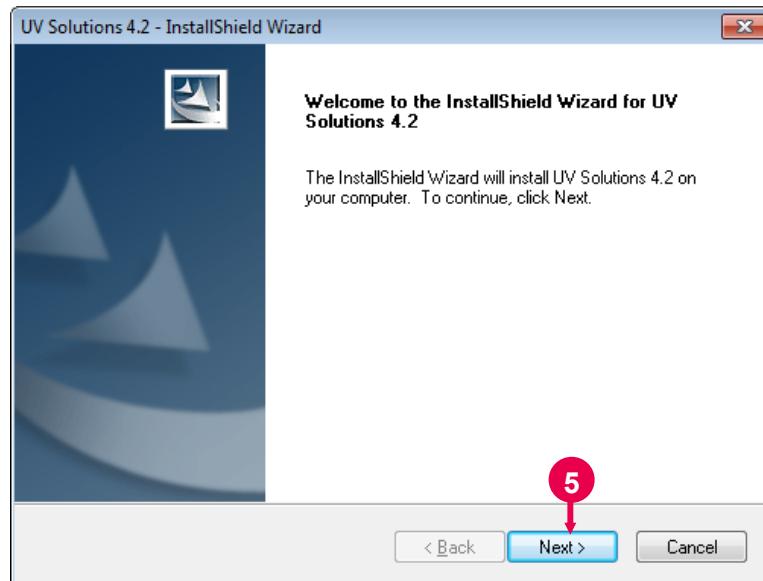


Fig. 1-5 (Windows 10)

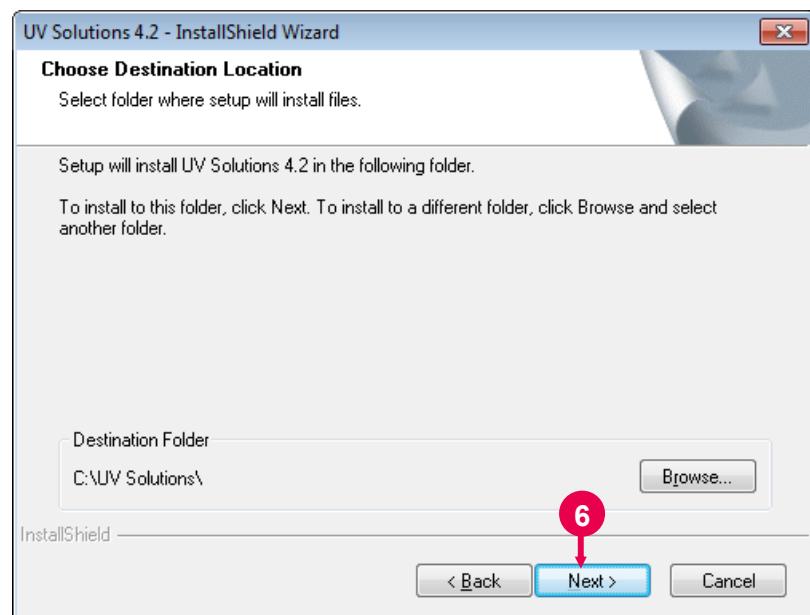
## 1.2 Installation of UV Solutions Program

Click **Next** button on the Setup window for UV Solutions 4.2.



**Fig. 1-6**

- (6) The window for selecting the installation destination will now appear.  
Click **Next** button here.



**Fig. 1-7**

- (7) The installation starts.

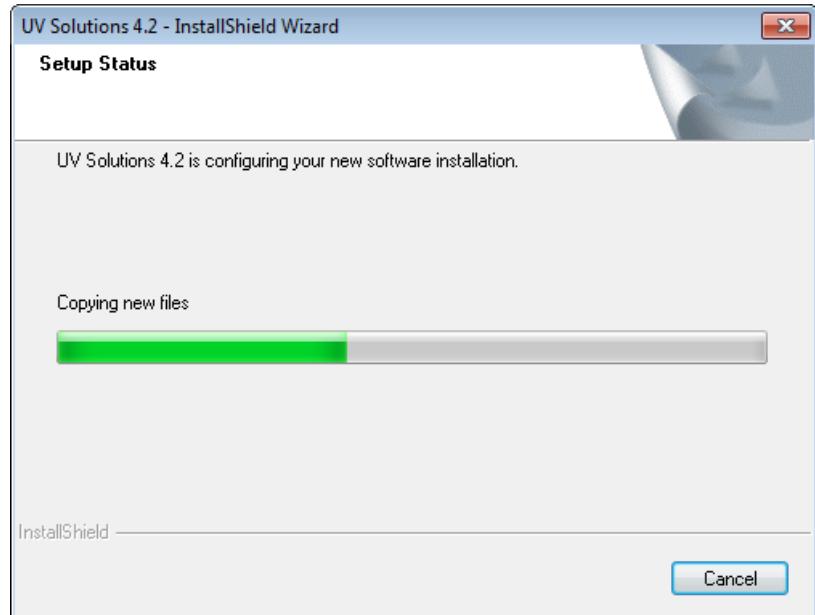


Fig. 1-8

- (8) The installation completion window now appears.

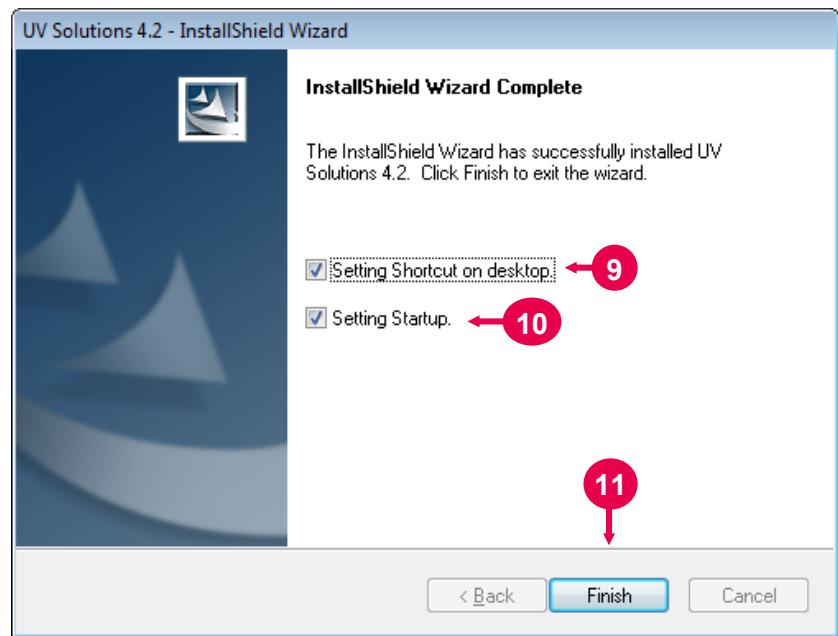


Fig. 1-9

- (9) If you wish to set a shortcut on desktop, put a check mark at **Setting Shortcut on desktop.** If you don't want to set the shortcut, remove the check mark from that item.

## 1.2 Installation of UV Solutions Program

- (10) If you want to set Startup, put a check mark at **Setting Startup**. And if you don't want to set it, remove the check mark from that item.
- (11) Click **Finish** button.
- (12) Remove the CD from the CD-ROM drive.

### 1.2.3 Re-installation of Program

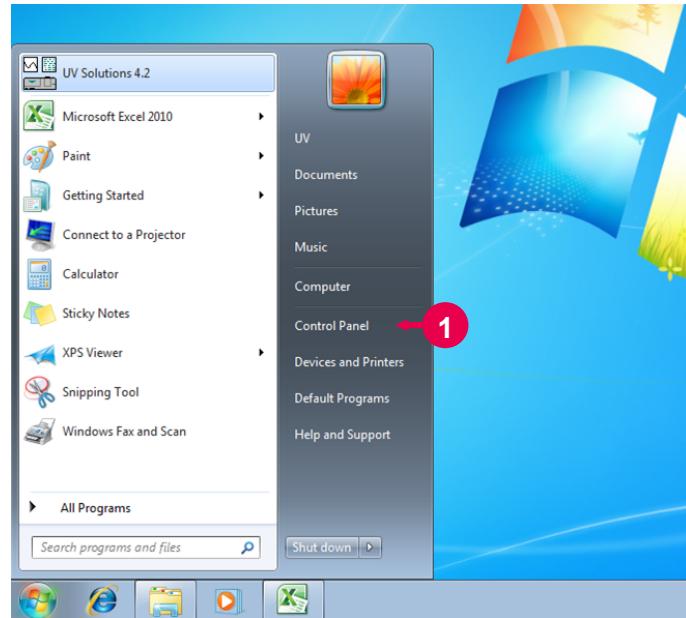
The program can be re-installed after once uninstalling it.  
Take the following procedure for uninstalling the program.

(1) In case of Windows 7

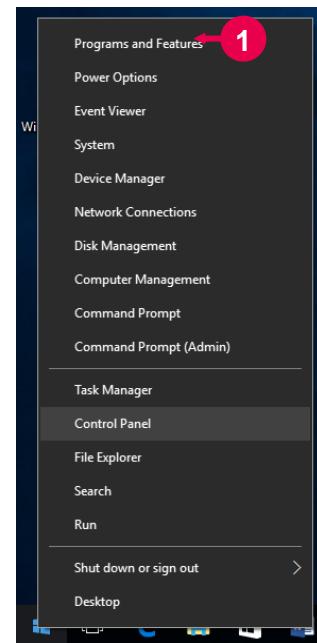
Click the **Start** button of Windows 7 on the desktop window and select “Control Panel”.

In case of Windows 10

Click Start button of Windows 10 on the desktop window, click “Control Panel” with the right-hand button of the mouse.



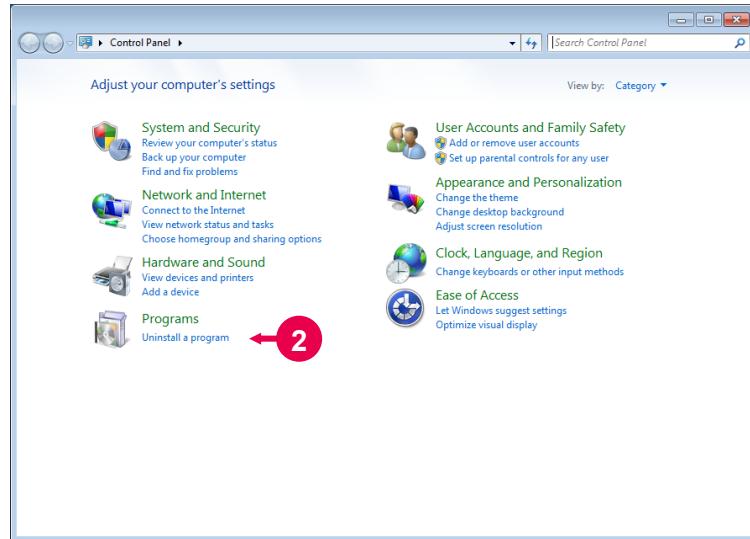
**Fig. 1-10 (Windows 7)**



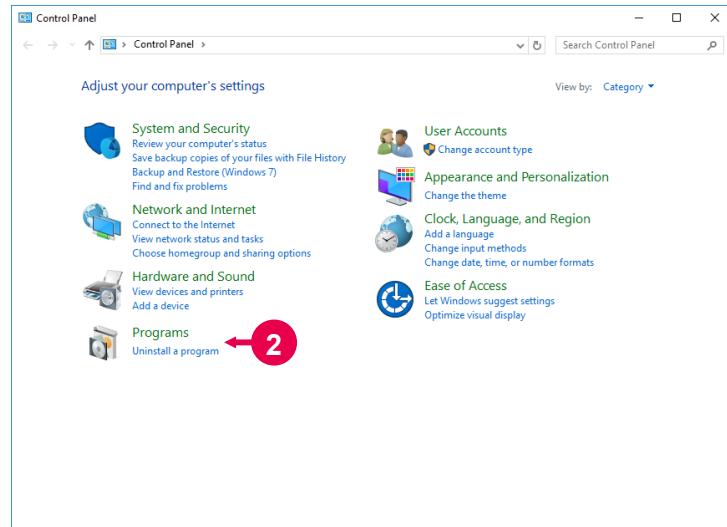
**Fig.1-10(Windows 10)**

## 1.2 Installation of UV Solutions Program

- (2) The Control Panel window will appear.  
Select “Uninstall a program”.



**Fig. 1-11(Windows 7)**



**Fig. 1-11(Windows 10)**

- (3) The “Uninstall or change a program” window will appear. Select “UV Solutions 4.2” and click the **Uninstall** button.

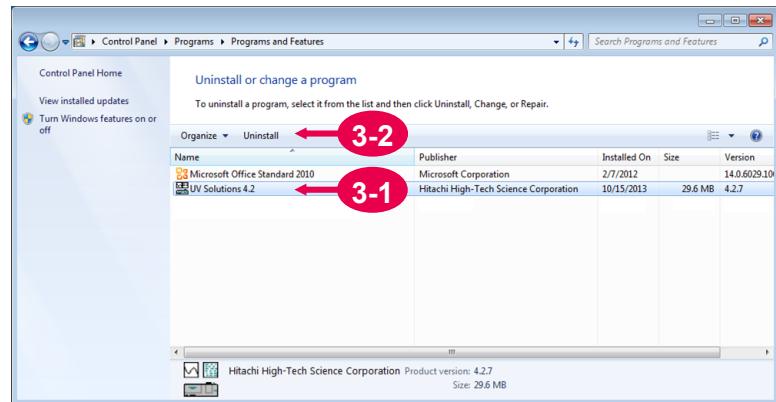


Fig. 1-12 (Windows 7)

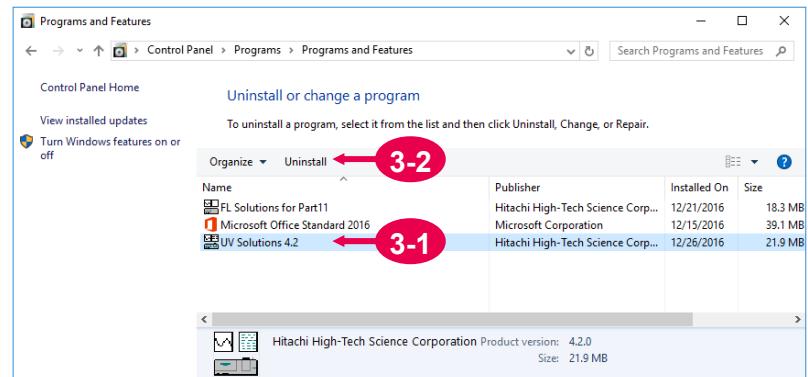


Fig. 1-12 (Windows 10)

## 1.2 Installation of UV Solutions Program

- (4) A confirmation window will now appear. Select **OK** and the uninstallation will continue.

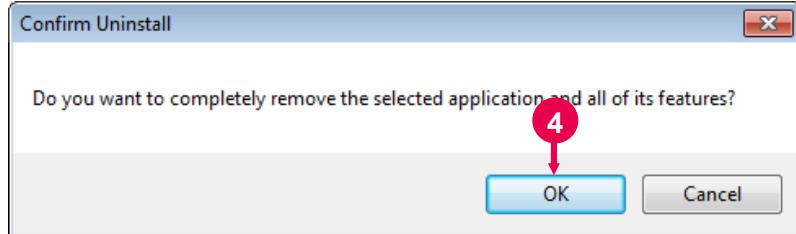


Fig. 1-13 (Windows 7)

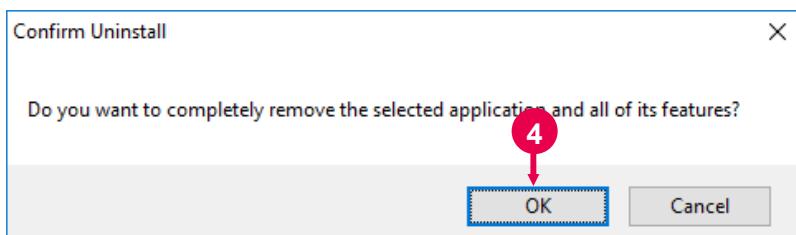


Fig. 1-13 (Windows 10)

- (5) When the uninstallation is finished, the "Maintenance complete" window will appear. Click **Finish** and the uninstallation will end.

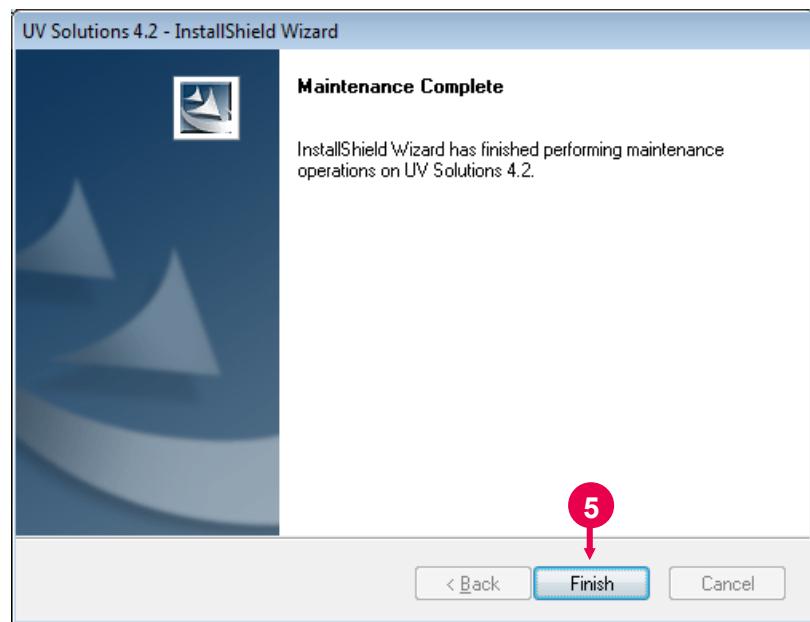


Fig. 1-14

- (6) When the uninstallation is completed, reinstall the UV Solutions 4.2 program according to the procedure in Setup of UV Solutions Program in 1.2.2.

#### 1.2.4 Setup of USB Driver (excluding Model U-1900, U-2900, U-2910, U-4100 spectrophotometers)

After setting up the UV Solutions system, you are required to set up the USB driver for the purpose of communication with the U-5100, U-3900 or U-3900H spectrophotometer.

- (1) Make sure the power to the spectrophotometer main unit is turned OFF, then connect the USB communication cable between the spectrophotometer and PC. (Check that the USB cable is connected between the port marked "PC" on the spectrophotometer and the PC. Set the remote selector switch on the U-5100 at "Remote". In the case of the U-5100, refer to the figure in section 2.2.1 of the U-5100's instruction manual.) Now turn ON the power switch of the spectrophotometer main unit.
- (2) In case of Windows 7  
"Found New Hardware" appears at the bottom right of the window. Then "Device driver software was not successfully installed" will appear.  
Proceed as is to the next step.

##### In case of Windows 10

Proceed as is to the next step.

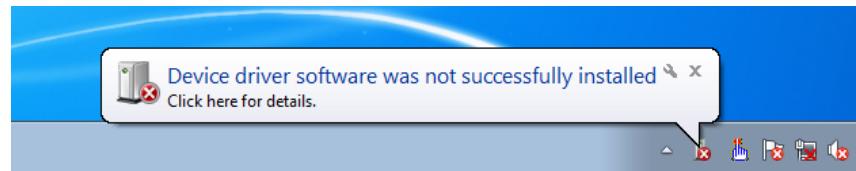


Fig. 1-15 (Windows 7)

## 1.2 Installation of UV Solutions Program

### (3) In case of Windows 7

Click **Start** button of Windows 7 on the desktop window, click “Computer” with the right-hand button of the mouse, and select “Properties”.

### In case of Windows 10

Click Start button of Windows 10 on the desktop window, click “Device Manager” with the right-hand button of the mouse. Next please advance towards (5).

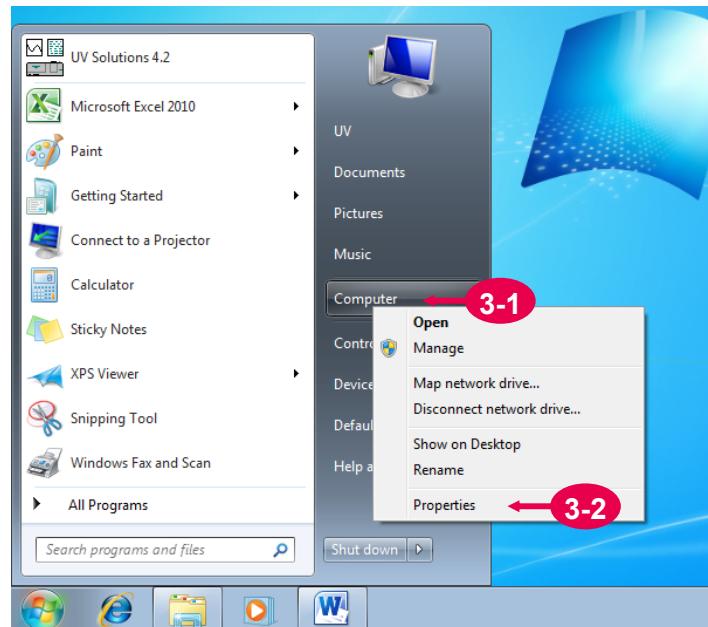


Fig. 1-16 (Windows 7)

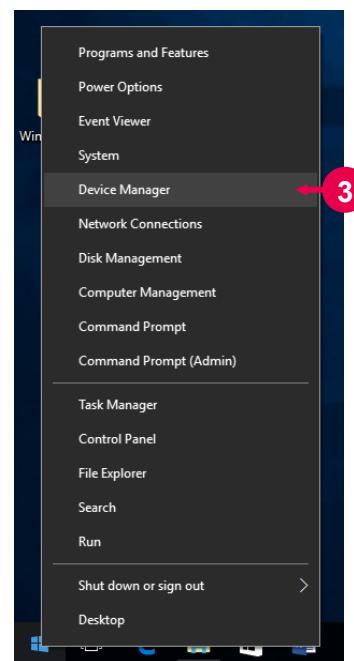


Fig. 1-16 (Windows 10)

(4) In case of Windows 7

The “View of basic information about your computer” window will now appear. Select “Device Manager”. (When the “User Account Control” dialog appears, select **Yes.**)

In case of Windows 10

Proceed as is to the next step.



Fig. 1-17

## (5) The Device Manager window will appear.

- In the case of U-5100 spectrophotometer:  
Double-click “Hi-Speed USB ASSP” under “Other devices”.

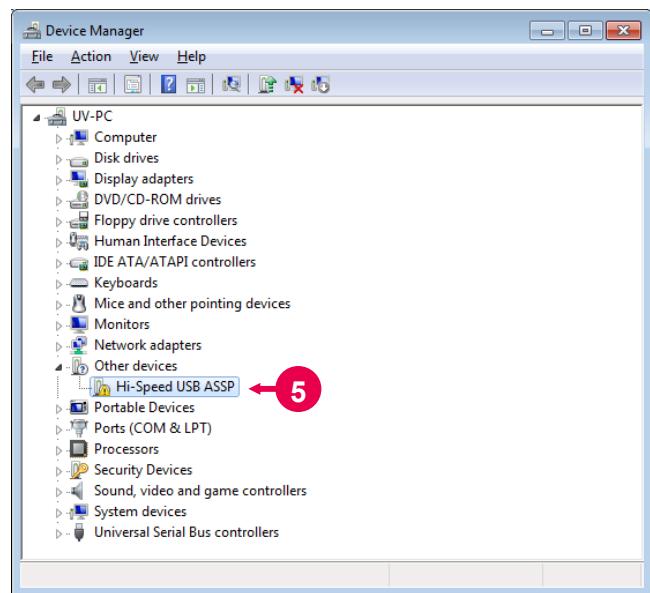


Fig. 1-18

## 1.2 Installation of UV Solutions Program

- In the case of U-3900, U-3900H spectrophotometer:  
Double-click “Unknown device” under “Other devices”.

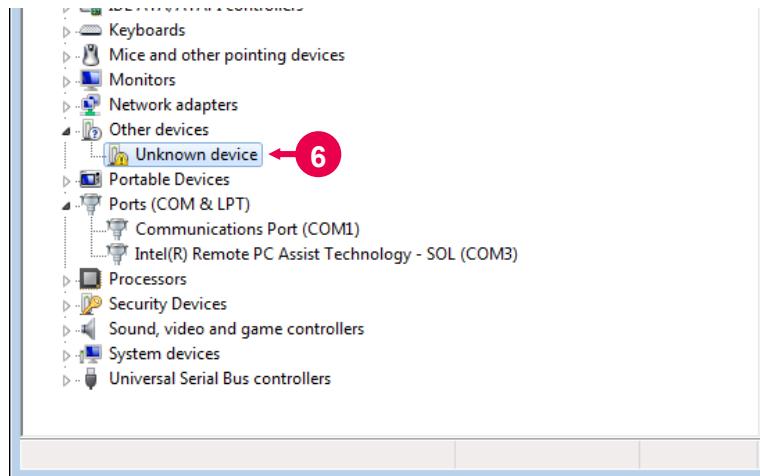


Fig. 1-19

- (6) The Properties window will appear.  
Click the “Driver” tab on Properties window and then click **Update Driver...** button.

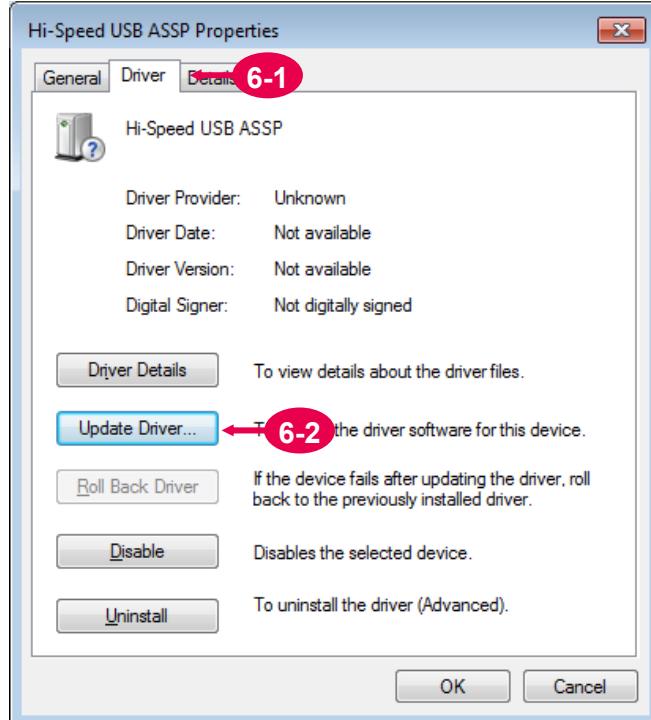


Fig. 1-20

- (7) The Update Driver Software window will now appear. Click "Browse my computer for driver software."

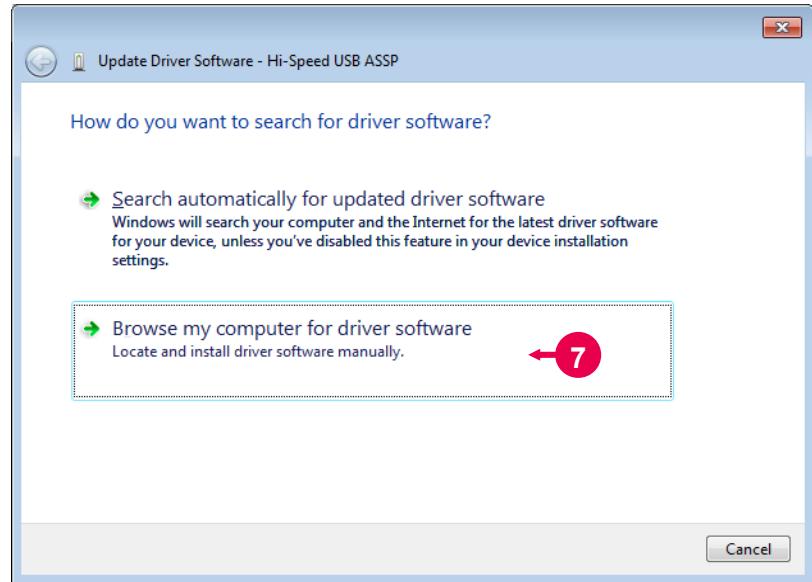


Fig. 1-21

- (8) Select "Browse..." beside "Search for driver software in this location."

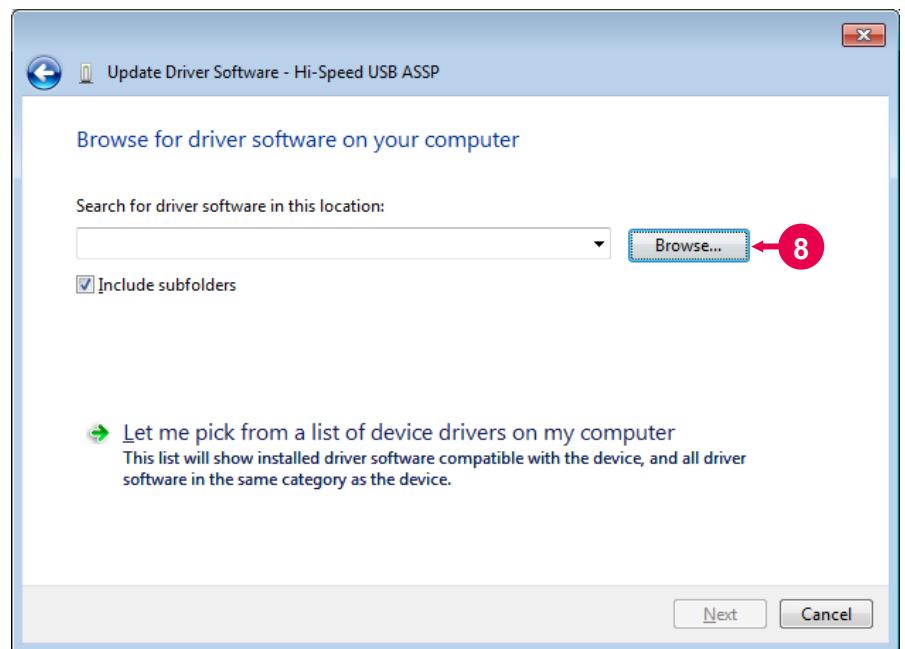


Fig. 1-22

## 1.2 Installation of UV Solutions Program

- (9) Select the folder (usually C:\UV Solutions) in which the UV Solutions 4.2 program is installed, and click **OK**.

※ PC Windows 10 (64bit) C:\UV Solutions\Drivers\USBx64  
PC Windows 7 (64bit) C:\UV Solutions\Drivers\USBx64  
PC Windows 7 (32bit) C:\UV Solutions\Drivers\USB

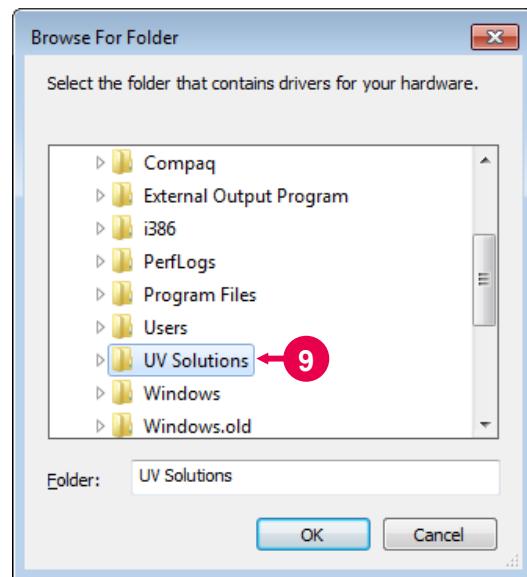


Fig. 1-23 (Windows 7)

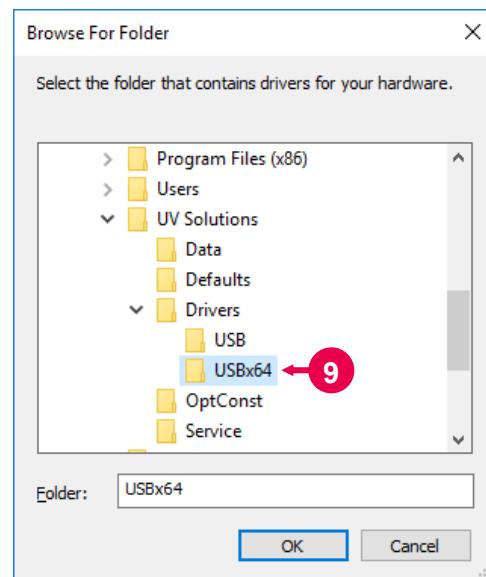


Fig. 1-23 (Windows 10)

- (10) Select “Search for driver software in this location” and check that the folder opens.  
Click **Next** and install the driver.

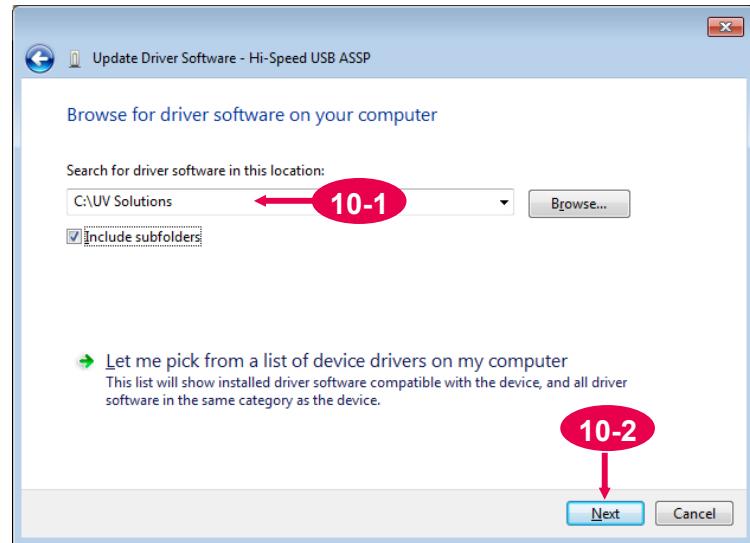


Fig. 1-24

## 1.2 Installation of UV Solutions Program

### (11) In case of Windows 7

When the Windows Security window opens, select “Install this driver software anyway” and continue the driver installation.

### In case of Windows 10

When the Windows Security window opens, select “Install” and continue the driver installation.

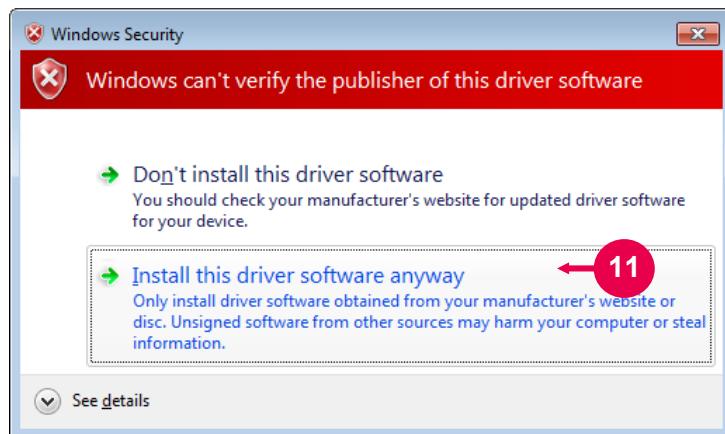


Fig. 1-25 (Windows 7)

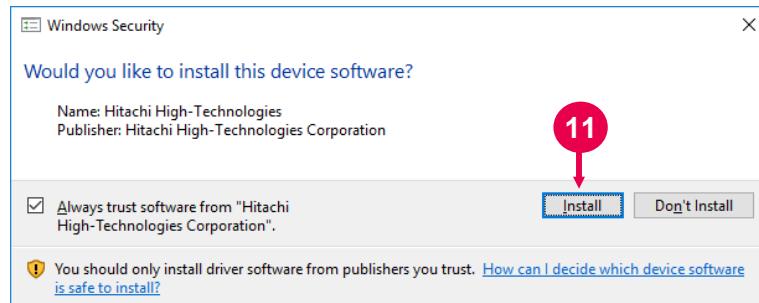


Fig. 1-25 (Windows 10)

(12) The following window appears during the driver installation.

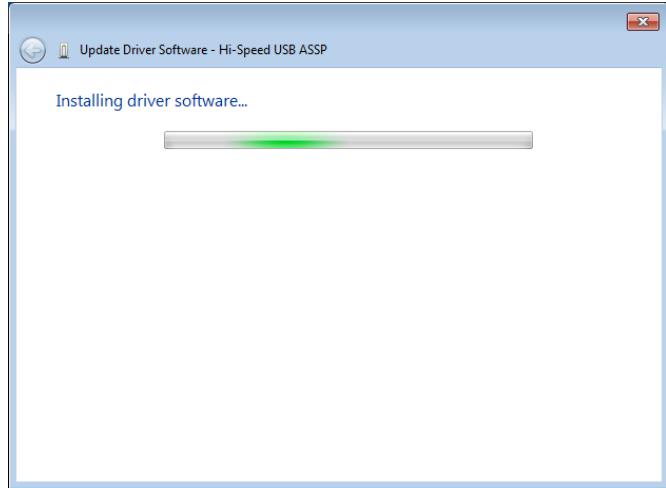


Fig. 1-26

(13) When the driver installation is finished, the message "Windows has successfully updated your driver software" will appear. Click **Close** button and driver installation is completed.

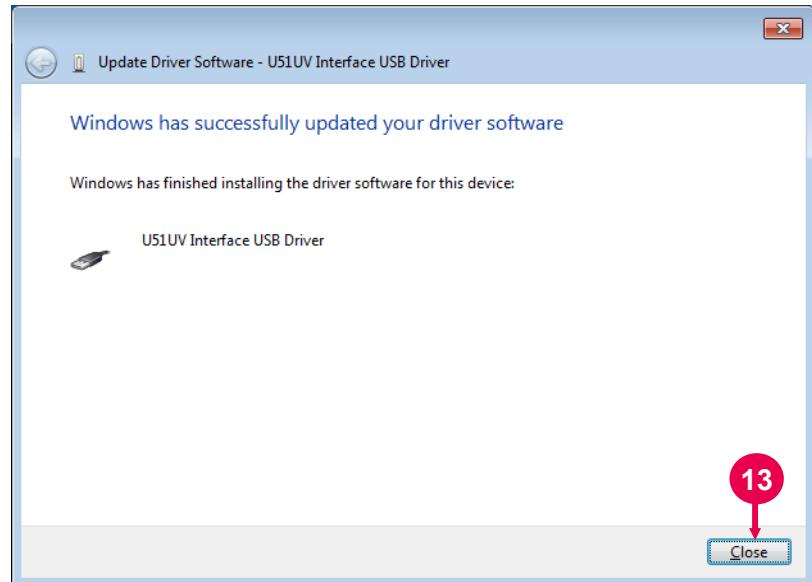


Fig. 1-27

**NOTE:** If the connection port of the USB cable is changed, the window shown in Fig. 1-15 will appear, and the setup will have to be made again. Repeat the preceding steps 3 to 13 in this case.

## 1.3 Starting the UV Solutions Program

### 1.3 Starting the UV Solutions Program

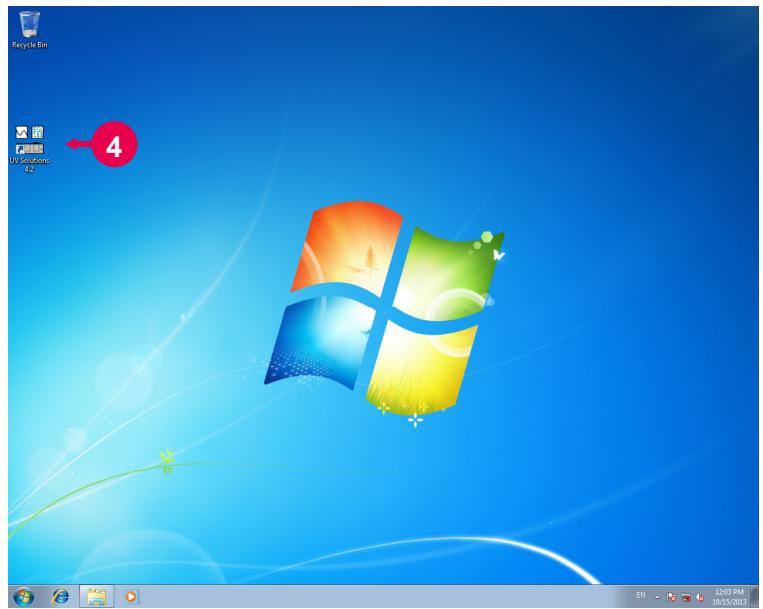
Take the following procedure for starting the UV Solutions 4.2 program. At this point, keep the power to the spectrophotometer main unit and computer (PC) turned OFF.

- (1) In the case of Model U-5100 and U-3900/U-3900H, check that the USB cable is connected between the port marked "PC" on the spectrophotometer and the PC.  
(Set the remote selector switch of the U-5100 at "Remote". Refer to the figure in section 2.2.1 of U-5100's instruction manual.)  
In the case of Model U-1900, U-2900/U-2910/U-4100 and UH4150AD+, check that the spectrophotometer and computer (PC) are connected via RS-232C cable. (Set the remote selector switch of U-1900 and U-2900 at "Remote".) For details on the connecting cables and connection method, refer to the spectrophotometer's instruction manual.
- (2) Turn ON the PC power supply and wait until Windows 7 is started.
- (3) When the startup of PC is finished, turn ON the power supply for the spectrophotometer main unit.

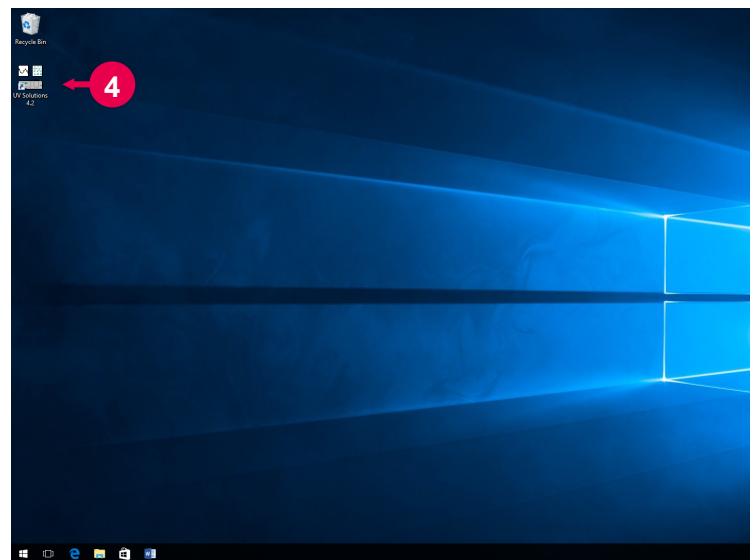
**NOTE:** If power is turned ON to the spectrophotometer main unit prior to starting up the PC, the USB connection will not be recognized and communication will not be possible. In such case, turn OFF power to the spectrophotometer once, start up the PC, and then turn ON power to the spectrophotometer again.

- (4) There are two methods of starting up the UV Solutions 4.2 program. Select whichever method you wish to use.

- (a) Normally, the program is started by double-clicking the UV Solutions 4.2 icon on the desktop.



**Fig. 1-28 (Windows 7)**



**Fig. 1-28 (Windows 10)**

### 1.3 Starting the UV Solutions Program

- (b) The other method is to click the **Start** button of the desktop and select All Programs – Hitachi Applications – UV Solutions 4.2.

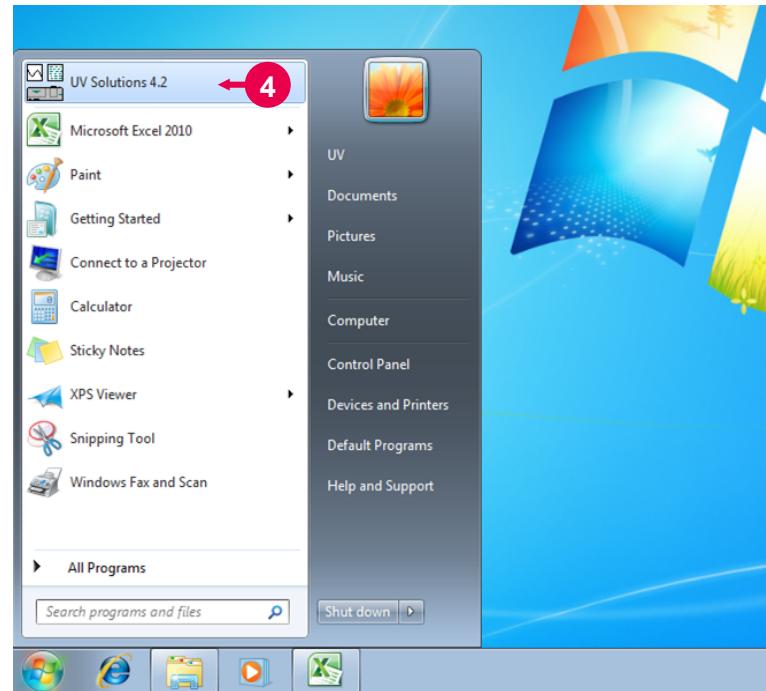


Fig. 1-29 (Windows 7)

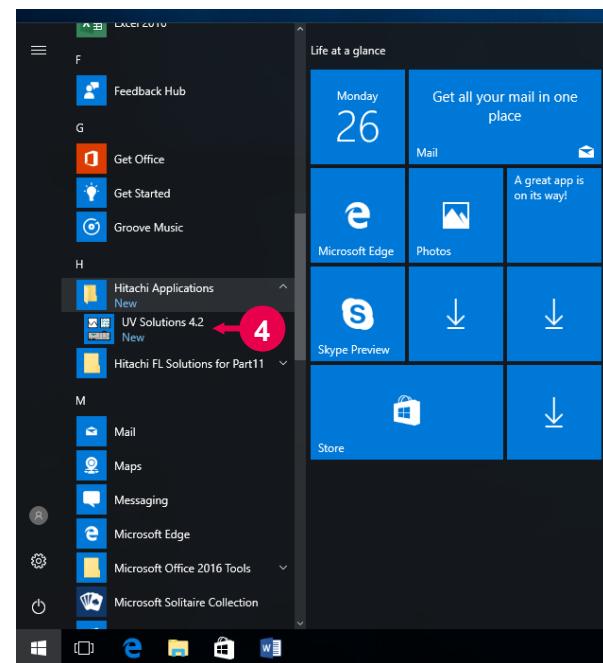
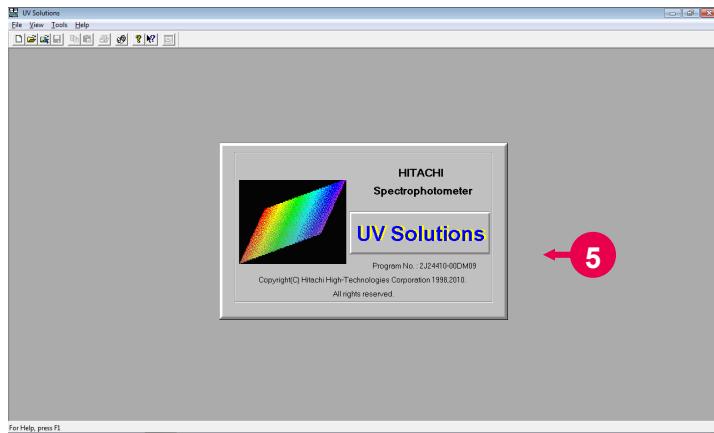


Fig. 1-29 (Windows 10)

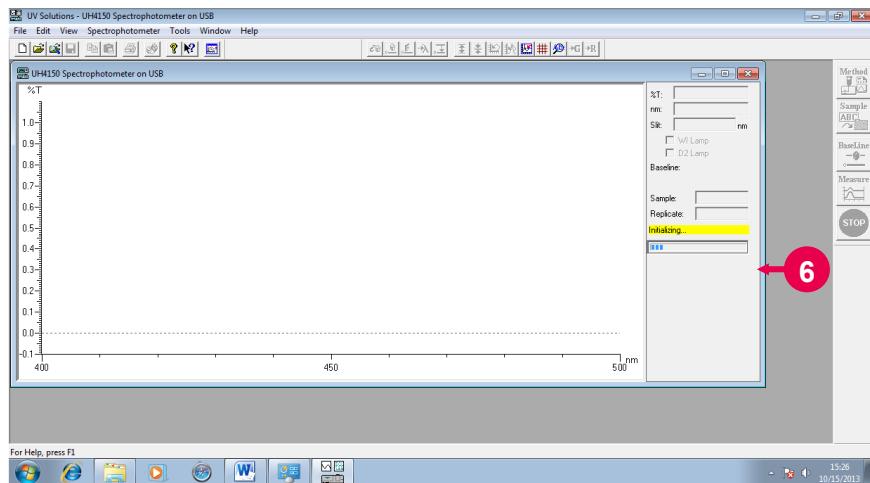
- (5) When the computer recognizes the spectrophotometer connected to the PC, a window as shown in Fig. 1-30 will appear.

The UV Solutions 4.2 program is started automatically.



**Fig. 1-30**

- (6) An Initializing gauge is displayed as shown in Fig. 1-31 whereby the progress of initialization can be visually checked.



**Fig. 1-31**

On execution of initialization, the following items are automatically self-diagnosed in sequence.

- ROM
- RAM
- Wavelength drive mechanism
- WI lamp lighting (except for U-5100)

### 1.3 Starting the UV Solutions Program

- D<sub>2</sub> lamp lighting (except for U-5100)
- Xe flash lamp lighting (only for U-5100)
- Slit mechanism (except for U-1900, U-5100, U-2900, U-2910)
- Chopper (except for U-1900, U-5100, U-2900, U-2910)

If an abnormality occurs in any of the above functions, an error will be indicated. In this case take a corrective measure with reference to the error messages in Appendix I. Or, contact our local service representative if necessary.

**NOTE:** If the spectrophotometer is not connected to the communication port or if it is connected but its power is not turned on, the monitor window (on which measurement can be executed) will not appear. However, functions other than those for measurement are usable. For measurement, first check the cable connection and then turn on the power to the spectrophotometer. And from the Tools (T) menu, select the Instruments (I) command. When the spectrophotometer has been selected and connected, a window as shown in Fig. 1-31 will appear.

- (7) When the initialization is completed, a window as in Fig. 1-32 will appear.

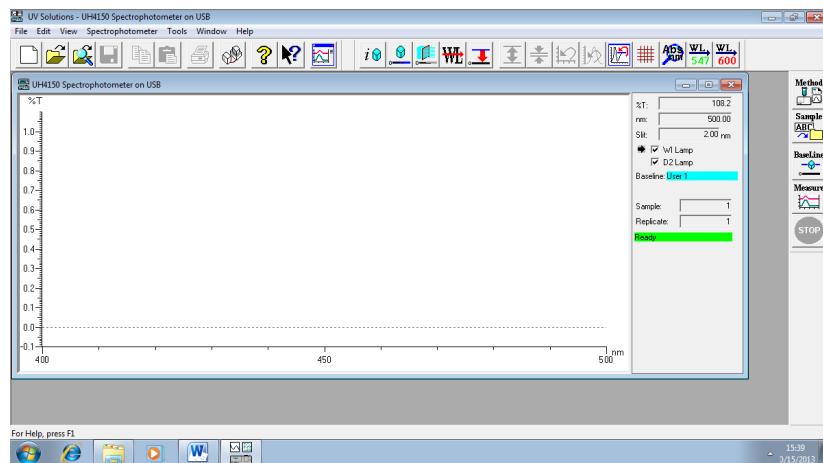


Fig. 1-32

## 1.4 Select spectrophotometer and enter serial number

When connecting U-2900 / U-2910 / U-3010 / U-3310 / U-3501 / U-4001, it is necessary to select the name of the photometer. Select [Tools]-[Instrument] and click the instrument name. Select the connected instrument.

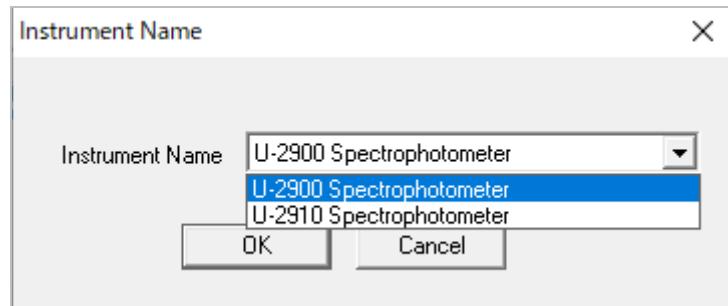


Fig. 1-33 (for U-2900)

After making your selection, click **OK**.  
Click the **serial No.** and enter the serial No. attached to the instrument body.

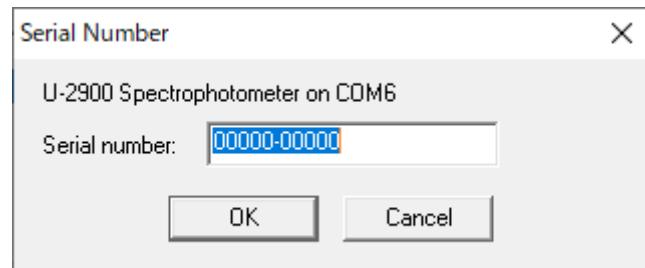


Fig. 1-34

After entering the serial No., click **OK**.

## 1.5 Window Configuration

### 1.5 Window Configuration

Although the windows is using Windows 7, please operate Windows 10 similarly.

#### 1.5.1 Basics of Window Operation

This manual describes a number of methods for activating a function. For implementation of those methods, explanation is given on the naming described below.

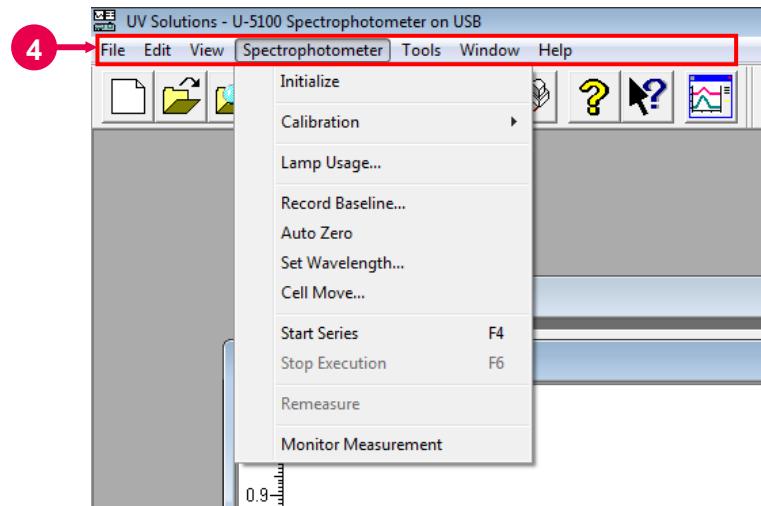


Fig. 1-35 Menu Bar and Commands

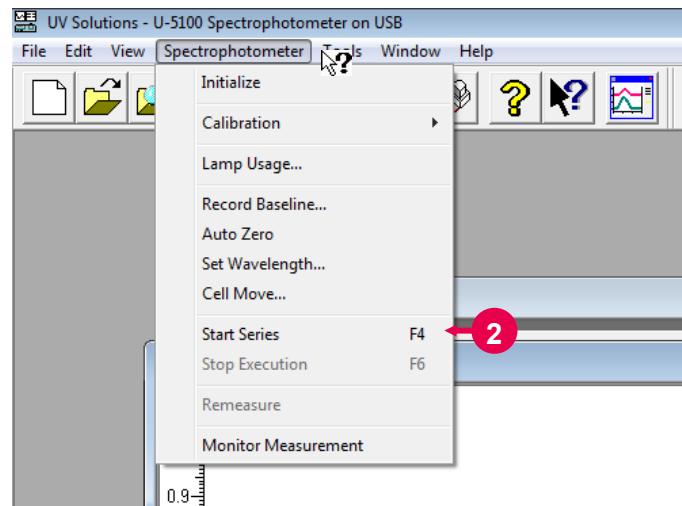
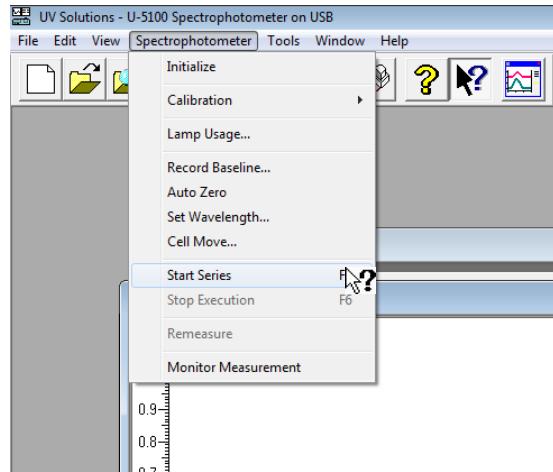


Fig. 1-36 Example of Start Series Command Help Indication (step (2))



**Fig. 1-37 Example of Start Series Command Help Indication (step (3))**

(1) Menu Bar

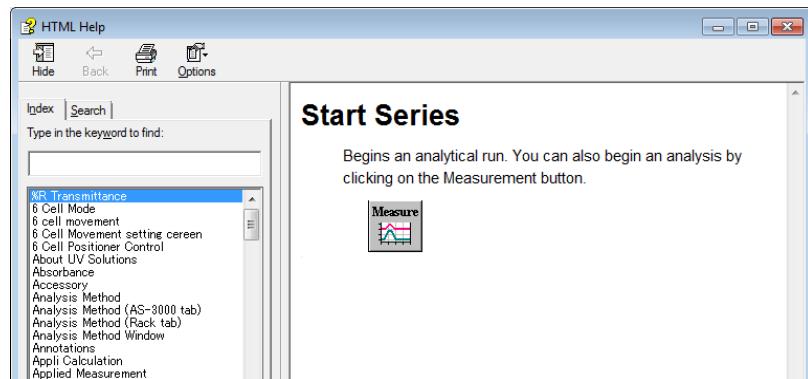
- The menu bar is the row of menu names such as “File (F)” and “Edit (E)”.

(2) Commands

- Commands are the functions selectable in each menu. Indicated in Fig. 1-35 is the “Start Series (S) command in Spectrophotometer (S) menu”.
- A menu or command is selectable by either of two methods
  - Moving the mouse pointer to the desired menu and clicking it.
  - Pressing the alphabetic character in parentheses after the desired menu name while holding down Alt key, and then pressing the alphabetic character in parentheses after the desired command name.
- Description of command functions can be made as follows.

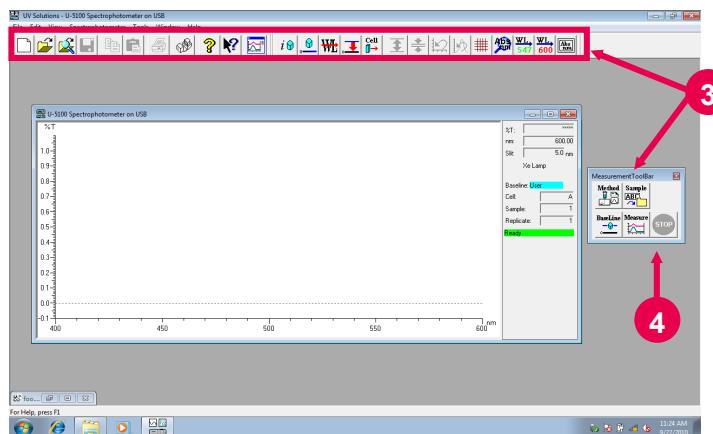
## 1.5 Window Configuration

- 1) Click the  (Help) button. The mouse pointer changes to .
- 2) Bring the mouse pointer  to the desired menu item and click the left-hand button. (Fig. 1-36)
- 3) When the pull-down menu appears, bring the mouse pointer  to the desired command position and click the left-hand button. (Fig. 1-37)



**Fig. 1-38 Example of Start Series Command Help Indication (step (4))**

- 4) Help in relation to the command function is indicated. (Fig. 1-38)



**Fig. 1-39 Toolbar**

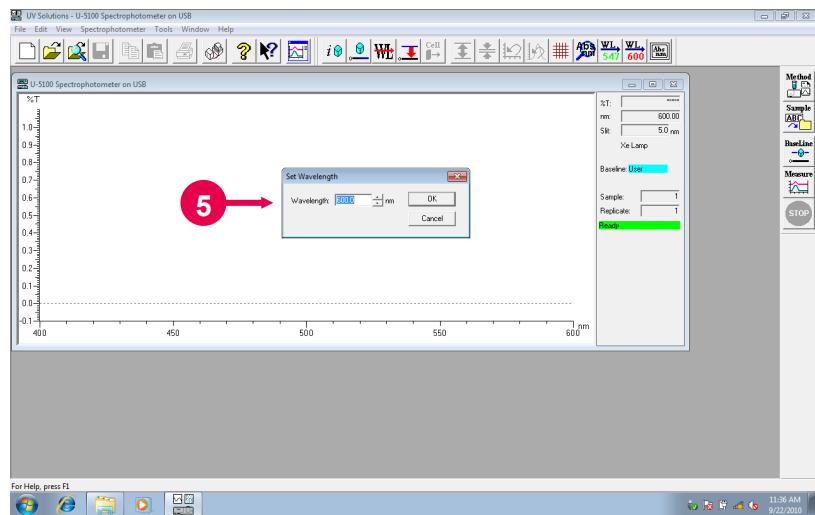
### (3) Toolbars

- Toolbars contain a group of tool buttons such as .

#### (4) Tool Buttons

- Tool buttons are used to execute command functions.

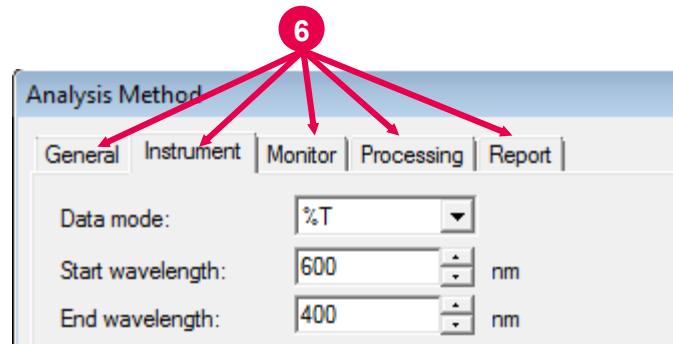
- Use of is expressed as “button on measurement toolbar” or “ (Edit Method) button”.
- For details on each button, refer to subsection 1.4.4.



**Fig. 1-40 Dialog Box**

#### (5) Dialog Box

- Clicking the (Set Wavelength) button on the instrument toolbar displays a small window as shown in Fig. 1-40. This window is called a “dialog box”.



**Fig. 1-41 Tab**

## 1.5 Window Configuration

### (6) Tab

- Tabs are used in the analytical condition setting window and properties window.
- Click a tab for changing the display. Each tab calls out a number of items for setting. In Fig. 1-41, “Instrument” tab has been selected.

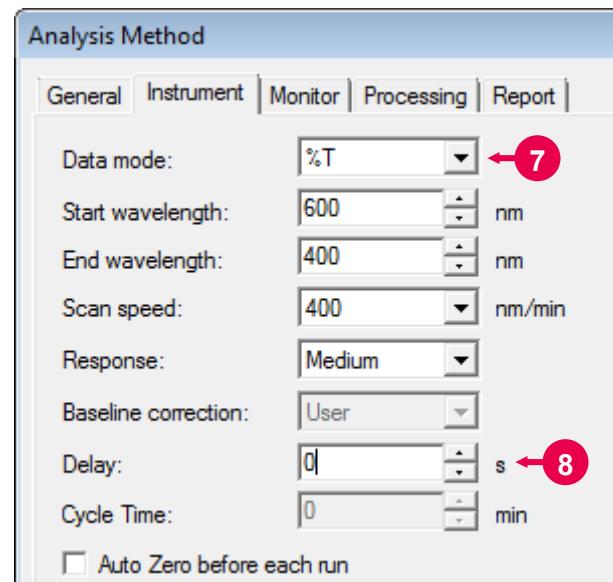


Fig. 1-42 Combo Box and Spin Buttons

### (7) Combo Box

- Selection is permitted from the preset conditions. The desired condition is selectable by clicking .

## (8) Spin Buttons

- These buttons are used for entering a numeral.  
Click or for the desired setting.  
However, digits below decimal point cannot be set.  
For setting decimal digits, entry from the keyboard is required.

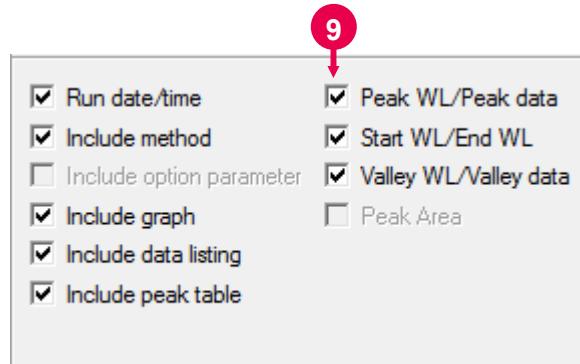


Fig. 1-43 Check Box

## (9) Check Box

- For setting, put a check mark in each check box.
- The selected box appears like .
- To cancel the setting, click the check box again to remove the check mark.

## 1.5 Window Configuration

### 1.5.2 Kinds of Windows

The UV Solutions 4.2 program utilizes two kinds of window, monitor window and data processing window.

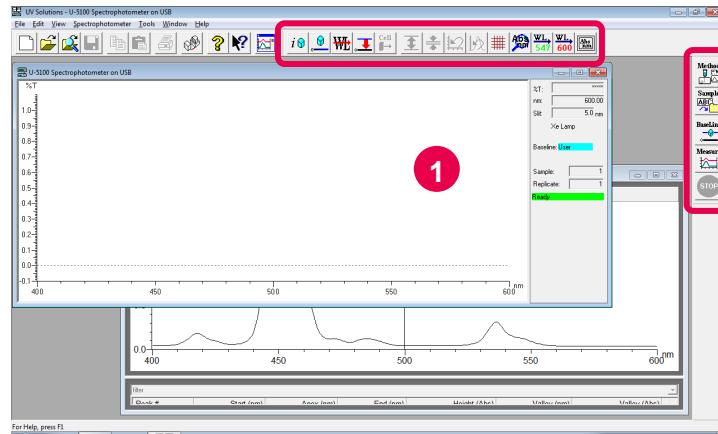


Fig. 1-44 Monitor Window

#### (1) Monitor Window

Activate the monitor window for conducting measurement.

- The toolbar for the monitor window will appear.

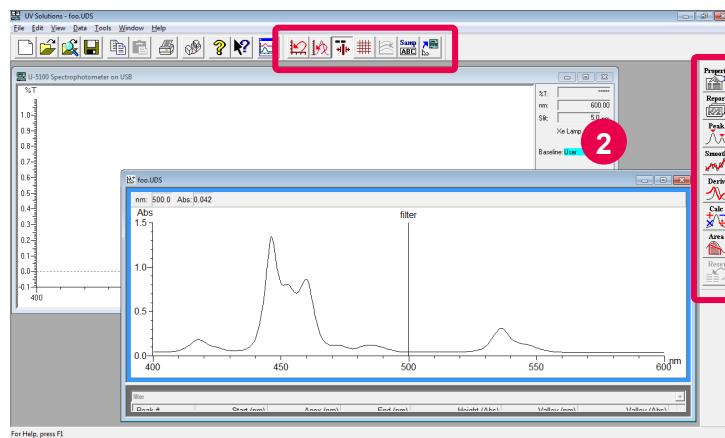


Fig. 1-45 Data Processing Window

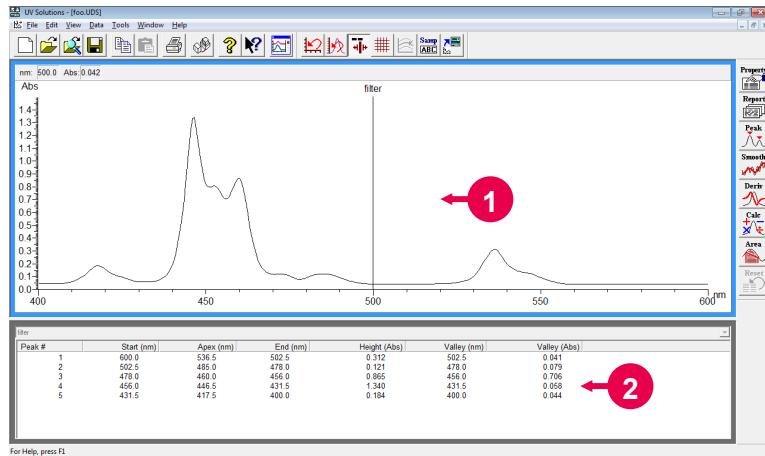
#### (2) Data Processing Window

Activate the data processing window for data processing.

- The toolbar for the data processing window will appear.

### 1.5.3 Data Processing Window

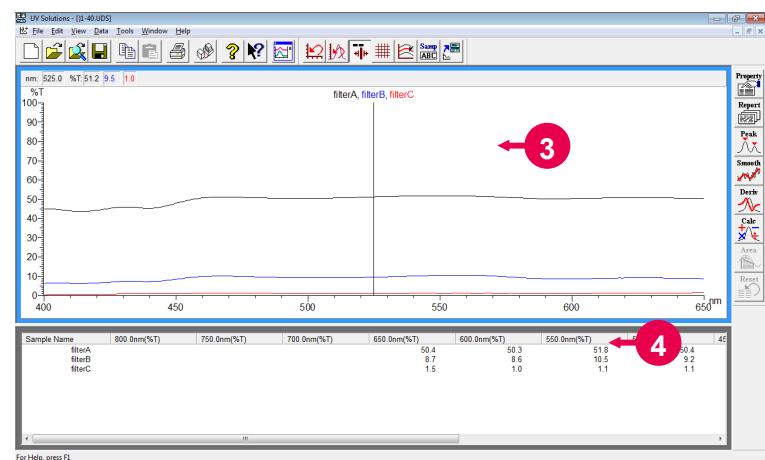
Indicates the items that can be displayed in each measurement mode.



**Fig. 1-46 Wavelength Scan (peak table)**

#### (1) Wavelength Scan

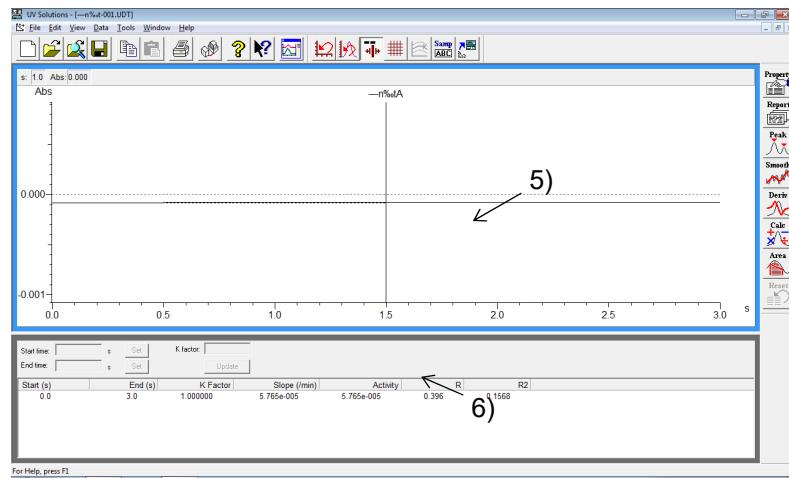
- A spectrum alone or both spectrum 1) and peak table 2) can be displayed as shown in Fig. 1-46.
- Display of the peak table can be turned on/off by means of "Peak Table" command on the menu.



**Fig. 1-47 Wavelength Scan (wavelength data table)**

## 1.5 Window Configuration

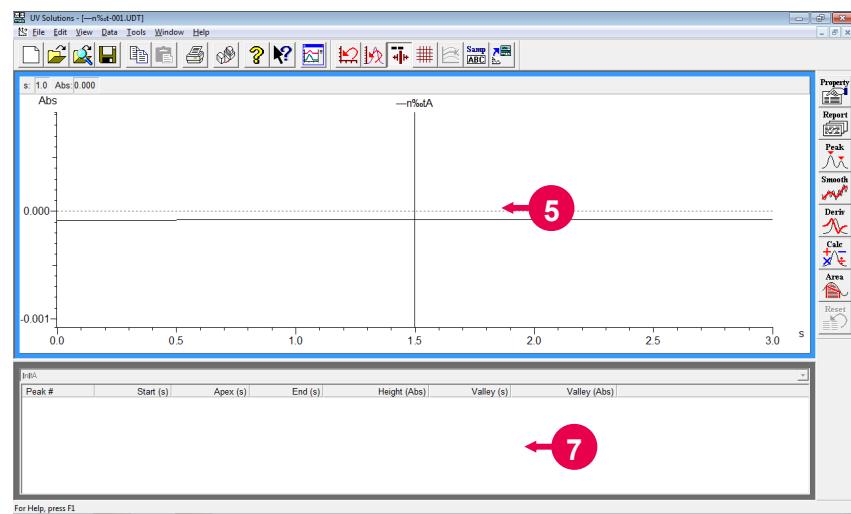
- As shown in Fig. 1-47, a spectrum 3) and a wavelength data table 4) can be simultaneously displayed.
- Display of the peak table or specified wavelength data table can be turned on/off by means of “Peak Table” command or “Wavelength Data Table” command on the menu.



**Fig. 1-48 Time Scan (kinetics table)**

### (2) Time Scan

- A spectrum alone or both spectrum 5) and kinetics table 6) can be displayed as shown in Fig. 1-48.



**Fig. 1-49 Time Scan (peak table)**

- As shown in Fig. 1-49, a spectrum 5) and a peak table 7) can also be displayed simultaneously.
- Display of the kinetics table or peak table can be turned on/off by means of “Kinetics” command or “Peak Table” command on the menu.

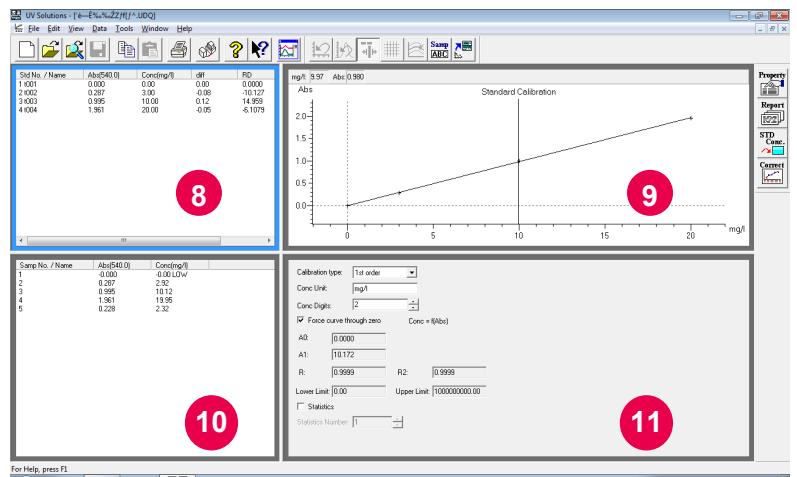


Fig. 1-50

### (3) Photometry

- For measurement from a calibration curve, a window as in Fig. 1-50 will appear.

Standard data 8)  
 Calibration curve 9)  
 Sample data 10)  
 Calibration curve data 11)

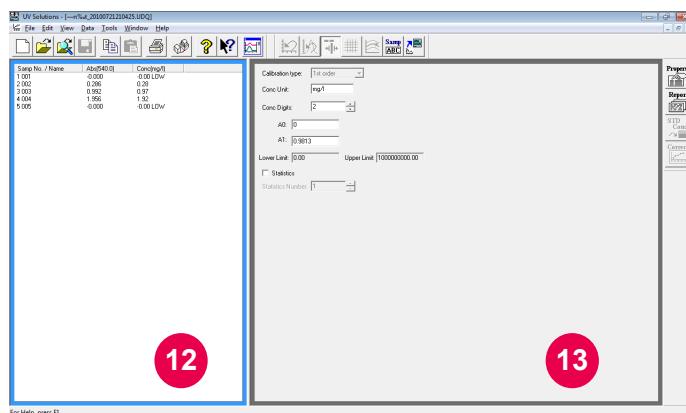


Fig. 1-51

## 1.5 Window Configuration

- For preparing a calibration curve via factor input and then measuring a sample, a window as in Fig. 1-51 will appear.

Sample data 12)

Calibration curve factor 13)

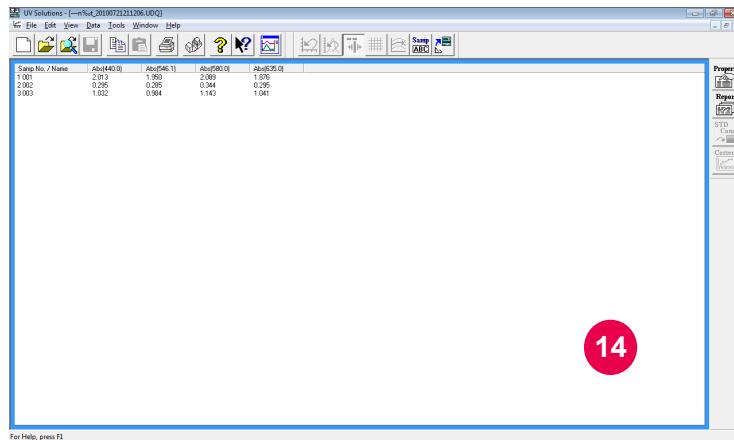


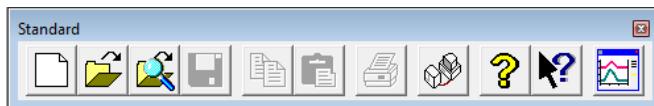
Fig. 1-52

- Upon measuring photometric value at each wavelength in multi-wavelength mode, the items shown in Fig. 1-52 will be displayed.

Sample data 14)

#### 1.5.4 Explanation of Tool Buttons

The UV Solutions 4.2 program has five toolbars in a rough classification. Although operation can be performed in two steps – pulling down the desired menu from the menu bar and selecting the desired command, it can be done more quickly and easily just by clicking the relevant tool button.



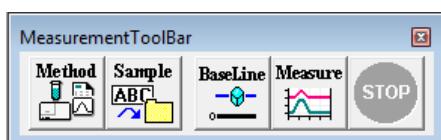
Standard toolbar:

Contains buttons for printing and file operation.



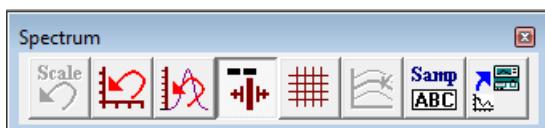
Instrument toolbar (displayed on monitor window):

Contains buttons for spectrophotometer control such as wavelength drive and auto pre-scan.



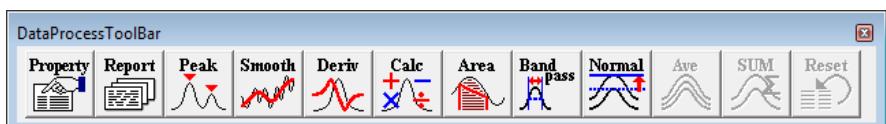
Measurement toolbar (displayed on monitor window):

Contains buttons related to measurement such as analytical condition setting and sample name input.



Spectrum toolbar (displayed on data processing window):

Contains buttons related to spectrum display such as auto scale, ruled line display and spectrum tracing.

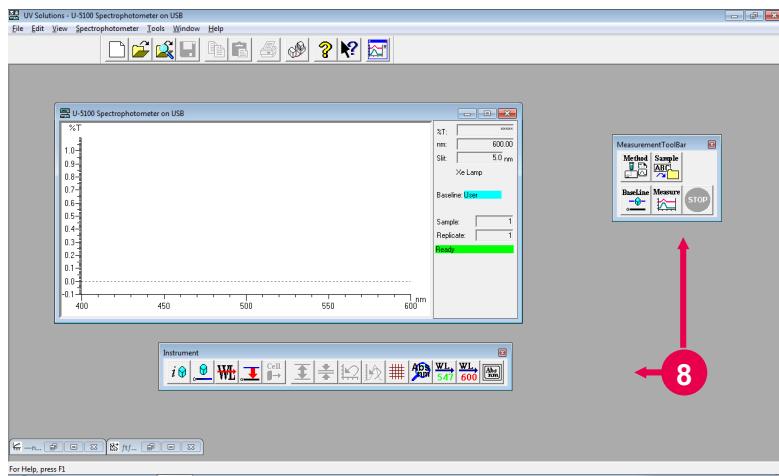


Data process toolbar (displayed on data processing window):

Contains buttons for data processing such as smoothing and differentiation.

**Fig. 1-53 Toolbars**

## 1.5 Window Configuration



**Fig. 1-54 Example of Toolbar Layout**

- (1) These toolbars are independent of one another and are usable after moving them to easy-to-use positions as shown in Fig. 1-54 (monitor window).

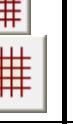
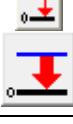
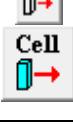
Refer to Tables 1-1 through 1-5 for a description of the buttons available on each toolbar and their functions. The function keys on the keyboard can also be used for activating the various functions. Refer to subsection 1.5 for a description on the functions of the function keys.

**Table 1-1 Standard Toolbar**

Button	Function	Button	Function
	Used to create new analytical conditions or sample table.		Opens the print window.
	Opens data files.		Indicates data on the connected spectrophotometer.
	Opens data files with preview.		Displays version information, etc. on UV Solutions.
	Saves the current file.		Calls out the help window.

Button	Function	Button	Function
	Saves a selected character string or graphics onto the clipboard.		Brings a monitor window to the forefront.
	Pastes the contents of the clipboard at the specified position.		

**Table 1-2 Instrument Toolbar**

Button	Function	Button	Function
	Initializes the spectrophotometer.		Resets the display scale.
	Conducts baseline measurement.		Selects auto scale for ordinate display so that the entire spectrum can be seen.
	Changes the wavelength.		Displays ruled lines.
	Executes auto zero (100%T adjustment).		Displays a window showing the present wavelength and photometric value.
	Moves the 6-cell turret to the selected position. (This function is available only in the U-5100.)		Shifts to the wavelength (547.0 nm) indicated in green.
	Doubles the scale of ordinate display.		Shifts to the wavelength (600.0 nm) indicated in red.
	Halves the scale of ordinate display.		Lights the lamp and starts monitor measurement. (This function also is available only in the U-5100.)
	Displays the scale in real time.		When it is photometry mode, this icon is active. Load calibration curve.

## 1.5 Window Configuration

**Table 1-3 Measurement Toolbar**

Button	Function	Button	Function
	Opens the Method window.		Executes baseline measurement.
	Displays a window for input of sample name and comment.		Starts measurement.
	Displays a sample table.		Stops measurement.
	Executes auto zero (100%T adjustment).		

**Table 1-4 Spectrum Toolbar**

Button	Function	Button	Function
	Resets the display scale to the original one.		Selects a spectrum for display.
	Sets display scale automatically.		Displays an information tab to allow change of sample name or comment.
	Displays the trace cursor.		Overwrites the presently displayed data onto the present analytical conditions.
	Displays ruled lines.		Returns to the previous scale.

**Table 1-5 Data Process Toolbar**

<b>Button</b>	<b>Function</b>	<b>Button</b>	<b>Function</b>
	Opens the Property window.		Performs calculation between spectra.
	Outputs a report on data files.		Calculates peak area.
	Conducts peak detection.		Resets data to the original one.
	Performs smoothing.		Permits editing of standard sample concentration.
	Performs differentiation.		Permits editing of concentration correction factor.
	Performs half band width calculation.		Creates total spectra.
	Creates average spectrum.		Creates standardized spectrum.
	Perform high absorbance correction.		

## 1.6 Functions of Function Keys

### 1.6 Functions of Function Keys

The function keys on the keyboard have the functions indicated below. Pressing a function key directly executes the corresponding function.

Key No.	Wavelength Scan	Time Scan	Photometry
[F4]	Measurement	Measurement	Sample measurement
[F5]			Measurement of blank
[F6]	Stop	Stop	Stop
[F7]			Interrupted measurement
[F8]			Re-measurement
[F9]			End

## 1.7 Description of Window

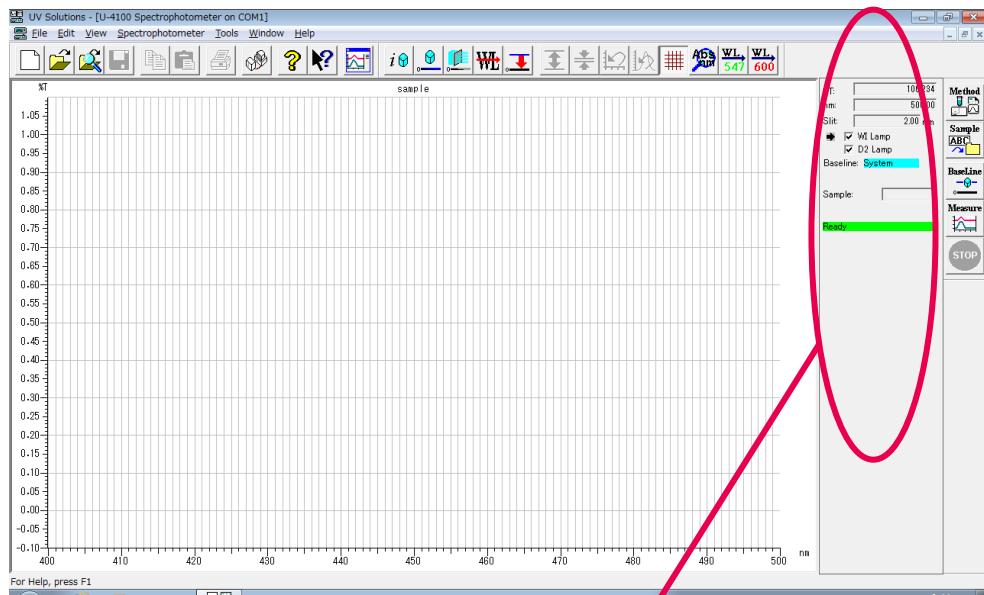


Fig. 1-55



Fig. 1-56

## 1.7 Description of Window

### (1) Sample Name Indication

Sample names are indicated. They can be entered in a sample table or sample name/comment input window.

### (2) Present Photometric Value Indication

The present photometric value is indicated.

### (3) Present Wavelength Indication

The present wavelength is indicated.

### (4) Present Slit Width Indication

The present slit width is indicated.

### (5) Lamp Lighting

The on/off setting of WI and D2 lamps and which lamp is presently used are indicated.

With check mark : Lamp is turned on.

Without check mark : Lamp is turned off.

Arrow indicates which lamp is presently in use.

### (6) Baseline Setting Indication

The baseline mode set in Method is indicated.

When setting is different from the stored one, "User1" is indicated on a light blue base. In this case baseline measurement should be performed; the light blue base will thus disappear.

### (7) Sample No. Indication

Sample No. of the sample under measurement is indicated.

### (8) No. of Repetitions Indication

The present number of repetitions is indicated.

### (9) Message Indication

Messages such as “Ready”, “Scanning” and “Parameters” are indicated.

When “Ready” is indicated, the  (measurement) button can be pressed.

### (10) Error Message Indication

An error message such as “Calibrate!” is indicated.

When an error message appears, take a corrective measure with reference to 4.7 in the Maintenance edition.

### (11) Temperature Indication

The set temperature is indicated when the temperature-controlled auto sipper or 6-cell positioner is used.

- NOTES:**
1. The WI/D<sub>2</sub> lamp lighting check box (5) is always turned ON (check is applied). The check remains ON even if an error occurs.
  2. “D<sub>2</sub> lamp!” or “WI lamp!” will appear at the error message indication (10) if the D<sub>2</sub> or WI lamp is not lit under the condition that it is to be used. The aforementioned error indication will remain until the relevant lamp comes on after turning ON the lamp lighting button. The error will disappear when the lamp comes on.

## 1.8 Indication of Spectrophotometer Serial No.

### 1.8 Indication of Spectrophotometer Serial No.

The serial number of the presently connected spectrophotometer can be indicated and confirmed.

<U-5100/3900/3900H>

Select the Instruments (I) command from the Tools (T) menu or click the  button. A dialog box as shown in Fig. 1-57 will appear. You can thus check the serial number of your spectrophotometer.

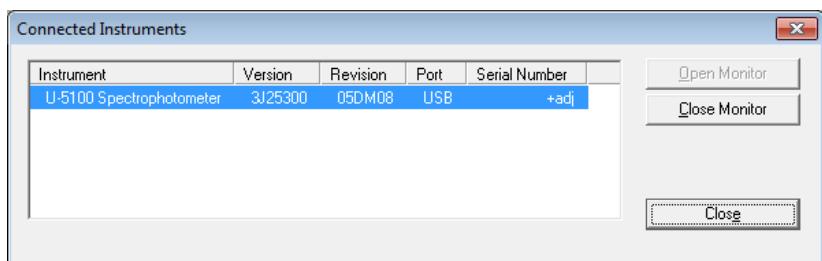


Fig. 1-57

<U-2900/2910/4100/UH4150>

Select the Instruments (I) command from the Tools (T) menu or click the  button. You can thus check the serial number of your spectrophotometer.

Click the spectrophotometer line and then **Serial Number**. The second dialog box will appear as shown in Fig. 1-58. Enter the serial No. of spectrophotometer.

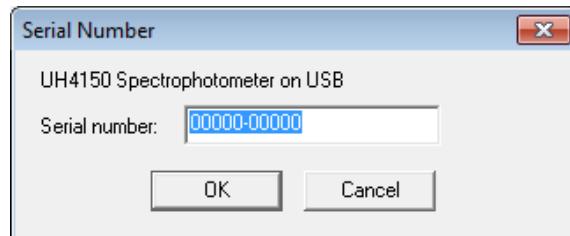


Fig. 1-58

For connecting the U-2900 or U-2910, the name of the actually used spectrophotometer needs to be selected in the window.

Click **Instrument name**. In case of the U-2900 and U-2910, a dialog box appears as shown in Fig. 1-59. In the combo box, select the actually connected Model.

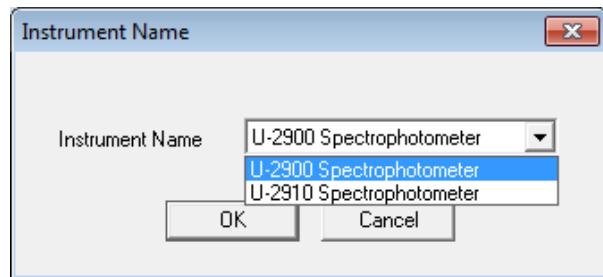
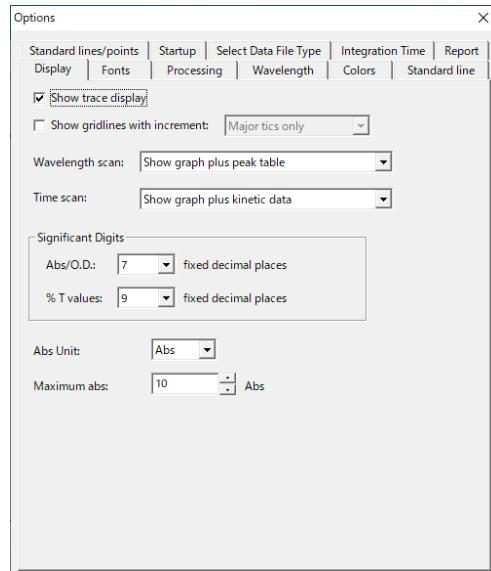


Fig. 1-59 Instrument Name

## 1.9 Display Setting

### 1.9 Display Setting

Necessary information can be displayed and unnecessary one can be excluded when starting up the initial screen of UV Solutions 4.2 program or when opening the data processing window.



**Fig. 1-60 Option Setting Window**

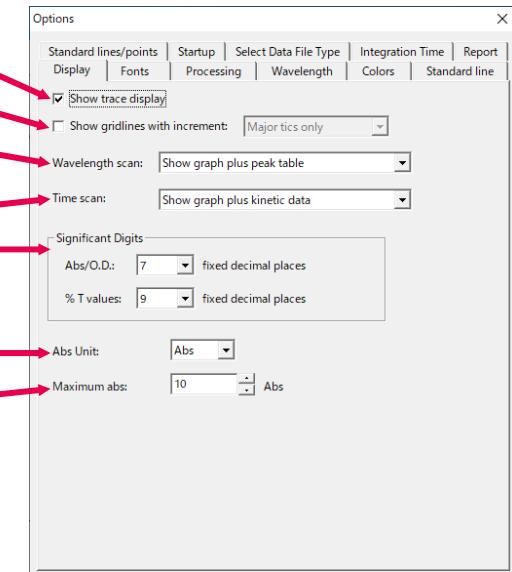
- (1) Select the Options (O) command from the Tools (T) menu.
- (2) The Options setting window will appear. Possible settings that can be made are shown here. After setting is completed, click **OK**.
  - The set functions are validated when restarting the monitor window or opening the data processing window.

The Options setting window has the following tabs.

Display tab  
Fonts tab  
Processing tab  
Wavelength tab  
Colors tab  
Startup tab  
Integration Time tab  
Report tab

### 1.9.1 Display Tab

This tab enables you to set the items to be displayed when opening the saved data file or data immediately after measurement. Items to be set here are also settable via a tool button or View menu after measurement. For the settable range of each parameter, refer to “Parameter setting range on Option window” in Appendix H.



**Fig. 1-61 Display Tab**

(1) Show trace display

When checked, a trace cursor can be indicated and tracing started upon opening the data processing window.

(2) Show gridlines with increment

When checked, the monitor window and data processing window can be displayed with rules lines. The width of rules lines can also be specified.

(3) Wavelength scan

The item to be displayed when opening the data processing window in wavelength scan mode is settable here.

## 1.9 Display Setting

### (4) Time scan

The item to be displayed when opening the data processing window in time scan mode is settable here.

### (5) Significant Digits

For the data to be displayed on the measurement window, the number of digits below decimal point is settable here.

- Abs / O.D.values

The number of digits below decimal point is settable for absorbance (Abs / O.D.) display.

- %T values

The number of digits below decimal point is settable for other than absorbance (Abs / O.D.).

Data Mode	No. of Digits Settable
Abs / O.D.	3 to 7
%T	1 to 9

### (6) Abs Unit

Select the absorbance from Abs or O.D for display.

Selected absorbance is displayed on the method screen, measurement data, and printed data.

The next item will be displayed in Abs.

- Report generator item name, method, result, print and file export for GLP / GMP, U-2900 text files. However, if you save the U-2900 text file with UV Solutions, you can display it in O.D.

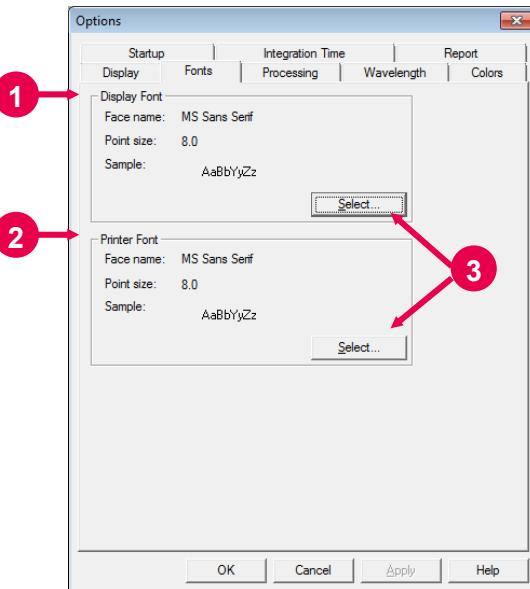
### (7) Maximum Abs

When a negative value as transmittance is converted to absorbance, selected absorbance is displayed.

**NOTICE:** The number of valid digits displayed depends on the device and transmittance.

## 1.9.2 Fonts Tab

Font, character size, etc. for display on the screen are settable here. Font, character size, etc. for printing are also settable.



**Fig. 1-62 Fonts Tab**

(1) Display Font

Font, character size, etc. in the spectrum display area can be set.

(2) Printer Font

Printer font can be set.

## 1.9 Display Setting

(3) Upon clicking **Select**, a dialog box as in Fig. 1-63 appears.

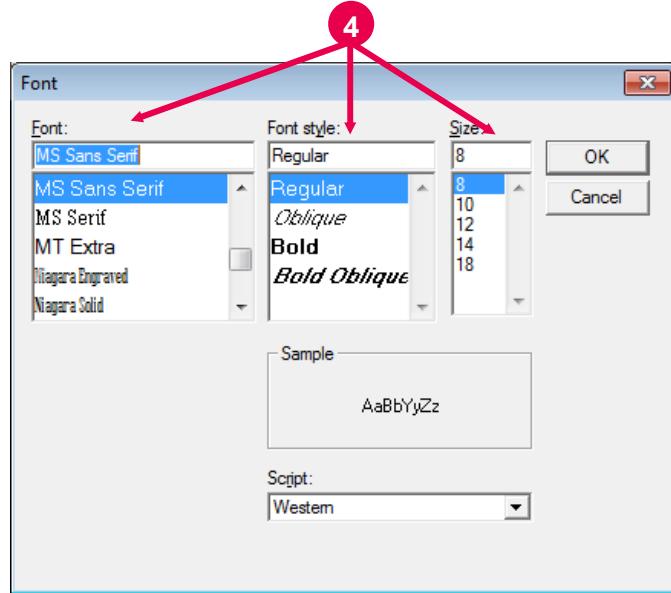


Fig. 1-63 Font Specification

(4) Specify your font, style and size.

### 1.9.3 Processing Tab

You can set the initial conditions for data processing here.  
Refer to Appendix H for the setting range of each parameter.

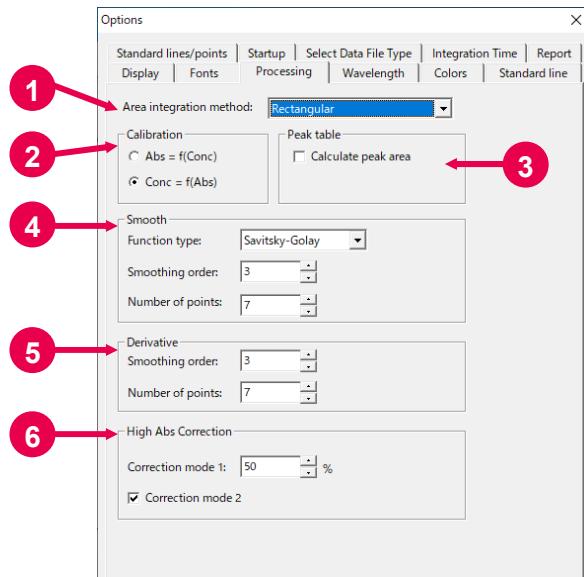


Fig. 1-64 Processing Tab

## (1) Area integration method

Select a method for area integration.

## (2) Calibration

Select the calibration curve formula to be used for photometry mode. With  $\text{Abs} = f(\text{Conc})$ , absorbance will be indicated via the expression to be used as a function for concentration. With  $\text{Conc} = f(\text{Abs})$ , concentration will be indicated via the expression to be used as a function for absorbance. The default setting is  $\text{Conc} = f(\text{Abs})$ . If the absorbance unit is set to O.D., O.D. is displayed instead of Abs.

- $\text{Abs} = f(\text{Conc})$

Absorbance is expressed by a calibration curve formula to be used as a function for concentration.

- $\text{Conc} = f(\text{Abs})$

Concentration is expressed by a calibration curve formula to be used as a function for absorbance.

## (3) Peak table

You can set whether or not the area calculation item is to be included in the peak table.

## (4) Smooth

The initial values of smoothing parameters are set here. However, these values will not be reflected on the parameters for the Method window.

## (5) Derivative

The initial settings of parameters for smoothing after Method setting and measurement can be made here.

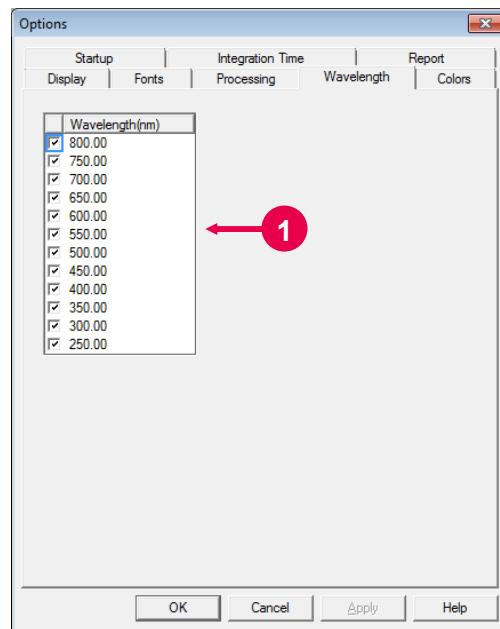
## (6) High Abs Correction

This is the initial value setting for high absorbance correction.

## 1.9 Display Setting

### 1.9.4 Wavelength Tab

This tab allows you to set the initial conditions for wavelengths to be indicated in the specified wavelength data table of wavelength scan data. The specified wavelength data table after measurement is the data table for the wavelengths specified here. To change the wavelengths for the data after measurement, make your change by means of the Wavelength tab of Property menu.



**Fig. 1-65 Wavelength Tab**

#### (1) Setting of Specified Wavelength Data Table

Take the following procedure for this setting.

- (a) Bring the mouse pointer to the wavelength you wish to set and click it.
- (b) Enter a wavelength.
- (c) If there are other wavelengths you wish to change, repeat steps (a) and (b). Up to 12 wavelengths can be set.
- (d) Put a check mark at the wavelengths you want to display. And remove the check mark from those you don't want to display.

### 1.9.5 Colors Tab

The colors of spectra to be overlaid on one another are settable here. “1 (bottom)” specifies the color for the initial display.

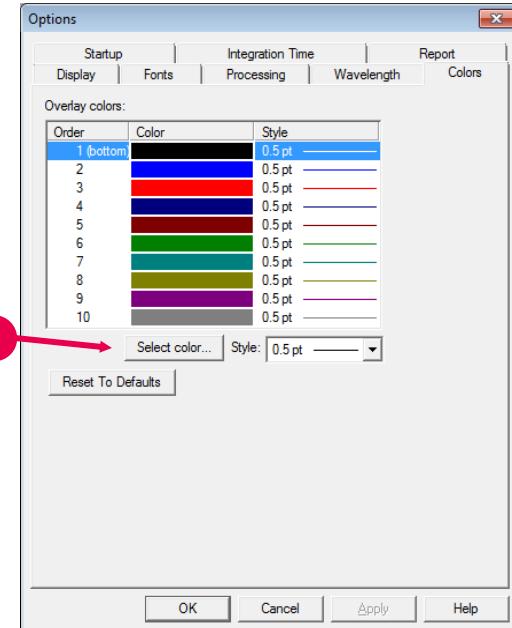


Fig. 1-66 Colors Tab

(1) Click **Select color....**

- A window as in Fig. 1-67 will appear.

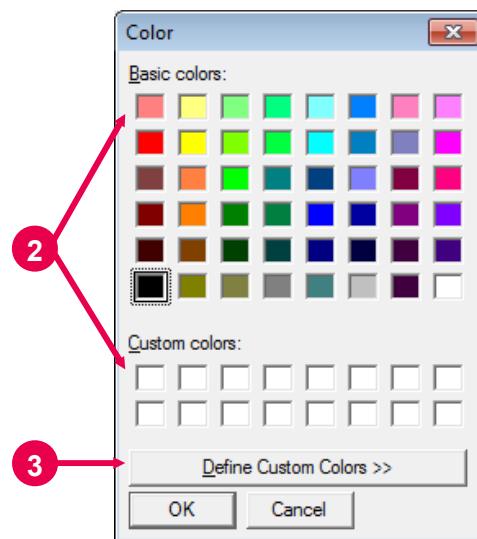


Fig. 1-67 Setting of Color

## 1.9 Display Setting

- (2) Select the desired color among the basic colors or created colors.
- (3) If the desired color is not contained in the basic colors, **Define Custom Colors** should be clicked.
  - A window as in Fig. 1-68 will appear.

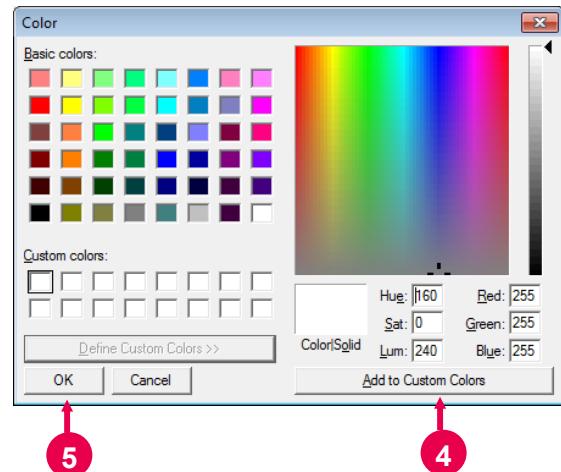
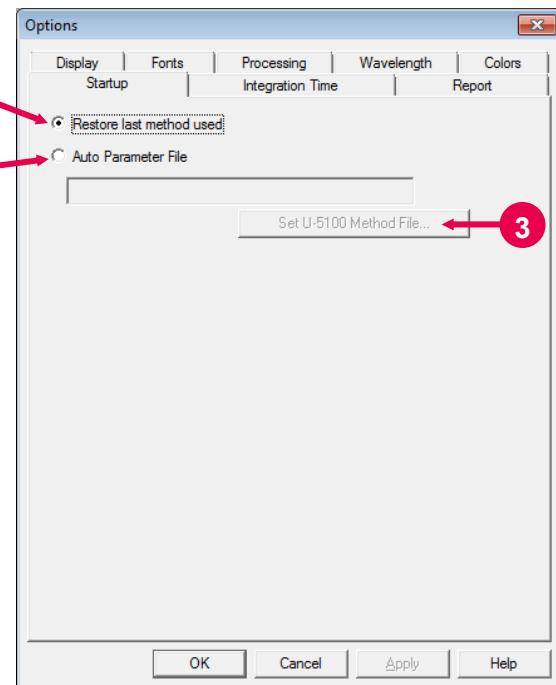


Fig. 1-68 Addition of Color

- (4) Set the Hue, Sat, Lum, etc. and click **Add to Custom Colors**.
- (5) Your color will be added to the list of created colors, so select it and click **OK**.

### 1.9.6 Startup Tab

Use this tab to set the measurement conditions for the startup of UV Solutions 4.2 program.



**Fig. 1-69 Startup Tab**

- (1) Restore last method used

The UV Solutions 4.2 program can be started according to the method that was used last time.

- (2) Auto Parameter File

The program can be started according to the specified method file.

- (3) Click the model name of the instrument being used.

- A dialog box as shown in Fig. 1-70 will appear.

## 1.9 Display Setting

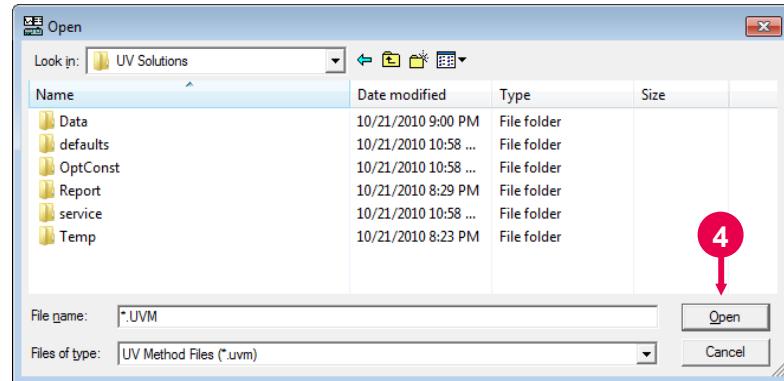


Fig. 1-70

- (4) Specify a method file and click **Open**.

The method file name specified in Fig. 1-69 will appear.

### 1.9.7 Integration Time Tab

Refer to Appendix H for the setting range for each parameter.

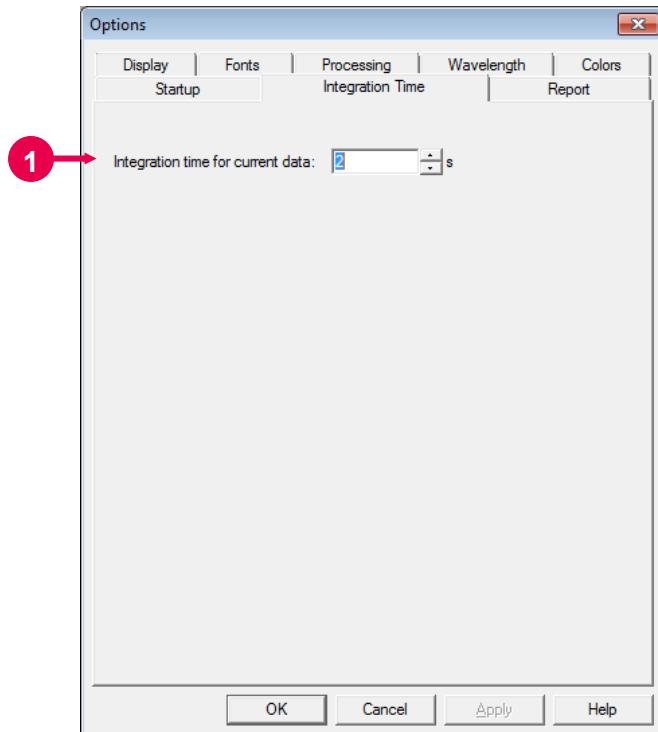
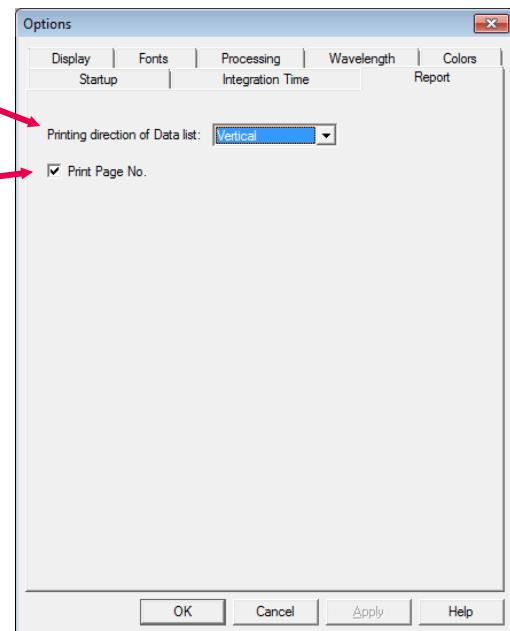


Fig. 1-71 Integration Time Tab

(1) Integration time for current data

Set an integration time for the present data acquisition using the Read Data command of the Tools menu. This integration time will also apply when executing auto zero. This is effective when the photometry mode is other than specified wavelength or Ratio. When the photometry mode is specified wavelength or Ratio, the integration time set on Instrument tab of the Method menu will be valid when executing measurement and auto zero.

### 1.9.8 Report Tab



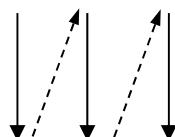
**Fig. 1-72 Report Tab**

(1) Printing direction of Data list

A printing direction for the data list (printed at fixed intervals and all data) can be set here.

Printing direction:

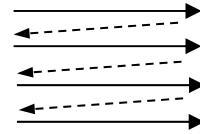
When vertical is set, wavelengths or times and photometric values will be printed in three vertical rows.



## 1.9 Display Setting

Printing direction:

When horizontal is set, wavelengths or times and photometric values will be printed in three horizontal rows. In other words, three kinds of data will be printed in each row.



### (2) Print Page No.

When check box is checked: Page number will be printed in the report.

When check box is not checked:  
Page number will not be printed in the report.

## 1.10 Saving of Data File

Data can or cannot be saved depending on your settings.  
So make your settings with reference to the table below.  
Pattern setting of (1) to (5) is recommended.

Setting	Use of Sample Table					
	ON		OFF			
Sample name/Comment input dialog	—		ON		OFF	
<input type="checkbox"/> Auto file save after measurement	ON	OFF	ON	OFF	ON	OFF
Method – Monitor tab	○	×	○	×	○	×
	Opening of data process window after measurement	Automatic	Automatic	Automatic	Automatic	Manual
Result	Display	○	×	○	×	○
	Saving	Automatic	Automatic	Automatic	Automatic	Impossible
Pattern		(1)	(2)	(3)	(4)	(5)
						(6)

Result indications ○ and ×

○ : After measurement, the relevant icon or data processing window will be open on the screen.

× : After measurement, the data processing window will not open.

## 1.11 Commands on Spectrophotometer Menu

### 1.11 Commands on Spectrophotometer Menu

The Spectrophotometer menu contains the following commands.

- Initialize
- Calibration
- Lamp Usage
- Record Baseline
- Zero
- Set Wavelength
- Start Series
- Stop Execution
- Remeasure
- R/S Reverse

#### Initialize

The spectrophotometer is initialized.

#### Calibration

Instrument calibration includes the following commands.

##### Calibrate Wavelength

Wavelength calibration is executed.

##### PMT Zero Function

Detector zero calibration is executed.

#### Lamp Usage (excluding Model U-5100)

This is used for checking and/or resetting the lamp usage time.

The cumulative lighting time of the lamp is indicated.

The time should be reset when the lamp is replaced. Refer to the Maintenance edition of the instruction manuals for details.

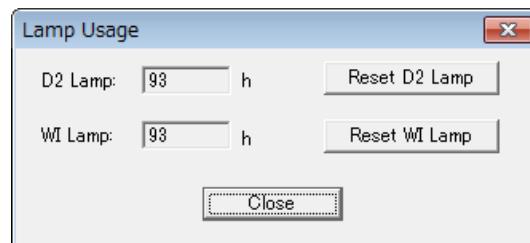


Fig. 1-73

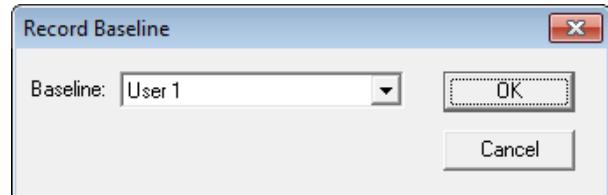
### Lamp Usage Condition (limited to U-5100)



**Fig. 1-74**

### Record Baseline

Baseline measurement is carried out. Select a type of baseline from System, User 1 and User 2 and click **OK**. Baseline measurement then starts.



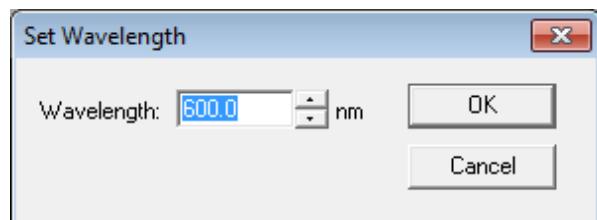
**Fig. 1-75**

### Zero

Auto zero measurement (100%T in transmittance mode, 0 Abs in absorbance mode) is conducted at the present wavelength. If the photometry mode is specified wavelength or Ratio, then auto zero measurement will be executed at each set wavelength.

### Set Wavelength

A function for driving the system to the set wavelength. Clicking the Set Wavelength command will open the dialog shown in Fig. 1-76. Enter a wavelength and click **OK**, and the system will be driven to the specified wavelength.



**Fig. 1-76**

## 1.11 Commands on Spectrophotometer Menu

Start Series

Measurement is started.

Stop Execution

Measurement is halted.

Remeasure

Remeasurement is conducted. This is valid in photometry mode.

R/S Reverse (excluding U-1900, U-5100, U-2900, U-2910)

A function for reversing the reference and sample side signals. Clicking the R/S Reverse command brings up the confirmation message shown below.

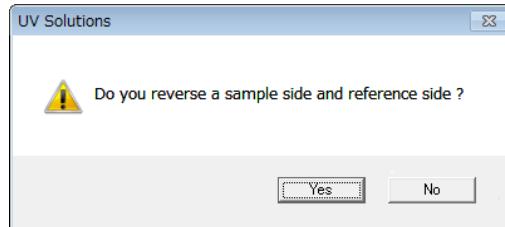


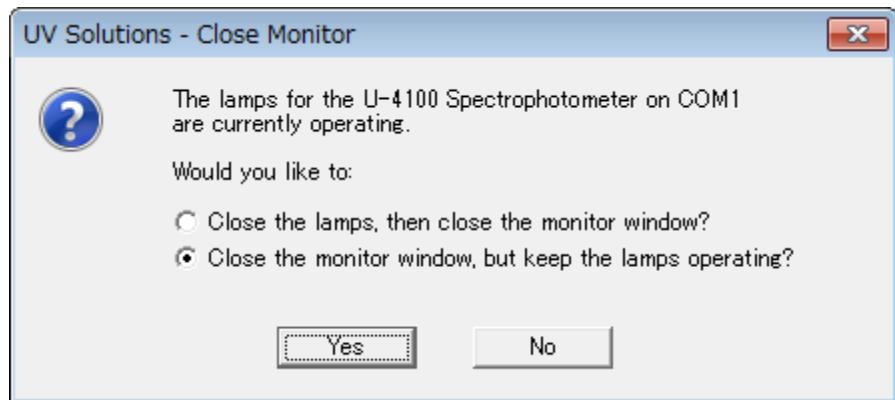
Fig. 1-77

Selecting **Yes** will reverse the reference and sample side signals. When reversing is conducted, a check mark is placed at the R/S Reverse command on the Spectrophotometer menu. To return to the original setting, click the R/S Reverse command again.

## 1.12 Termination of UV Solutions Program

When measurement is finished, shut down the instrument in the following procedure.

- (1) From the File (F) menu, select the Exit (X) command.  
A dialog as shown below will appear.  
But with the U-5100 spectrophotometer, the UV Solutions program will end without the dialog shown in Fig. 1-78 appearing. Proceed to step (3) after the program termination.



**Fig. 1-78**

- (2) To terminate the program with the lamps lit, select “Close the monitor window, but keep the lamps operating?”.  
To terminate the program after turning off the lamps, select “Close the lamps, then close the monitor window?”.  
Click **Yes** and the UV Solutions program will end.
- (3) Turn OFF the POWER switch of the spectrophotometer main unit.
- (4) Click the Start button of Windows 7, select “Shut Down (U)” and click **OK**.
- (5) Turn OFF the power supply of PC and CRT.  
(Your computer may be set so as to turn off its power supply automatically at step (4).)
- (6) Turn OFF the printer power supply.

## 2. WAVELENGTH SCAN

### 2.1 Flow of Operation

In this section, the wavelength scan condition setting and operational procedures are explained.

Measurement is to be carried out in the flow shown below.

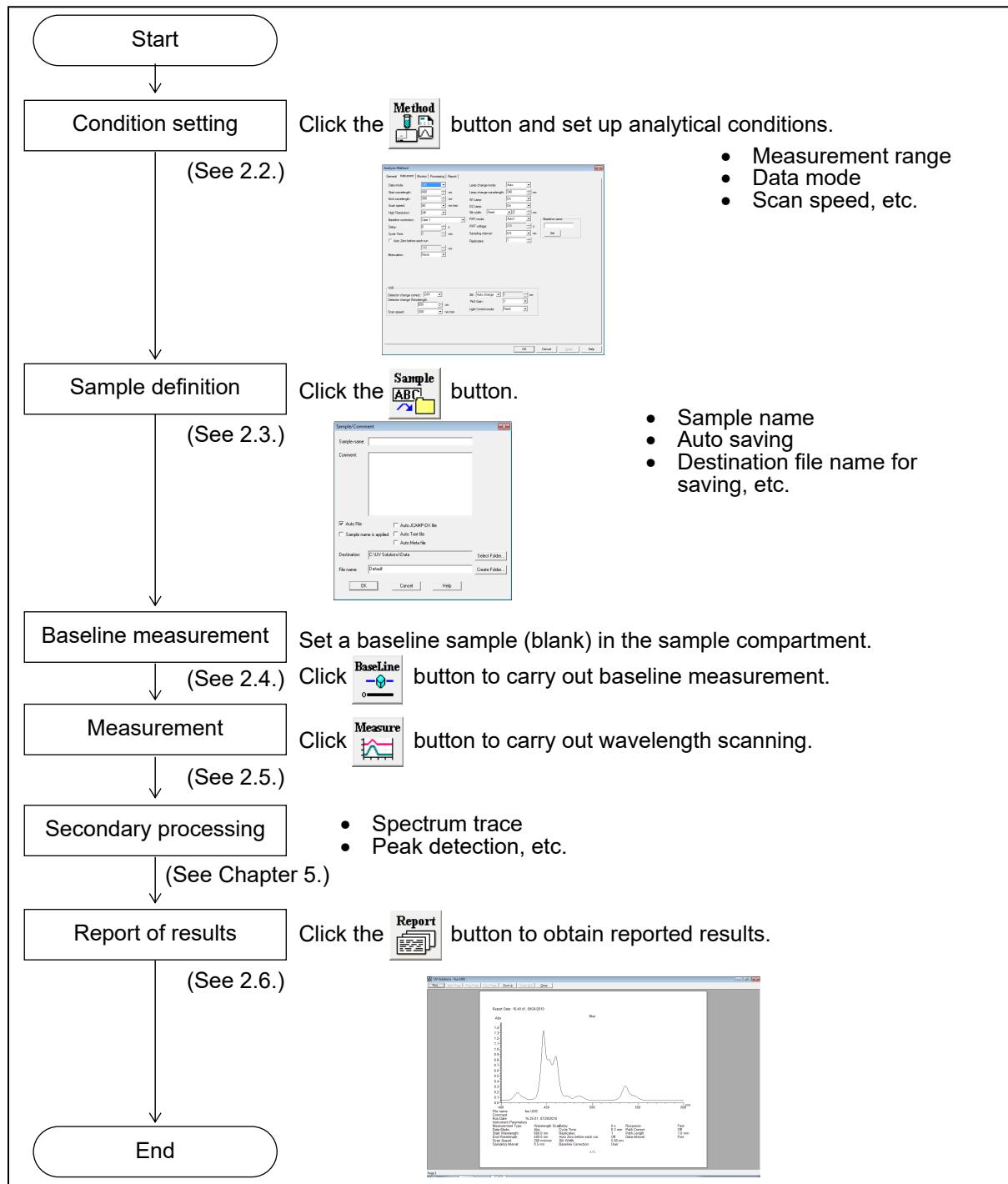


Fig. 2-1 Flow of Operation (wavelength scan)

## 2.2 Setting Analytical Conditions

### 2.2 Setting Analytical Conditions

Set up analytical conditions before proceeding to measurement.

Click the  (Edit Method) button on the measurement toolbar, and the Analysis Method window shown in Fig. 2-2 will then appear.

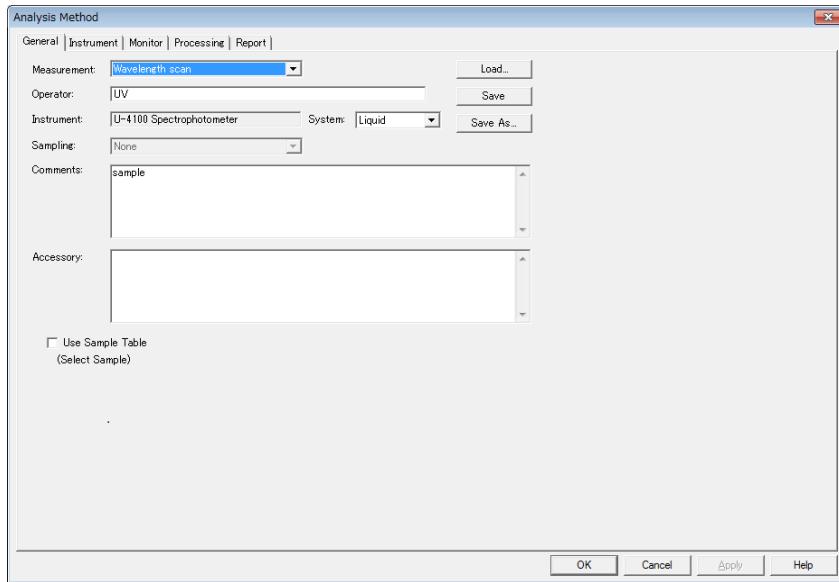


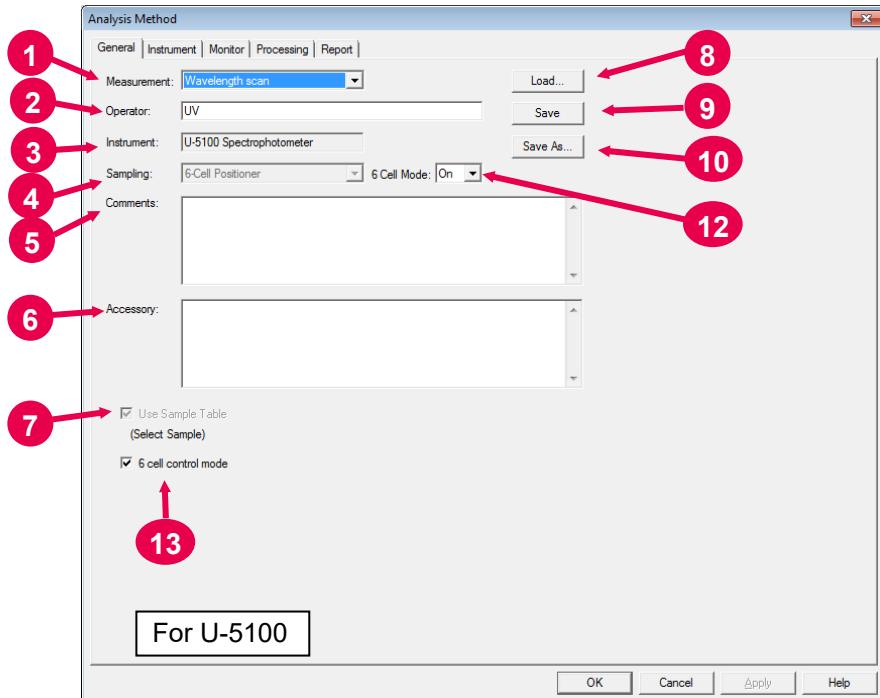
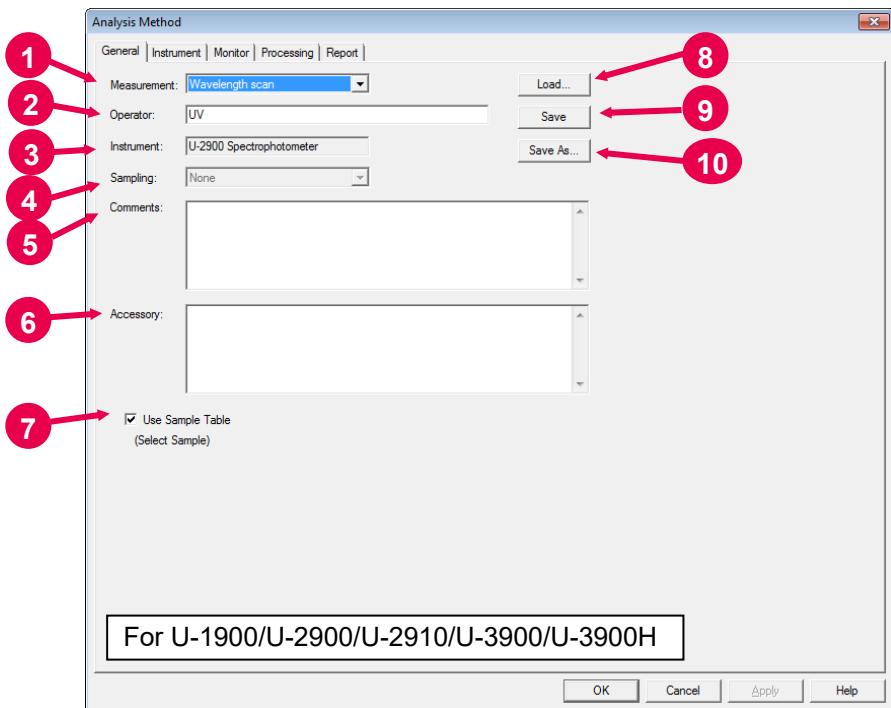
Fig. 2-2 Analytical Conditions (Analysis Method) (For U-4100)

The Analysis Method window in the wavelength scan mode has the following tabs. For details of these tabs, refer to the descriptions given below.

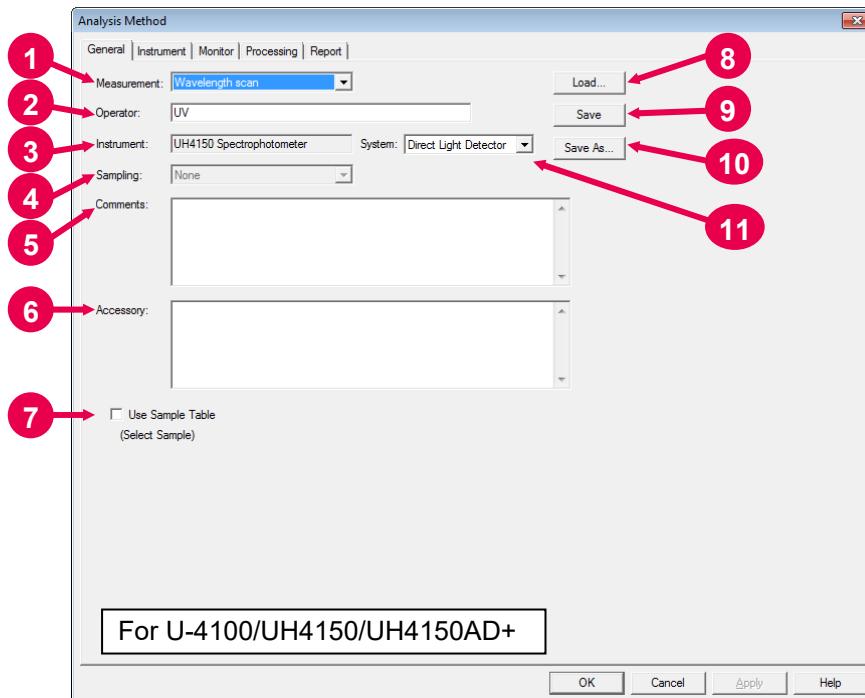
- General
- Instrument
- Monitor
- Processing
- Report

## 2.2.1 General Tab

On the General tab page, you can use the parameters shown in Fig. 2-3. For the setting range of each of these parameters, refer to Appendix F.



## 2.2 Setting Analytical Conditions



**Fig. 2-3 General Tab for Each Instrument Model**

(1) Measurement

This box is provided for measurement mode selection. Select "Wavelength scan" here. For the descriptions of time scan and photometry, refer to Sections 3 and 4.

(2) Operator

Enter the name of the analyst concerned.

(3) Instrument

The model name of the spectrophotometer being used is indicated.

## (4) Sampling

- |                     |   |
|---------------------|---|
| None                | : It is required to replace a sample manually.  |
| Sipper              | : This item is indicated when the auto sipper is connected.   |
| 6-Cell Positioner : | This item is indicated when the 6-cell positioner is connected.<br>(For Model U-5100, "6-Cell Positioner" is indicated because this instrument is equipped with the 6-cell turret.) |

## (5) Comments

Any annotation or remarks regarding measurement conditions can be entered.

## (6) Accessory

Enter the name of a special type of accessory mounted. While the Sampling (option) box mentioned above indicates the name of an accessory that is automatically recognized by the spectrophotometer, this Accessory box is available for you to enter the name of an accessory such as a micro-cell holder that is not automatically recognized by the instrument.

## (7) Use Sample Table (Select Sample)

Turn on the check mark when using a sample table.

## (8) Load

Click this button to read out stored analytical conditions. When this button is clicked, the Open window will come up. In this window, select an analytical condition file as required.

## (9) Save

By clicking this button after completion of parameter setting, you can overwrite the current analytical conditions for saving. For a new set of analytical conditions, clicking this button will open the Save As window. In this window, enter a new file name.

## 2.2 Setting Analytical Conditions

### (10) Save As

Click this button to save the current analytical conditions with a name. In the Save As window, enter a new file name.

### (11) System

Displayed when the Model U-4100/UH4150/UH4150AD+ is used. Select the system depending on the connected system. If the UH4150AD+ is connected to the device, it will be set automatically.

Liquid: For U-4100 (liquid sample measurement system),

Solid: For U-4100 (solid sample measurement

system)(large-sample measurement system),

UV: For U-4100 (UV-region sample measurement system)

Direct Light Detector: For UH4150/UH4150AD+ Direct light detection system, Integrating Sphere: For

UH4150/UH4150AD+ integrating sphere detection system

Other: UH4150AD+

## (12) 6 Cell Mode

Displayed when the Model U-5100 is used.

- On : Be sure to set at ON for measurement with the 6-cell turret.  
 Off : Be sure to set at OFF for measurement with the single-cell holder, rectangular long cell holder, etc. other than the 6-cell turret.

## (13) 6 cell control mode

This function is used for measurement with the 6-cell positioner when the Model U-2900, U-2910, U-3900 or U-3900H is connected. Use of this control enables you to carry out measurement while automatically moving the 6-cell positioner.

With the U-5100, this field appears when the 6-cell mode is activated (ON). Use this control for measurement through automatic movement of the 6-cell turret. For details, refer to the following table.

**Table 2-1 Setting of 6-cell Condition for Different Usages in Model U-5100**

Usage Setting Method	With 6-cell Turret		Without 6-cell Turret
	Continuous Measurement in Auto Mode	Sample by Sample Measurement	Measurement with Single-cell Holder or Rectangular Long Cell Holder
6 Cell Mode	On	On	Off
6 cell control mode	On *1	Off *2	Off *2

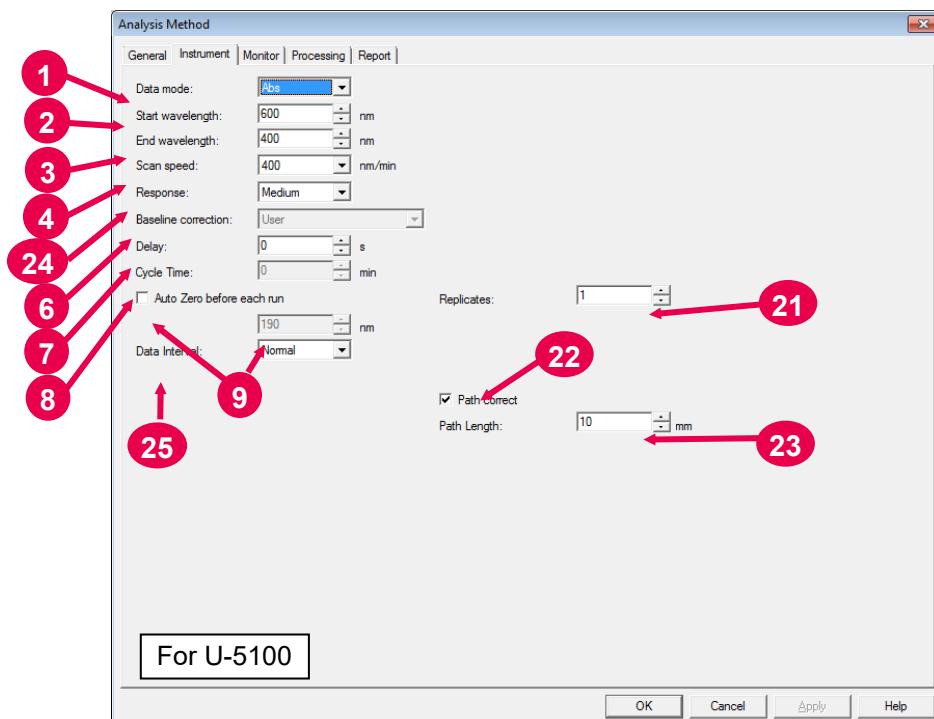
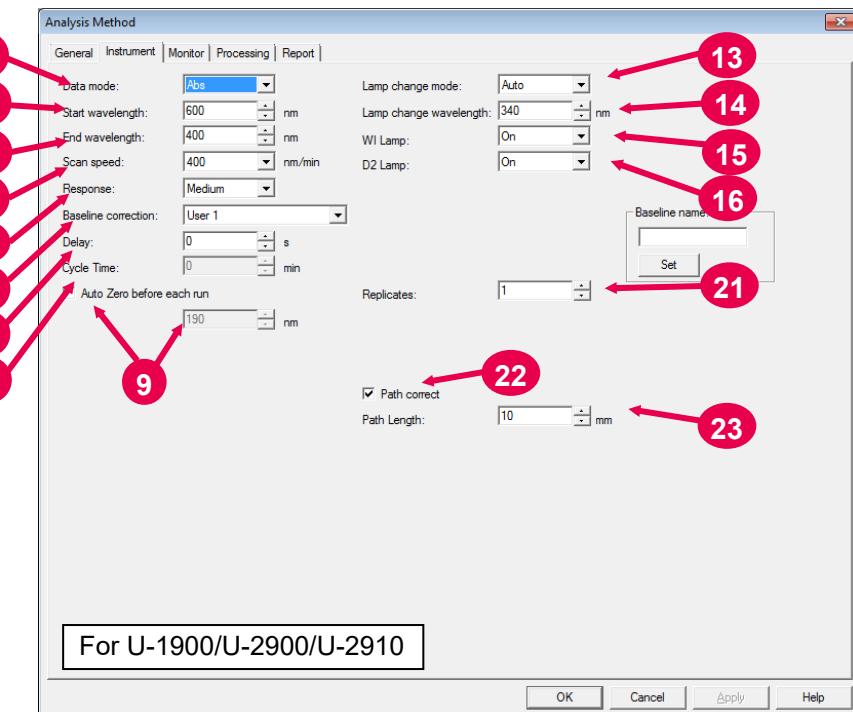
\*1 On : Turn on the check box (put check mark).

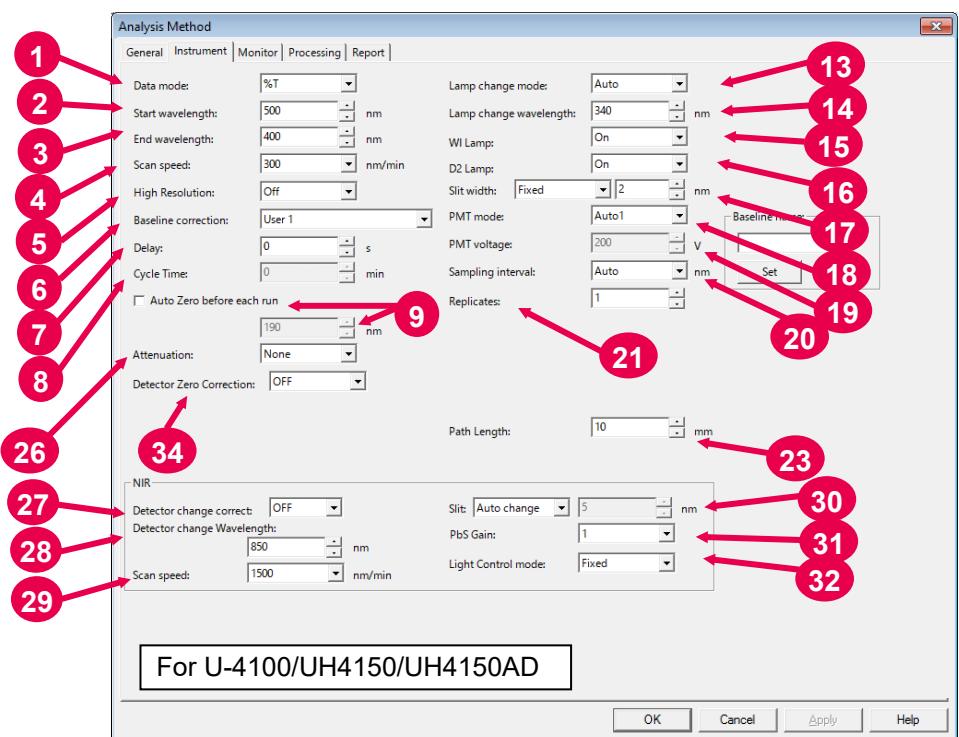
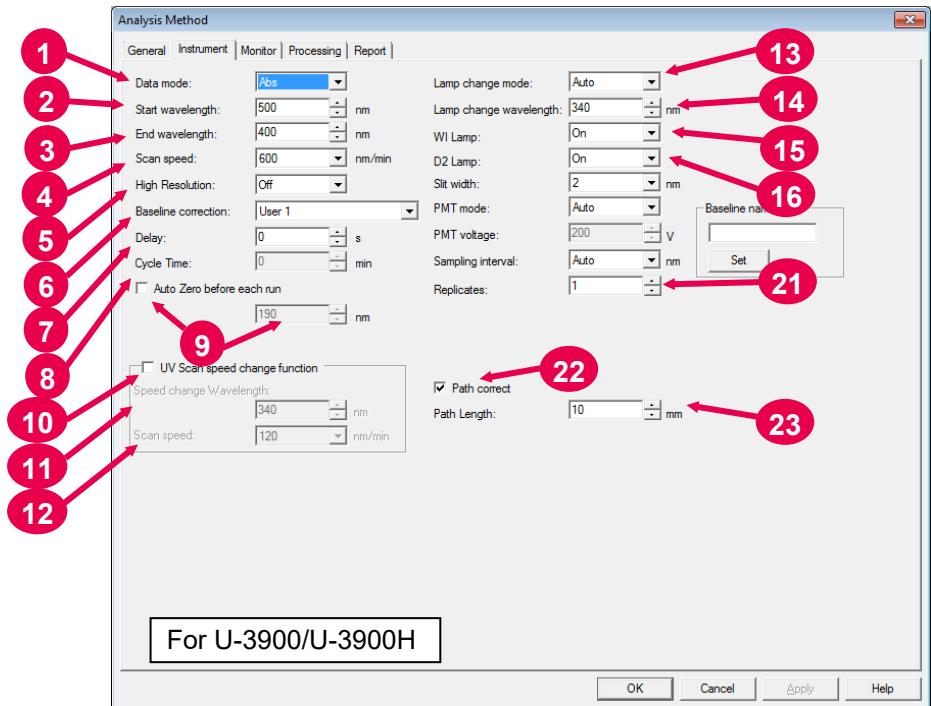
\*2 Off : Turn off the check box (remove check mark).

## 2.2 Setting Analytical Conditions

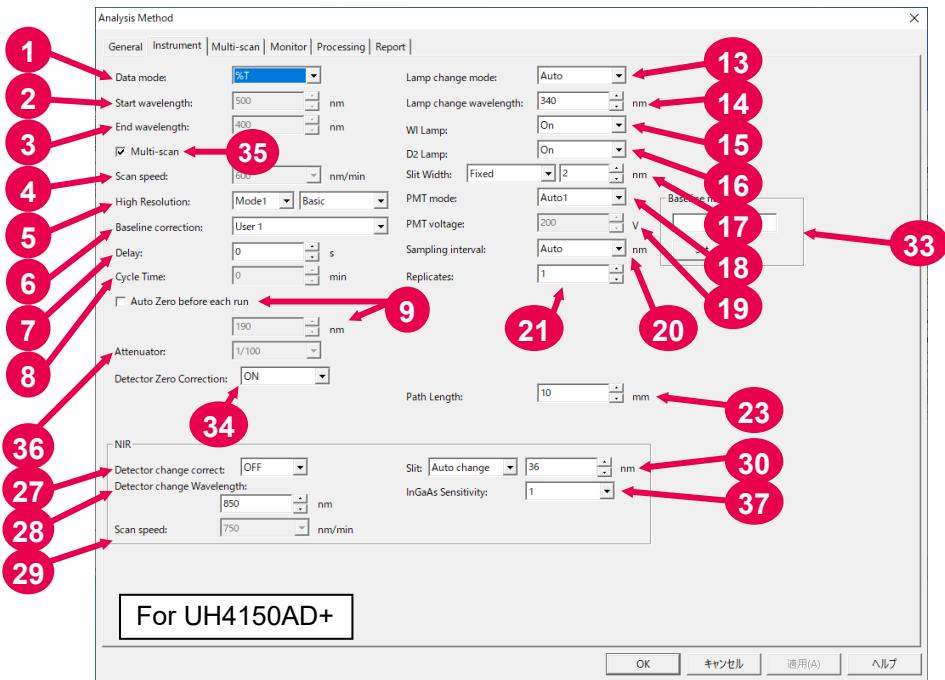
### 2.2.2 Instrument Tab

When you select the Instrument tab, the window shown in Fig. 2-4 will appear. For the setting range of each of the parameters in this window, refer to Appendix F.





## 2.2 Setting Analytical Conditions



**Fig. 2-4 Instrument Tab**

### (1) Data mode

Select a data mode from the following.

%T : Set this mode for transmittance measurement.

Abs / O.D.:

Set this mode for absorbance measurement. Abs or O.D. is displayed.

E(S) : Set this mode for measuring the energy of sample beam.

E(R) : Set this mode for measuring the energy of reference beam.

%R : Set this mode for reflectance measurement.

Instrument Model	Settable Data Mode
U-1900	%T, Abs/O.D., E(S), E(R)
U-5100	%T, Abs/O.D., E(S), E(R)
U-2900, U-2910, U-3900, U-3900H, U-4100, UH4150/UH4150AD+	%T, Abs/O.D., E(S), E(R), %R

## (2) Start wavelength

A wavelength for starting wavelength scanning should be specified. Enter a value corresponding to the longer wavelength side of the wavelength range under measurement.

## (3) End wavelength

A wavelength for ending wavelength scanning should be specified. Enter a value corresponding to the shorter wavelength side of the wavelength range under observation.

## (4) Scan speed

Set up a scan speed.

## (5) High Resolution

<For U-3900/U-3900H/U-4100/UH4150>

Select high resolution measurement or smoothing processing.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

On : Select “On” for high-resolution measurement when measuring steep spectral data.

Off : Select “Off” for ordinary measurement. In the smoothing operation, 15-point data values are smoothed based on the Savitsky-Golay method. Through this operation, noise-suppressed data can be obtained with the spectral profile intact.

<For UH4150AD+>

**Mode 1:** The measured data is smoothed by the Gaussian method. Data with less noise can be obtained while keeping the shape of the spectral waveform.

Normally you will use the basic.

High: Select “High” for high-resolution measurement when measuring steep spectral data.

Middle: Smooths data at 3 points with the Gaussian method. It is used when higher resolution measurement than standard is required.

Basic: Used for normal measurement. Smooths data at 5 points with the Gaussian method.

Low: Smooths data at 9 points with the Gaussian method. It can obtain data with least noise.

## 2.2 Setting Analytical Conditions

**Mode 2:** Same function with

U-3900/U-3900H/U-4100/UH4150

Select high resolution measurement or smoothing processing.

On : Select “On” for high-resolution measurement when measuring steep spectral data.

Off : Select “Off” for ordinary measurement. In the smoothing operation, 15-point data values are smoothed based on the Savitsky-Golay method. Through this operation, noise-suppressed data can be obtained with the spectral profile intact.

### (6) Baseline correction

Specify baseline correction data. Raw data without baseline correction can be obtained by selecting “None”.

- NOTES:**
1. For ordinary measurement, select the user baseline.
  2. After the spectrophotometer has been powered on, be sure to measure the user baseline before sample measurement.
  3. For sample measurement, be sure to use the same measurement conditions and spectrophotometer parameters as those stored in user baseline measurement.

### (7) Delay

After the  (Start Series) button is pressed, the system waits for a period of time specified in this box and then proceeds to measurement operation. Use this function for providing a wait time for temperature stabilization. In the case of repeated measurements, a wait time specified in this box indicates a period of time to be taken before the start of the first measurement. No wait time is provided for the second and subsequent measurements.

## (8) Cycle Time

This function is effective when “2” or more is specified for “Replicates”. In this box, set up a period of time to be taken from the start of one measurement to the start of the next measurement. If a cycle time specified here is shorter than the actual measurement time, the cycle time is ignored to carry out continuous measurement.

## (9) Auto Zero before each run

Auto zero measurement (100%T in transmission mode, Abs 0 in absorption mode) is carried out before each measurement. In this box, specify a wavelength to be used for auto zero measurement.

## (10) UV Scan speed change function

Use this function for carrying out measurement while changing over a scan speed in the ultraviolet region.  
(Unavailable with U-1900, U-5100, U-2900, U-2910 and U-4100, UH4150, UH4150AD+)

## (11) Speed change Wavelength

Specify a wavelength for scan speed changeover in the UV scan speed changeover measurement.  
(Unavailable with U-1900, U-5100, U-2900, U-2910, U-4100 and UH4150/UH4150AD+)

**NOTES:** 1. The following condition should be satisfied in the setting:

“UV scan speed changeover wavelength” ≤  
“Light source changeover wavelength”

2. The following condition should also be satisfied in the setting:

“Measurement end wavelength” <  
“UV scan speed changeover wavelength” <  
“Measurement start wavelength”

## 2.2 Setting Analytical Conditions

### (12) Scan speed

Set up a scan speed in UV scan speed changeover measurement.

(Unavailable with U-1900, U-5100, U-2900, U-2910 and U-4100/UH4150/UH4150AD+)

### (13) Lamp change mode

Select a light source to be used for measurement.

(Unavailable with U-5100)

### (14) Lamp change wavelength

With the automatic light source changeover function, the D<sub>2</sub> lamp for UV region light or the WI lamp for visible region light is selected automatically. In this box, specify an automatic changeover wavelength for this purpose.

(Unavailable with U-1900 and U-5100)

### (15) WI Lamp

Specify whether the WI lamp is to be turned on or off.

When the **OK** button is clicked and analytical conditions are set up, the WI lamp is turned on or off according to the setting in this box. (Unavailable with U-5100)

### (16) D<sub>2</sub> Lamp

Specify whether the D<sub>2</sub> lamp is to be turned on or off.

When the **OK** button is clicked and analytical conditions are set up, the D<sub>2</sub> lamp is turned on or off according to the setting in this box. (Unavailable with U-5100)

### (17) Slit width

Select a slit width.

(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (18) PMT mode

This function is provided for controlling a high voltage to be applied to the photomultiplier for detection.

(Unavailable with U-1900, U-5100, U-2900 and U-2910)

- Fixed : Select this item for energy mode measurement.  
A high voltage to be applied to the photomultiplier will be fixed at an input value level.
- Auto : Select this item for ordinary measurement.

## (19) PMT voltage

When "Fixed" is selected in the PMT mode box, you can set up a photomultiplier voltage in this box.

(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (20) Sampling interval

Set up an interval of data sampling. For details, refer to Appendix G.

(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (21) Replicates

Enter the number of measurements to be repeated.

## (22) Path correct

In measurement with other than a 10 mm rectangular cell, photometric value data is corrected with respect to that measured with the 10 mm rectangular cell. When the check mark is turned on, compensation is made according a specified cell length.

For example, a photometric value measured with a 5 mm rectangular cell is 0.500 Abs, it is corrected with respect to that measured with the 10 mm rectangular cell, resulting in 1.000 Abs.

**NOTE:** This function is effective in the Abs/O.D. mode.

## (23) Path Length

Specify the optical path length of the cell to be used for measurement.

## 2.2 Setting Analytical Conditions

### (24) Response

Select a response level from the following.

(Unavailable with U-3900, U-3900H, U-4100 and  
UH4150/UH4150AD+)

Slow : Select this level for minimizing a fluctuation in photometric value data.

Medium: Select this level for normal-level response.

Fast : Select this level for high-resolution measurement when measuring steep spectral data.

### (25) Data Interval

This parameter is displayed when the U-5100 is connected.

Set up an interval of data acquisition.

(Unavailable with U-1900, U-2900, U-2910, U-3900,  
U-3900H, U-4100 and UH4150/UH4150AD+)

Normal : Normal interval will be set.

High resolution : Measurement can be carried out at an interval shorter than "Normal."

### (26) Attenuation

In the U-4100/UH4150, an attenuation plate is inserted on the reference side. Of the attenuation plate, an attenuation factor can be set. This factor is usable for a sample whose absorbance is 4 Abs or higher or transmittance/reflectance is 0.1% or lower. For usage, implement the following procedure. In Analysis Method, select 1/10 or 1/100 for Attenuator Factor (attenuation factor of the attenuator plate) and measure the baseline. Then, choose the Attenuator Factor command from the Spectrophotometer menu.

For this command, you must select a factor of 1/10 or 1/100 whichever selected in Analysis Method. After completion of attenuation factor measurement, sample measurement can be carried out.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

None

1/10

1/100

## (27) Detector change correct

This is a function for automatically compensating for a photometric difference between detector changeover points in the near infrared region and visible region when the U-4100/UH4150/UH4150AD+ is used.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

ON  
OFF

## (28) Detector change Wavelength

With use of the U-4100/UH4150/UH4150AD+, you can set a wavelength for changeover between the UV-VIS and NIR region detectors.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Effective input range: 700.0 to 900.0 nm (U-4100/UH4150)  
Effective input range: 700.0 to 920.0 nm (UH4150AD+)

## (29) Scan speed

In the U-4100/UH4150/UH4150AD+, a scan speed in the near infrared region is settable.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

0.75nm/min  
7.5  
37.5  
75  
150  
300  
750  
1500  
3000  
6000

## 2.2 Setting Analytical Conditions

### (30) Slit

In the U-4100/UH4150/UH4150AD+, a slit width in the near infrared region can be set.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Fixed : A desired slit width can be input in increments of 0.1 nm within a range from 0.1 to 20.0 nm.

Auto change: Slit width is automatically controlled according to optical energy level. This is a function for keeping S/N (signal to noise ratio) as constant as possible in the measuring wavelength range. While this function is active for U-4100/UH4150, the slit width automatically changes within a range from about 0.1 to 36 nm.

This auto change cannot be set simultaneously with the light quantity control mode. For UH4150AD+, the upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.

### (31) PbS Gain

In the U-4100/UH4150, sensitivity of the NIR-region detector can be set. This is a function for setting PbS sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (PbS sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a PbS sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

(32) Light Control mode

This is a mode for controlling NIR-region light quantity in the U-4100/UH4150.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

Fixed : Usually this mode is used.

Auto change: This function is used when measurement with the slit width fixed cannot be carried out due to an excessive light quantity in the infrared region.

(33) Baseline name

Set the name of the user baseline. Input the user baseline name. Then click the Set button. This inputted name is displayed in monitor window and the Baseline correct window. (Unavailable with U-1900／U-5100)

(34) Detector Zero Correction

This function is compatible with UH4150 type. By selecting "ON", 0% T zero level is measured at baseline correction execution under the set measurement condition. Correct the transmittance / absorbance of the sample measurement using its 0% T zero level. Depending on the measured wavelength, it is recommended to use when the transmittance is about 0.1% or less and the absorbance is about 3 or more. When "ON" is selected, guidance for Detector Zero Correction is displayed during baseline correction. Follow the guidance, and run Baseline correction and Detector Zero Correction. (Except for U-1900 / U-5100 / U-2900 / U-2910 / U-3900 / U-3900H / U-4100).

(35) Multi-scan

This function is compatible with UH4150 AD+. When it is selected, the multi-scan tab will be displayed. Set the scan speed and attenuator according to the wavelength range.

## 2.2 Setting Analytical Conditions

### (36) Attenuator

This function is compatible with UH4150 AD+.

Set the attenuation on this window. The attenuation is automatically inserted on the reference side.

After selecting the attenuation on the method window, perform baseline measurement. Attenuation is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuation, refer to 6.19 and 6.20.

None

1/10

1/100

1/1000

1/10000

### (37) InGaAs sensitivity

This function is compatible with UH4150 AD+.

Sensitivity of the NIR-region detector can be set. This is a function for setting InGaAs sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (InGaAs sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a InGaAs sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

### 2.2.3 Multi-scan Tab

This function is compatible with UH4150 AD+. Click multi-scan on the instrument tab to display the "Multi-scan" tab (Fig. 2-5). Set the scan speed and attenuator for each wavelength range. It can be divided and set up to 10 blocks. For the setting range of each parameter, refer to "Appendix G Parameter Setting Ranges of Analysis Method".

System baseline measurement, detector zero correction, and detector calibration are performed without use even if multi-scan is set.

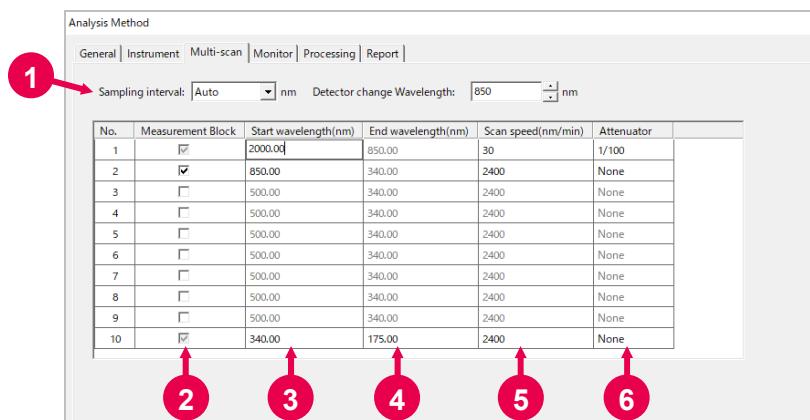


Fig. 2-5 Multi-scan Tab

In this window, set up the following parameters.

(1) Sampling interval

Set up an interval of data sampling. For details, refer to Appendix H Sampling intervals.

(2) Measurement block

Set up the measurement block to be used. Measure the checked No. using the scan speed and attenuator.

(3) Start wavelength

Starting wavelength of the selected block should be specified. Enter a value corresponding to the longer wavelength side of the wavelength range under measurement.

## 2.2 Setting Analytical Conditions

**NOTICE:** For No. 2 to 10 start wavelengths, enter the wavelength based on the No. 1 start wavelength and with the sampling interval (1).

### (4) End wavelength

Ending wavelength of the selected block should be specified. Enter the end wavelength of No.10. Other numbers will be entered automatically.

### (5) Scan speed

Set up a scan speed. UV / visible conditions are displayed at the top and near infrared conditions are displayed at the bottom, so select according to the measurement wavelength range.

The screenshot shows a software interface for setting analytical conditions. At the top, there is a notice about entering start wavelengths for blocks 2 to 10 based on block 1. Below this, the 'Scan speed' section is highlighted. It features a table with 10 rows, each representing a measurement block. The columns are: No. (block number), Measurement Block (checkbox), Start wavelength(nm) (value), End wavelength(nm) (value), Scan speed(nm/min) (dropdown menu), and Attenuator (dropdown menu). The 'Scan speed(nm/min)' dropdown is currently set to 0.3 nm/min. A red bracket on the right side of the interface groups the 'UV,VIS' and 'NIR' sections. The 'UV,VIS' section contains a list of scan speeds: 30, 2400, 0.3, 3, 10, 15, 30, 60, 120, 300, 600, 1200, 2400, 0.75, 3, 10, 30, 75, 150, 300, 750, 1200, 1500, 3000, and 6000. The 'NIR' section contains a list of scan speeds: 3, 10, 30, 75, 150, 300, 750, 1200, 1500, 3000, and 6000. Red arrows point from the 'UV,VIS' and 'NIR' labels to their respective dropdown menus.

No.	Measurement Block	Start wavelength(nm)	End wavelength(nm)	Scan speed(nm/min)	Attenuator
1	<input checked="" type="checkbox"/>	2000.00	850.00	30	1/100
2	<input checked="" type="checkbox"/>	850.00	500.00	2400	None
3	<input checked="" type="checkbox"/>	500.00	340.00	0.3	None
4	<input type="checkbox"/>	500.00	340.00	3	None
5	<input type="checkbox"/>	500.00	340.00	10	None
6	<input type="checkbox"/>	500.00	340.00	15	None
7	<input type="checkbox"/>	500.00	340.00	30	None
8	<input type="checkbox"/>	500.00	340.00	60	None
9	<input type="checkbox"/>	500.00	340.00	120	None
10	<input checked="" type="checkbox"/>	340.00	175.00	300	None

Fig. 2-6 Multi-scan Tab

## (6) Attenuator

Set the attenuator on this window. The attenuator is automatically inserted on the reference side.

After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19 and 6.20.

None

1/10

1/100

1/1000

1/10000

## 2.2 Setting Analytical Conditions

### 2.2.4 Monitor Tab

When you select the Monitor tab, the window shown in Fig. 2-7 will appear. For the setting range of each parameter in this window, refer to Appendix F.

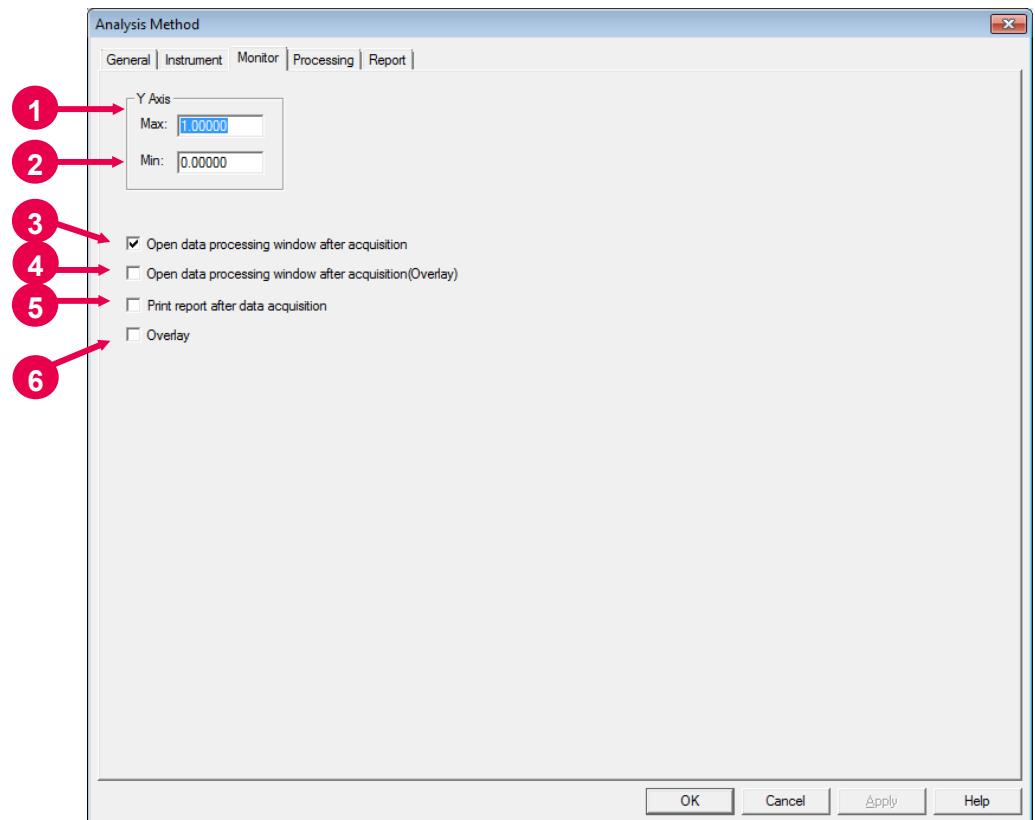


Fig. 2-7 Monitor Tab

In this window, set up the following parameters.

(1) Y Axis (Max.)

Enter a maximum value of the axis of ordinates in the Monitor window.

(2) Y Axis (Min.)

Enter a minimum value of the axis of ordinates in the Monitor window.

(3) Open data processing window after acquisition

Specify whether or not to carry out data processing after sample measurement. With this item selected (with the check mark turned on), the data processing window will appear after completion of sample measurement.

Further, with “Overlay” selected (with the check mark turned on), measured data is indicated as an icon after completion of measurement.

(The icon shown at right is provided →  )

By clicking this icon, you can carry out data processing such as peak detection.

**NOTE:** If the remaining free space of the main memory of the PC being used is insufficient (less than 20% of system resource), the data processing window will not open even when this item is turned on. In this case, close the data processing window being opened, or restart the UV Solutions program.

(4) Open data processing window after acquisition (Overlay)

Specify whether or not to carry out data processing with spectra overlaid after sample measurement. This item is selectable when the check mark of “Open data processing window after acquisition” is turned on. Note that this function is not available for repeated measurements.

(5) Print report after data acquisition

Specify whether or not to print out result data after sample measurement. With this item selected (with the check mark turned on), result data will be printed out automatically after measurement. In this printing, items specified in the Report tab page are included. When this item is not selected, you can select [file] – [Open] to read out the file concerned for printout.

(6) Overlay

Spectra are overlaid in the Monitor window. Note that this function is not available when 2 or larger value is entered for Replicates on the Instrument tab.

## 2.2 Setting Analytical Conditions

### 2.2.5 Processing Tab

When you select the Processing tab, the window shown in Fig. 2-8 will appear. For the setting range of each parameter, refer to Appendix F.

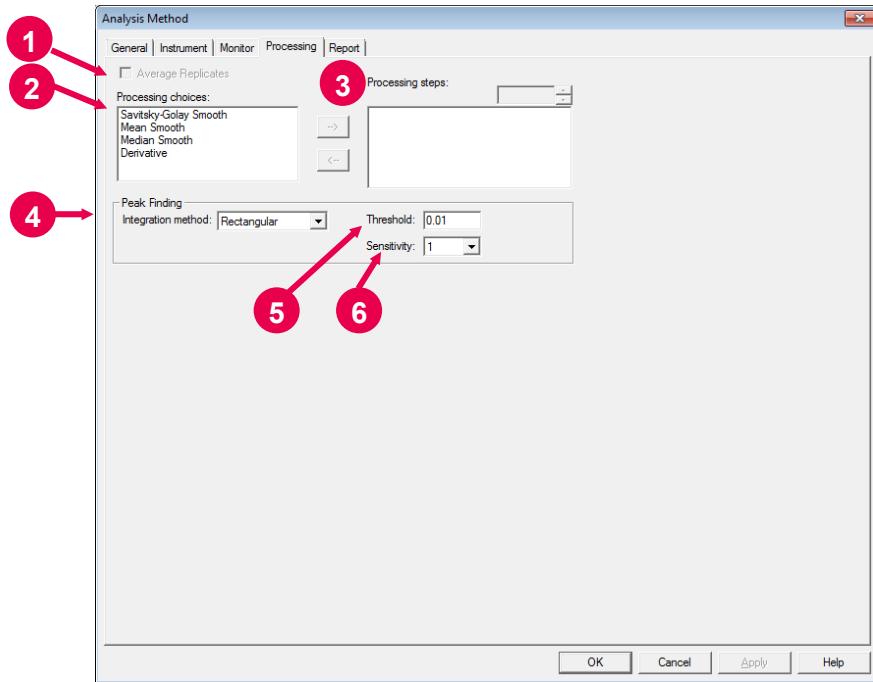


Fig. 2-8 Processing Tab

#### (1) Average Replicates

This item is effective when “2” or more is specified in the “Replicates” box on the Instrument tab page. With the check mark of this item turned on, average spectral data is indicated in repeated measurements.

#### (2) Processing choices

A list of data processing methods is presented. Select a desired data processing method, and click the right-arrow button (→). Then, the selected processing method will be indicated in the field “Processing steps”. For instance, when “Derivative” is selected and the → button is clicked, “Derivative” is indicated in the field “Processing steps” as shown in Fig. 2-9.

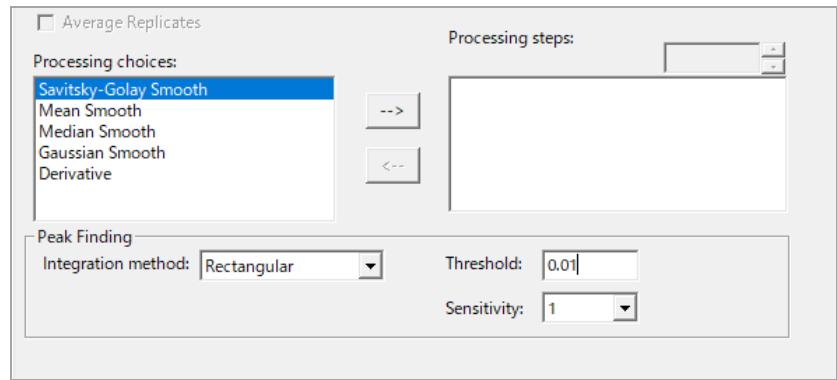


Fig. 2-9

### (3) Processing steps

This field indicates the sequence of data processing operations. After measurement, data processing operations will be carried out in the sequence specified here.

**How to delete a processing method:**

To remove a processing method, select it and click the left-arrow button ( | <- ). The processing method being selected will then disappear from the field “Processing steps”.

**How to indicate/change parameters:**

In the field “Processing steps”, clicking the [+] mark will present a list of parameters. Then, to change a parameter, click its name. For example, to change a parameter of “Derivative”, click the [+] mark indicated at the left of “Derivative” (see Fig. 2-9). The parameters regarding the current derivative (Derivative order, Smoothing order, Number of points) will then be indicated. To change the order of derivative, click its indication to allow you to change its relevant values as shown in Fig. 2-10.

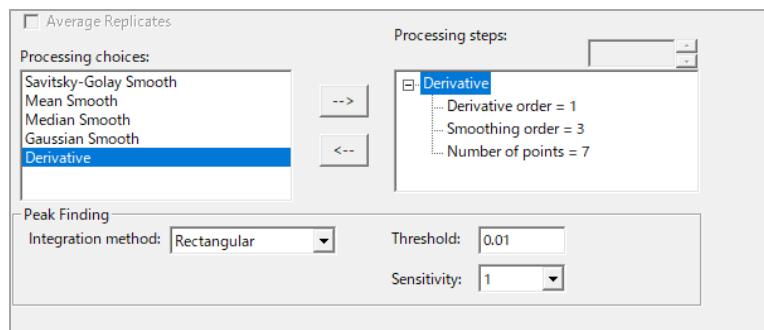


Fig. 2-10

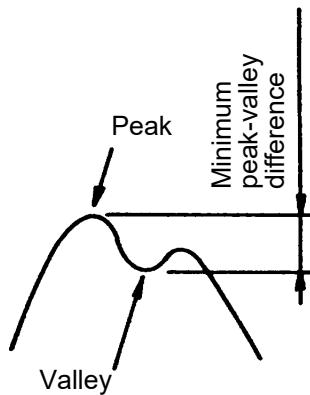
## 2.2 Setting Analytical Conditions

### (4) Peak Finding: Integration method

Select a method of calculating an area presented on the peak table concerned.

### (5) Peak Finding: Threshold

Specify a minimum photometric value difference (peak-valley difference) to be used for definition of a peak.

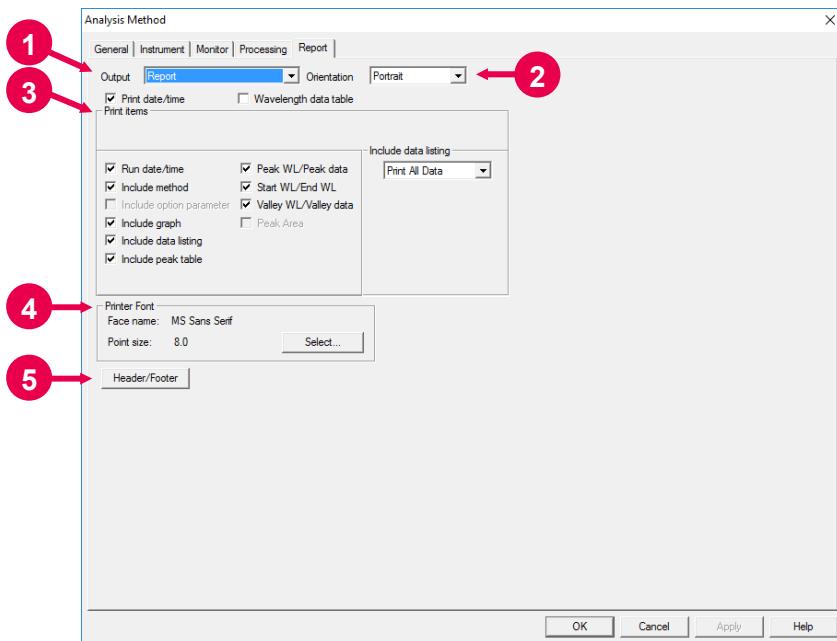


### (6) Peak Finding: Sensitivity

Select the number of data points in the axis of abscissas. For detection of a sharp peak, it is advisable to specify "1" in this box. For detection of a broad peak, select "8" in this box.

## 2.2.6 Report Tab

When you select the Report tab, the window shown in Fig. 2-11 will appear. For the setting range of each parameter, refer to Appendix F.



**Fig. 2-11 Report Tab**

In this window, you can select a method and items of output of measured result data.

### (1) Output

- Report

Specified items are printed in a report form. For details of the printout procedure, refer to 2.6.

- Use Microsoft Excel

Specified items are exported to the Microsoft Excel. For details of data export, refer to 5.13.

- Use print generator sheet

This function is available for use of the report generator (option). For how to use the report generator, refer to the instruction manual accompanying it.

## 2.2 Setting Analytical Conditions

### (2) Orientation

This function is selectable when “Report” is selected in the Output box. Specify the orientation of printing to be taken, i.e., select the portrait or landscape form. When the Landscape form is selected, the items to be printed are Print date/time, Run date/time and Include method.

### (3) Print items

- Print date/time
- Wavelength data table

The data table corresponding to a specified wavelength is printed (transferred). To change a specified wavelength, use the Wavelength tab page available in option or properties setting.

- Run date/time  
The date and time analyzed are printed.
- Include method
- Include graph
- Include data listing

#### Print All Data

All the data in the range of measurement are printed (transferred) at sampling intervals.

#### Constant

Data covered by two wavelengths are printed (transferred) at fixed intervals. Specify a value of data interval, start wavelength, and end wavelength.

#### Select data

Data corresponding to specified wavelengths are printed (transferred). Up to 12 wavelengths can be specified.

By clicking a wavelength, you can edit its data.

Set up a wavelength within the range of measurement specified in the Instrument tab page.

- Include peak table

Select items to be output to the peak table concerned.

By turning on the check mark of “Include peak table”, you can select the following output items.

Peak WL/Peak data

Start WL/End WL

Valley WL/Valley data

Peak Area

## (4) Printer Font

If it is desired to change the font to be used for reporting, click the **Select...** button.

## (5) Header/Footer

If it is desired to use header/footer in the report, click this button.

## 2.3 Defining Samples

### 2.3 Defining Samples

#### 2.3.1 Not Using a Sample Table

(Refer to “2.3.2 Using a Sample Table” when “6 Cell Mode On” and “6 cell control mode On” are selected on the General tab page with the U-5100 connected.)

In cases where “Use Sample Table” is left unchecked in the Analysis Method window, it is required to define a sample before measurement as instructed below.

- (1) Click the  (Sample/Comment) button, and the window shown in Fig. 2-12 will then appear.

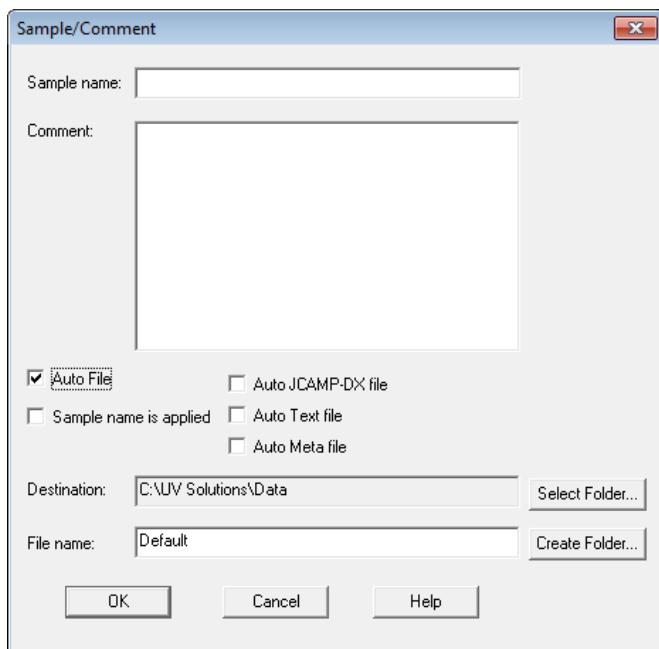


Fig. 2-12

- (2) Enter a sample name and comment.

Maximum allowable number of input characters  
(single-byte characters)

Sample name : 40 characters

Comment : 255 characters

For automatic saving, turn on the check mark of “Auto File” and specify the name of a destination file for saving.  
The **Select...** button is available for file name selection.

Using this button, you can specify a file name as the destination for saving.

By turning on the check mark of “Auto File”, you can select “Auto JCAMP-DX file”, “Auto Text file”, or “Auto Meta file”.

Thus, simultaneously with automatic saving of a wavelength scan data file, one of the following types of files can also be saved automatically.

- JCAMP-DX Files (\*.dx)
- ASCII Text Files (\*.txt)
- Graph Meta Files (\*.wmf)

At the time of saving, a specified destination file name is used.

(3) On completion of the above settings, click the **OK** button.

## 2.3 Defining Samples

### 2.3.2 Using a Sample Table

In cases where “Use Sample Table” is specified in the Analysis Method window, define samples before measurement as instructed below.

(With the U-5100, a sample table is also usable on condition that “6 Cell Mode” and “6 cell control mode” are both activated on the General tab page. In this case, the maximum number of samples is limited to 5. The set number of samples will automatically be measured.)

Open the Monitor window, and click the  (Edit Sample Table) button. The sample table window shown in Fig. 2-13 will then appear. In this window, enter each sample name and comment. Then, specify a destination folder for saving data, and set up a file name.

- (1) To create a new sample table, enter the number of samples and then click the **Update** button. For example, when five samples are to be measured, enter “5” in the box “Number of Samples”, and then click the **Update** button.

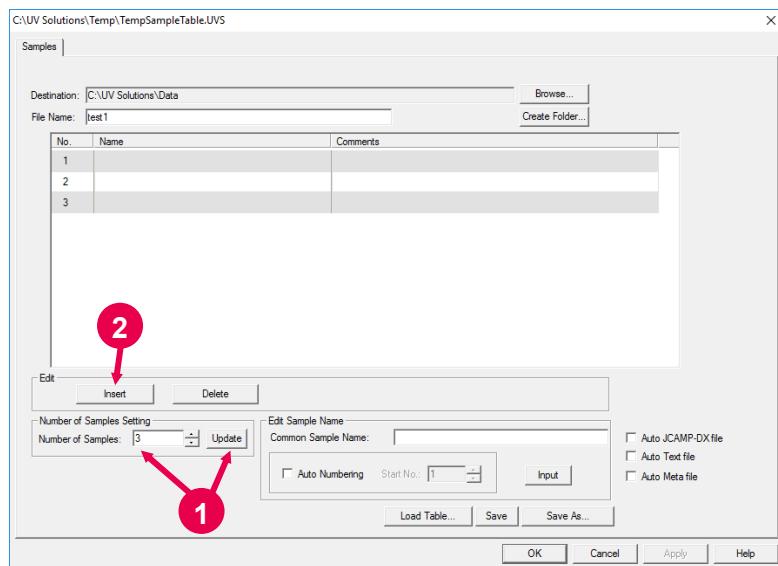


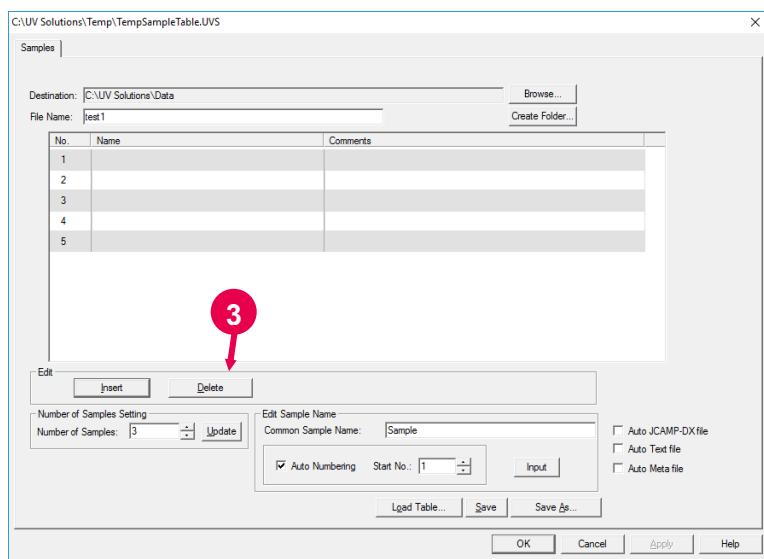
Fig. 2-13 Sample Table

If there is an existing sample table having the same name as that of the new sample table to be created, the following confirmation message will appear:

“Changing the number of sample entries will clear all existing records. Are you sure you want to continue?”

- Yes : The new sample table corresponding to the specified number of samples will be created.  
 No : An attempt of creating the new sample table is canceled.

- (2) To add a row to the end of the sample table being displayed, click the **Insert** button. Each click of this button causes one row to be added to the end of the sample table.
- (3) As shown in Fig. 2-14, you can remove an unnecessary row. For this purpose, click the “No.” field of the row to be removed so that it will be highlighted. Then, click the **Delete** button.



**Fig. 2-14**

The highlighted row can thus be deleted.

- (4) For each sample, you can enter its name and comment by clicking the relevant fields in the sample table.

Maximum allowable number of input characters  
 (single-byte characters)

Name : 40 characters

Comments : 255 characters

## 2.3 Defining Samples

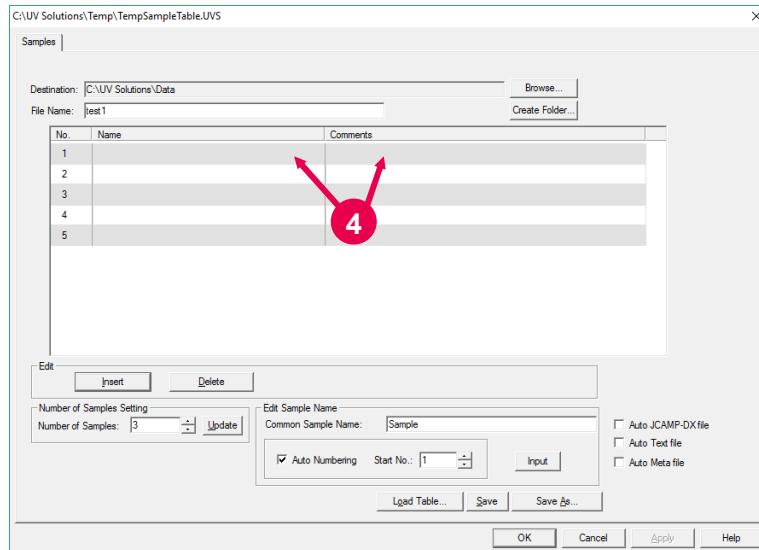


Fig. 2-15

For the U-5100, the function for baseline measurement before sequence is provided. When the check box for this function is turned on, baseline correction will be carried out with cell A before sample measurement. After the baseline correction, sample measurement is carried out. Unless the check box is turned on, sample measurement starts without baseline correction. Therefore, baseline correction is always required before start of measurement.

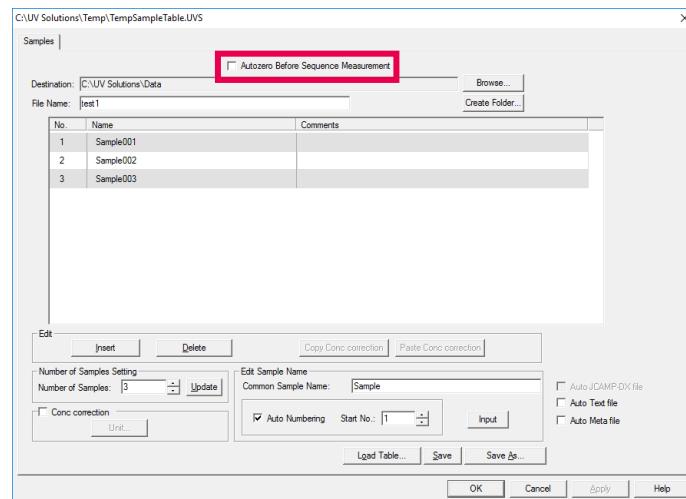


Fig. 2-16 Function for Baseline Correction before Sequence in U-5100

## (5) Collective Input of Sample Names

In the following procedure, you can also set up a group of sample names in the form of “Common Sample Name + Start No.”, “Common Sample Name + Start No. incremented by one”, and so on.

- 1) Enter a common name to a group of samples concerned. Up to 36 characters can be used (single-byte characters).  
(Example: SolutionA)
- 2) Turn on the check mark of “Auto Numbering”, and then specify the Start No..  
(Example: Start No. = 1)
- 3) Select the first row of the group of samples by clicking the corresponding “No.” field in the sample table. Specify the remaining rows for the group of samples. For this purpose, while holding down the Ctrl key, click the “No.” field of each sample name.

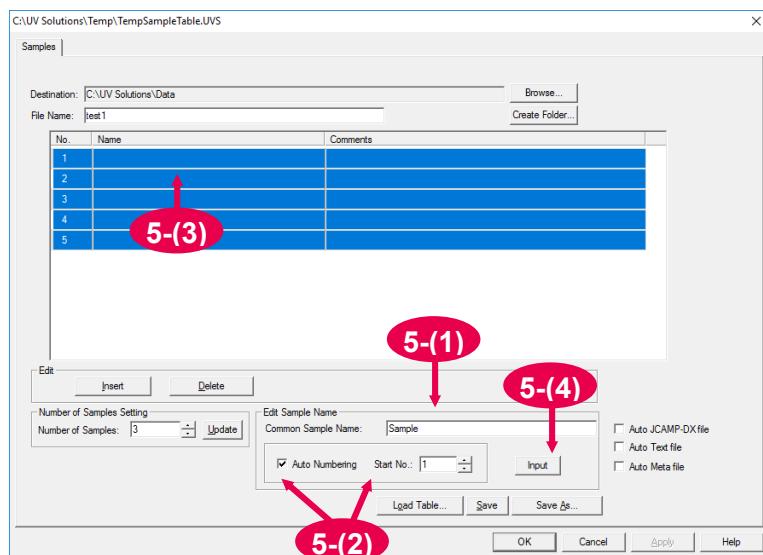


Fig. 2-17

## 2.3 Defining Samples

- 4) Then, press the [**Input**] key, and the common sample names will be set up in the form of “Common Sample Name + Start No.”, “Common Sample Name + Start No. incremented by one”, and so on.  
(In the example shown in Fig. 2-17, sampleA001 to sampleA005 are set up.)  
If the check mark of “Auto Numbering” is not turned on, pressing the **Input** button will cause the common sample name to be set on the active rows.

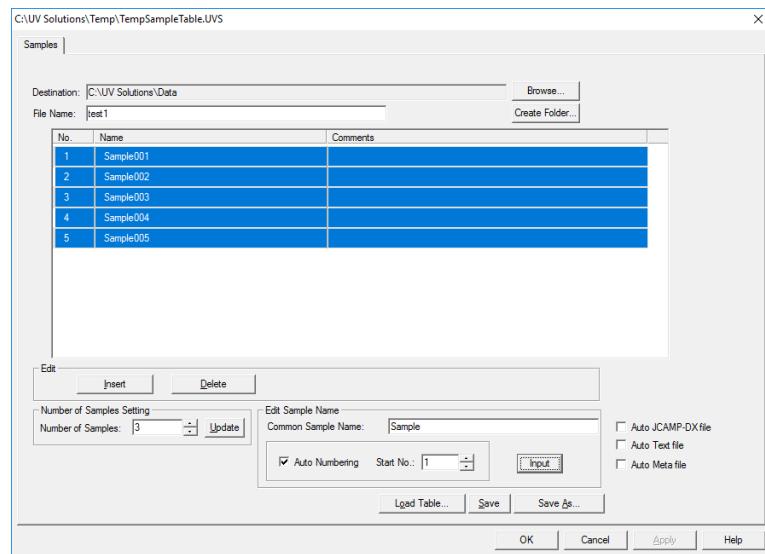


Fig. 2-18

- (6) Specify the destination folder for saving data files.  
To set up the destination folder for data saving, take the following procedure.

- (a) To use any existing destination folder for data saving, click the **Browse** button to open the Browse for Folder dialog box. In this box, select a desired folder, and press the **OK** button.

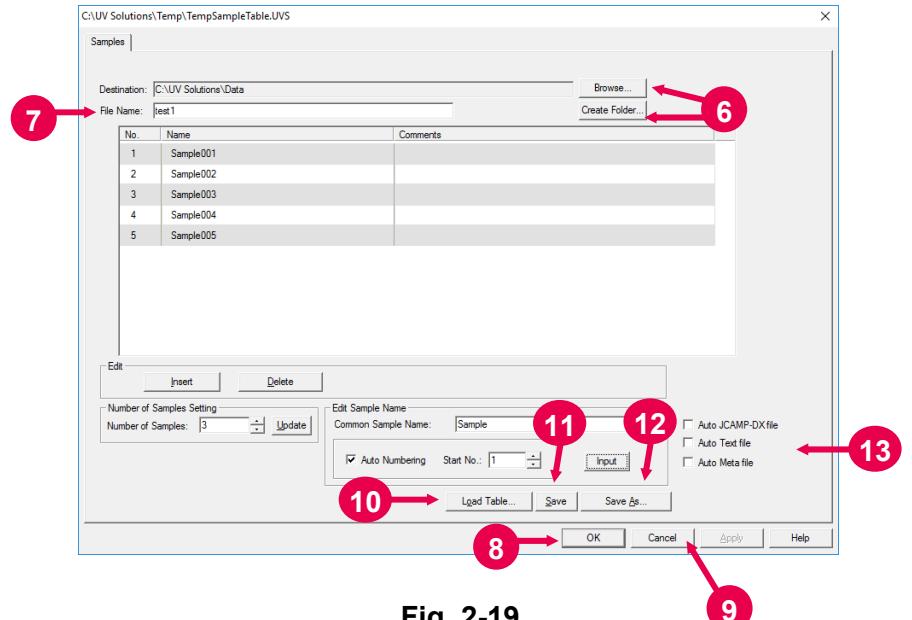


Fig. 2-19

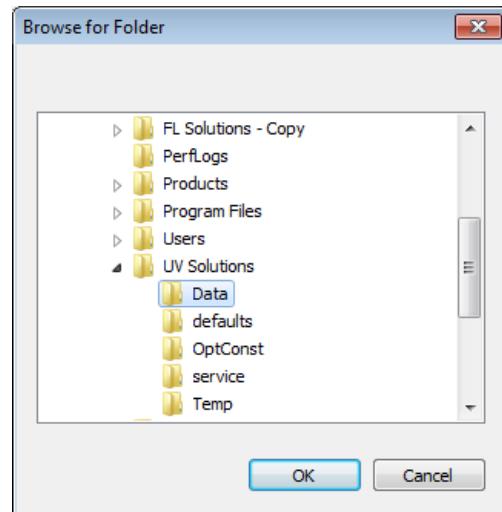


Fig. 2-20 Browse for Folder Dialog Box

## 2.3 Defining Samples

- (b) To create a new destination folder for data saving, take the following procedure.
- 1) Click the **Browse** button to open the Browse for Folder dialog box as shown in Fig. 2-20. Specify a path for folder creation.
  - 2) Click the **Create Folder** button to open the Create New Folder dialog box as shown in Fig. 2-21. In this dialog box, enter a folder name in the Name field, and click the **OK** button. A new folder having the specified name will be created under the current folder.

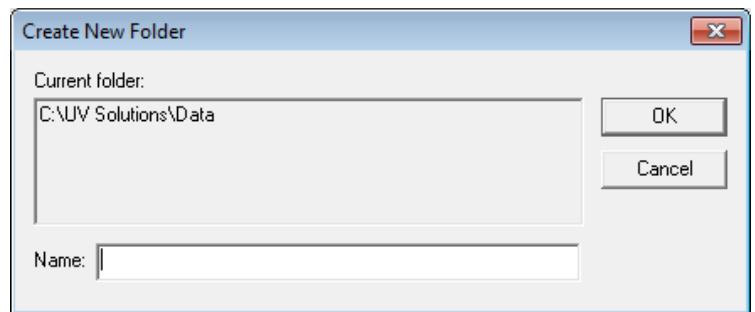
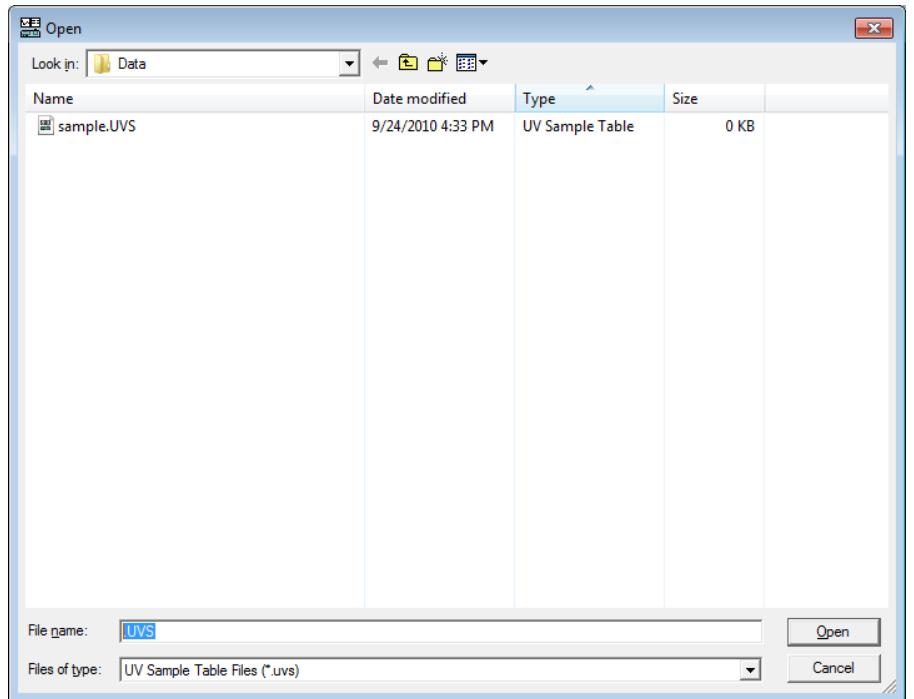


Fig. 2-21 Create New Folder Dialog Box

- (7) Enter a file name. (Example: test1)  
In the destination folder, each data file is stored with "File name – Sample number". (Example: test1-001.uds)  
If the number of repeated measurements ≥ 2, each data file is stored with "File name – Sample number – Repeat number". (Example: test1-001-01.uds)  
Further, if there is an existing file having the same name, each data file is stored with "Data file name + Date and time measured". (Example: test1-001\_20100811164856.uds)
- (8) After checking that information necessary for the sample table has been entered, click the **OK** button.  
This completes the setting of the sample table.
- (9) **Cancel** Button  
Clicking this button causes the input information to be abandoned.

(10) **Load Table...** Button

Use this button to read out an existing sample table.  
When the **Load Table...** button is clicked, the Open dialog box will appear.



**Fig. 2-22 Open Dialog Box**

In this dialog box, select a desired sample table, and click the **Open** button. Then, the specified sample table will be read out.

(11) **Save** Button

Use this button to overwrite data that has been altered.  
When a new file is to be created, the Save As dialog box will come up.

(12) **Save As...** Button

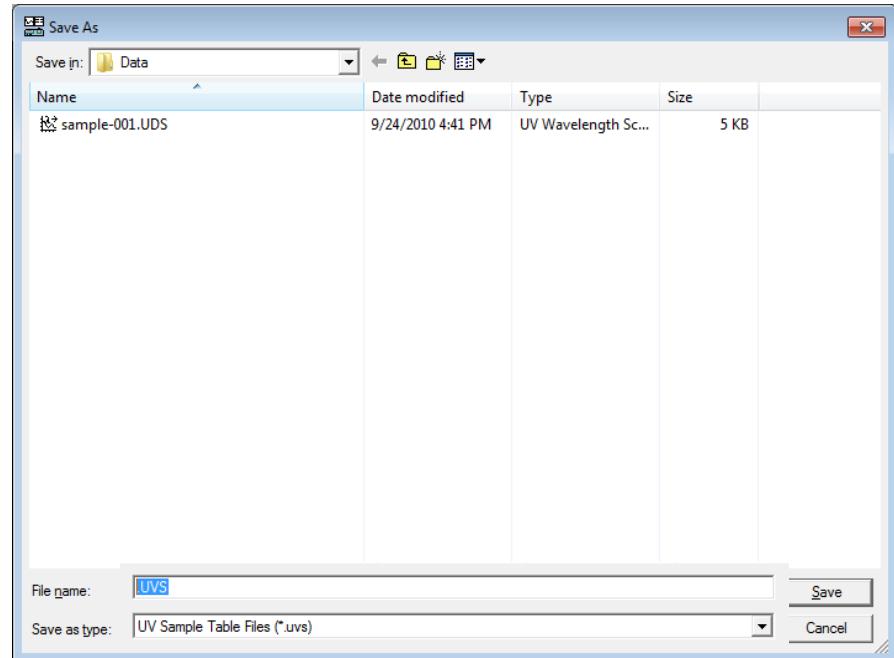
Use this button to save a file with a new name.  
Clicking this button will present the Save As dialog box.

## 2.3 Defining Samples

### (13) Auto file Button

Use this button to save a file after measurement automatically.

- Auto JCAMP-DX file
- Auto Text file
- Auto Meta File



**Fig. 2-23 Save As Dialog Box**

In this dialog box, select a destination folder for saving, enter a file name, and then click the **Save** button.

## 2.4 Baseline Measurement

There are two kinds of baselines to be measured; user baseline and system baseline. The system baseline is intended to inspection of the instrument. For common measurement applications, use the user baseline. Setting of the system baseline is not selectable for the U-1900 and U-5100.

### 2.4.1 Measuring User Baseline

Set a blank sample in the cell holder, and select the Record Baseline (B) command from the Spectrophotometer (S) menu, or click the  button. The dialog box shown in Fig. 2-24 will then appear.



Fig. 2-24

Select the user baseline specified in the baseline setting on the Instrument tab page (User 1 or User 2). (This selection is not provided for the U-1900 and U-5100.)

Then, click the **OK** button, and user baseline measurement will then be carried out. In sample measurement, data corrected with respect to the user baseline can thus be obtained.

When 6-cell mode is activated with the U-5100 connected, baseline correction will be carried out at the position of cell A. Therefore, a blank sample needs to be set in cell A.

## 2.4 Baseline Measurement

### 2.4.2 Measuring System Baseline (excluding U-1900 and U-5100)

Make sure that no samples are set on the sample-side position and reference-side position of the cell holder. Then, select the Record Baseline (B) command from the Spectrophotometer (S) menu, or click the  button.

The dialog box shown in Fig. 2-24 will then appear. In this dialog box, select "System" and click the **OK** button to carry out system baseline measurement.

The system baseline correction function is effective under the condition that "System" is selected in the baseline setting on the Instrument tab page. In sample measurement, data corrected with respect to the system baseline can thus be obtained.

## 2.5 Measurement

### 2.5.1 Not Using a Sample Table

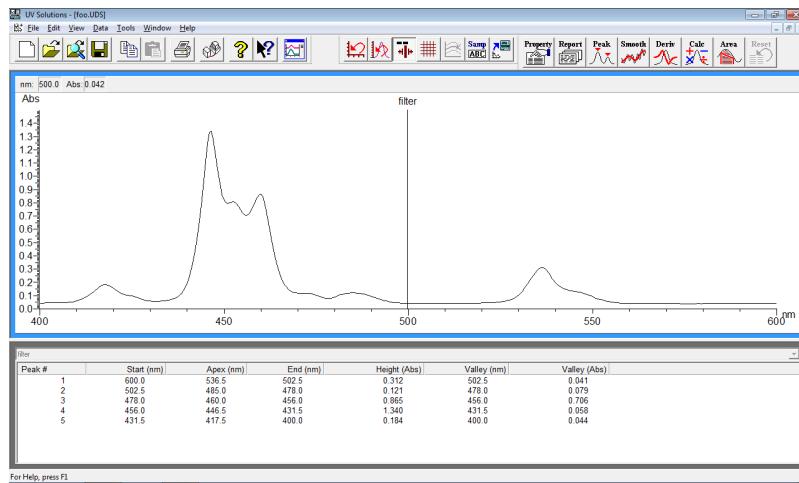
[With U-1900, U-5100 (6-cell mode OFF), U-2900, U-2910, U-3900, U-3900H, U-4100 and UH4150/UH4150AD+]

- (1) Click the  (Sample/Comment) button, and check that the relevant sample definitions have been made.
- (2) Set a baseline sample (blank) in the sample compartment, and click the  (Record Baseline) button.  
(Refer to 2.4.)
- (3) After completion of user baseline measurement, set the sample concerned, and click the  (Start Series) button. The measurement of the sample will be carried out, and its spectrum will be displayed.  
To abandon the measurement being executed, click the  (Stop Command) button.
- (4) On completion of the measurement with the auto save setting specified, the measured data is automatically saved under a specified destination file name.  
If there is an existing file with the same name, the measured data is saved with “Data file name + Date and time measured”.  
(Example: data1\_20100811164856.udf)

If the auto save setting has not been specified, select the “Save As...” command from the File menu for saving the measured data.

When the data file thus saved is opened, the Data Processing window will be presented as shown in Fig. 2-25. In the example shown in Fig. 2-25, the spectral chart and peak table are presented. It is also possible to display the specified wavelength data table. Note, however, that the peak table and the specified wavelength data table cannot be displayed at the same time. For selection of the peak table or the specified wavelength data table, use the View menu.

## 2.5 Measurement



**Fig. 2-25 Data Processing Window (wavelength scan)**

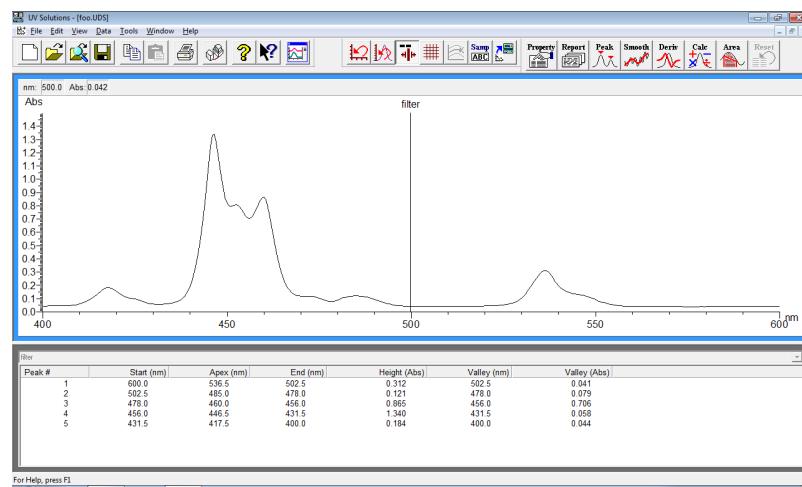
[With U-5100 (6 Cell Mode On)]

- (1) Click the (Sample/Comment) button, and check that the relevant sample definitions have been made.
- (2) Set a baseline sample (blank) in cell A of the sample compartment, and click the (Record Baseline) button. (For details, refer to 2.4.)
- (3) After completion of user baseline measurement, set the sample concerned at a desired cell position. Click the (Move Cell) button to move the 6-cell turret to the cell position for measurement. Click the (Start Series) button. The measurement of the sample will be carried out, and its spectrum will be displayed. To abandon the measurement being executed, click the (Stop Command) button.
- (4) On completion of the measurement with the auto save setting specified, the measured data is automatically saved under a specified destination file name. If there is an existing file with the same name, the measured data is saved with "Data file name + Date and time measured".  
(Example: data1\_20100811164856.udis)

If the auto save setting has not been specified, select the “Save As...” command from the File menu for saving the measured data.

When the data file thus saved is opened, the Data Processing window will be presented as shown in Fig. 2-26. In the example shown in Fig. 2-26, the spectral chart and peak table are presented. It is also possible to display the specified wavelength data table. Note, however, that the peak table and the specified wavelength data table cannot be displayed at the same time. For selection of the peak table or the specified wavelength data table, use the View menu.

- (5) For measuring the next sample, click the  button again to move the 6-cell turret to a desired cell position for measurement. Then, click the 



**Fig. 2-26 Data Processing Window (wavelength scan)**

## 2.5 Measurement

### 2.5.2 Using a Sample Table

[With U-1900, U-5100 (6 Cell Mode Off), U-2900, U-2910, U-3900, U-3900H, U-4100 and UH4150/UH4150AD+]

- (1) Click the  (Edit Sample Table) button, and check that the relevant sample definitions have been made.
- (2) Set a baseline sample (blank) in the sample compartment, and click the  (Record Baseline) button.
- (3) After completion of user baseline measurement, click the  (Start Series) button. Then, the window shown in Fig. 2-27 will appear. Set the sample concerned, and click the **Yes** button.  
If you need to have confirmation dialog of setting a sample, please check (1).

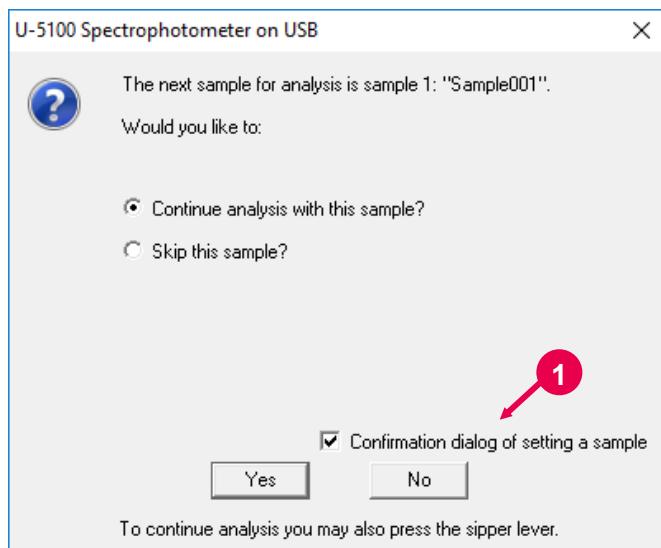


Fig. 2-27

- (4) The dialog box shown in Fig. 2-28 will then appear.

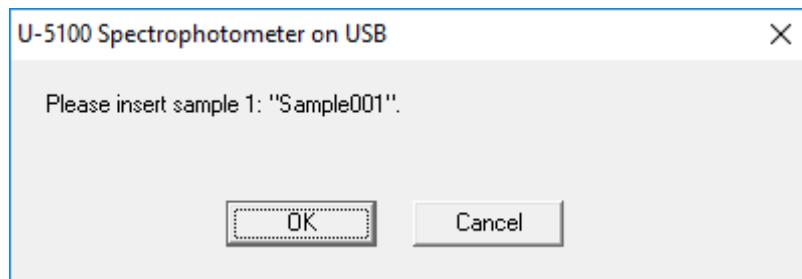


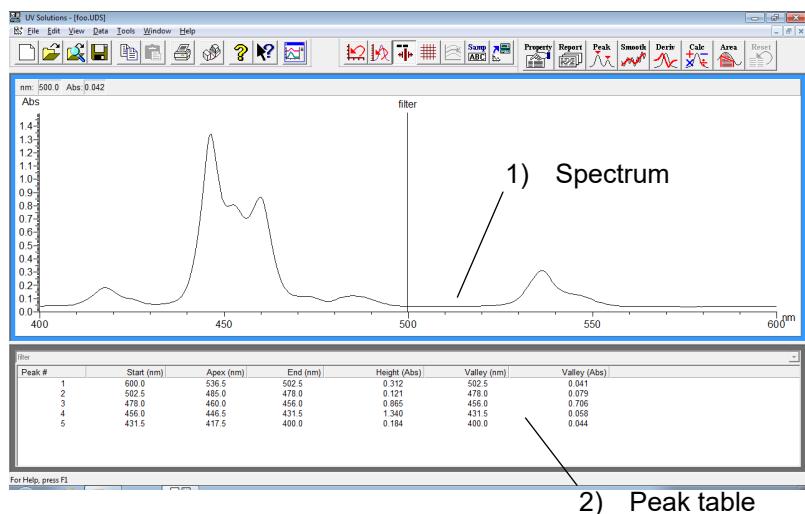
Fig. 2-28

To start the measurement of the sample concerned, click the **OK** button.

To abandon the measurement being executed, click the  (Stop Command) button.

For the number of samples specified in the sample table, repeat measurements according to the guide messages.

- (5) On completion of the measurements, the measured data is automatically saved under a specified destination file name. When the data file thus saved is opened, the Data Processing window will be presented as shown in Fig. 2-29.



**Fig. 2-29 Data Processing Window (wavelength scan)**

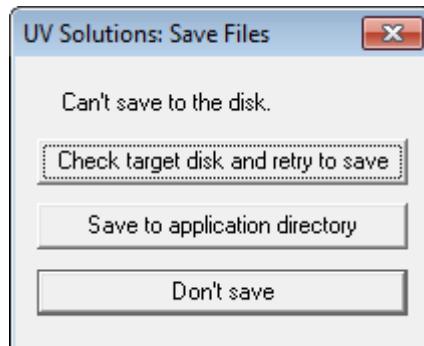
### 1) Spectrum

The spectrum of the sample measured is displayed.

### 2) Peak table

The peak wavelengths, peak heights, and valley wavelengths are indicated.

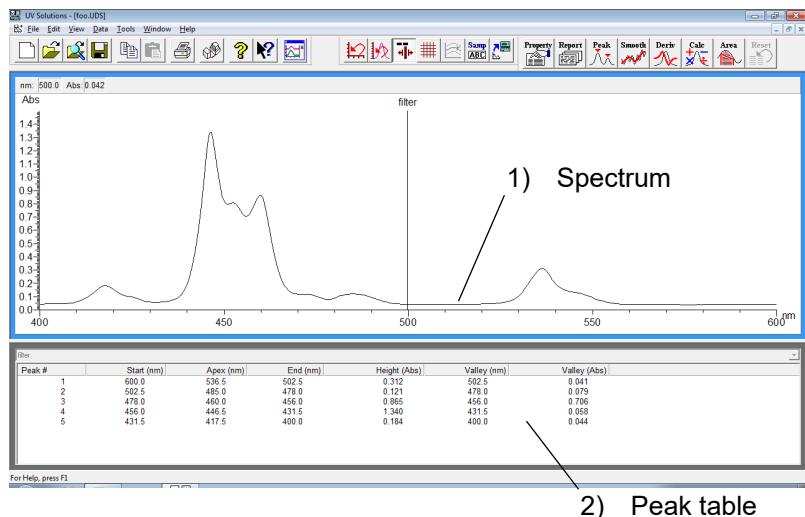
- NOTES:**
1. Data measured under the following conditions will be automatically saved in “¥UV Solutions¥Data”.  
(Example: C:¥UV Solutions¥Data)  
A measurement is carried out under the conditions that the sample table is not used, “Auto File” is specified, and no file name is specified.
  2. For the data measured under the following conditions, a guidance “Can't save to the disk” will be displayed. According to the guidance, select the subsequent measure.
    - (1) A measurement is carried out under the condition that there is no sufficient free space on a specified storage medium (floppy disk, MO, etc.).
    - (2) A measurement is carried out under the condition that a specified storage medium is write-inhibited.



[With U-5100 (6 Cell Mode On)]

- (1) Click the  (Edit Sample Table) button, and check that the relevant sample definitions have been made.  
The sample must be set at the same cell position as the sample No. set in the sample table. (Example: For sample No. 1, cell 1 must be set.)
- (2) Set a baseline sample (blank) in cell A of the sample compartment. When the check mark of “Baseline measurement before sequence” is not turned on in the sample table, click the  (Record Baseline) button to carry out baseline measurement.

- (3) Click the  (Start Series) button, and measurement starts.  
To abandon the measurement being executed, click the  button.  
The number of samples specified in the sample table will automatically be measured.
- (4) On completion of the measurements, the measured data is automatically saved under a specified destination file name. When the data file thus saved is opened, the Data Processing window will be presented as shown in Fig. 2-30.



**Fig. 2-30 Data Processing Window (wavelength scan)**

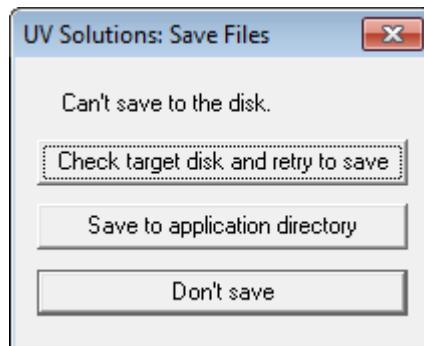
### 1) Spectrum

The spectrum of the sample measured is displayed.

### 2) Peak table

The peak wavelengths, peak heights, and valley wavelengths are indicated.

- NOTES:**
1. Data measured under the following conditions will be automatically saved in “¥UV Solutions¥Data”.  
(Example: C:¥UV Solutions¥Data)  
A measurement is carried out under the conditions that the sample table is not used, “Auto File” is specified, and no file name is specified.
  2. For the data measured under the following conditions, a guidance “Can't save to the disk” will be displayed. According to the guidance, select the subsequent measure.
    - (1) A measurement is carried out under the condition that there is no sufficient free space on a specified storage medium (floppy disk, MO, etc.).
    - (2) A measurement is carried out under the condition that a specified storage medium is write-inhibited.

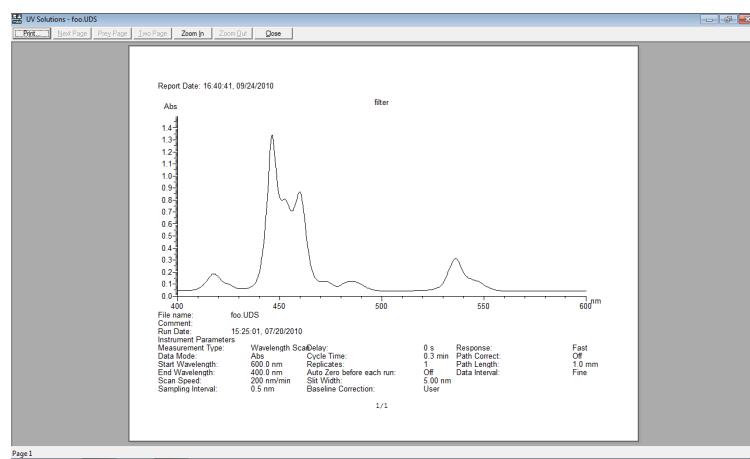


## 2.6 Printing Data

Data can be printed out even if the function of auto printing after measurement is not specified. For printing out data, the following two procedures are available.

### [Printout from file menu]

Click the spectral chart area, and its outline will be highlighted in cyan. In this state, select the Print command from the File menu and click the **OK** button, or click the  (Print) button on the toolbar. The field that is active in the data processing window (1) in Fig. 2-30 will be printed out. What is displayed by clicking the Print Preview command of the File menu will be printed out as shown below.



**Fig. 2-31**

## 2.6 Printing Data

[Printout from Print button]

Select the Report command from the Data menu, or click the (Report) button on the toolbar. The Print Preview window will then appear as shown in Fig. 2-32. In this window, select the Print button.

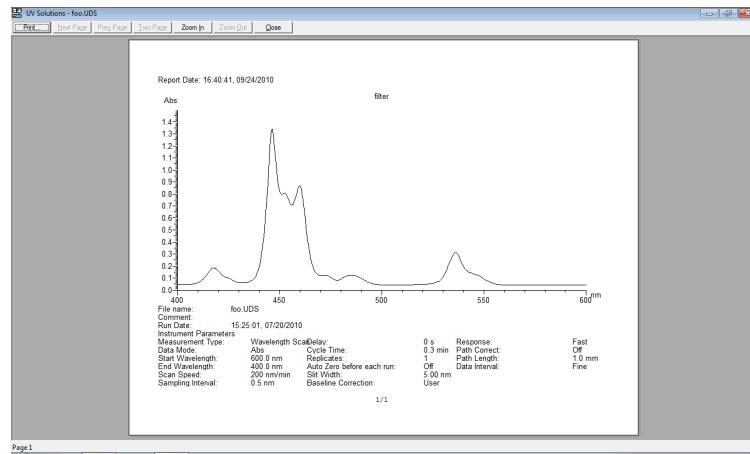


Fig. 2-32

**NOTE:** If data acquired through repeated measurement or overwriting cannot be contained within the portrait form, select “Landscape” in the orientation setting on the Report tab page shown in Fig. 2-33.

For selection of printing items, take the following procedure.

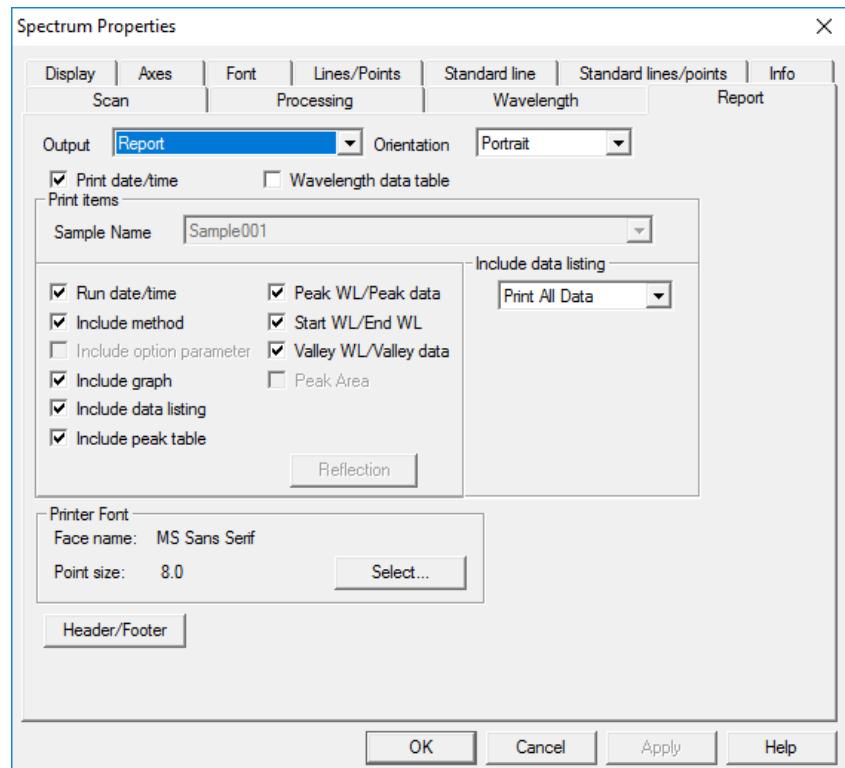
Click the  (Properties) button, and the Spectrum Properties window will then appear.



Select the Report tab, and the dialog box shown in Fig. 2-33 will come up.



On this tab page, set up printing items as required.



**Fig. 2-33**

### 3. TIME SCAN

#### 3.1 Flow of Operation

This section describes the condition setting and operation method for time scan. Measurement is to be carried out in the operational flow shown below.

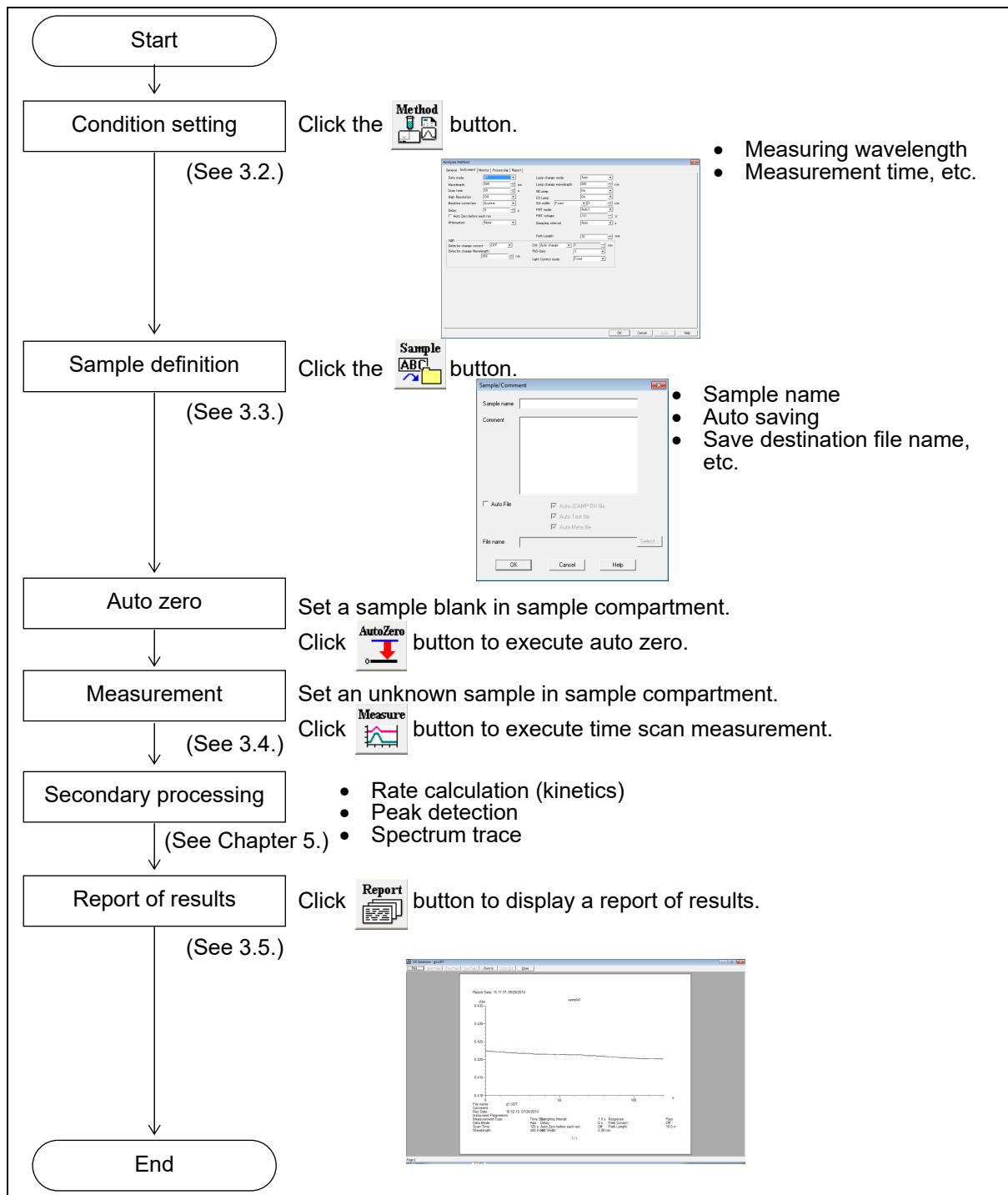


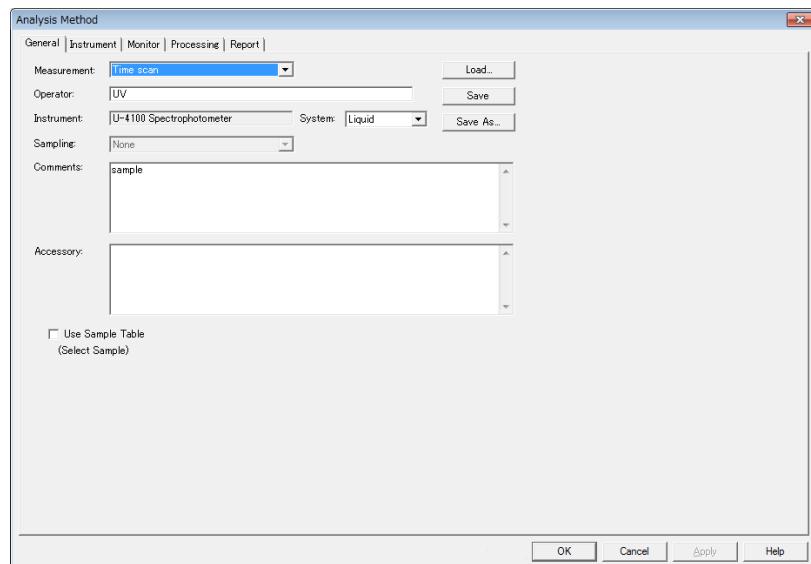
Fig. 3-1 Flow of Operation (time scan)

### 3.2 Setting Analytical Conditions

## 3.2 Setting Analytical Conditions

Analytical conditions must be set prior to measurement.

Click the  (Edit Method) button on the measurement toolbar, and a window as shown in Fig. 3-2 will appear.



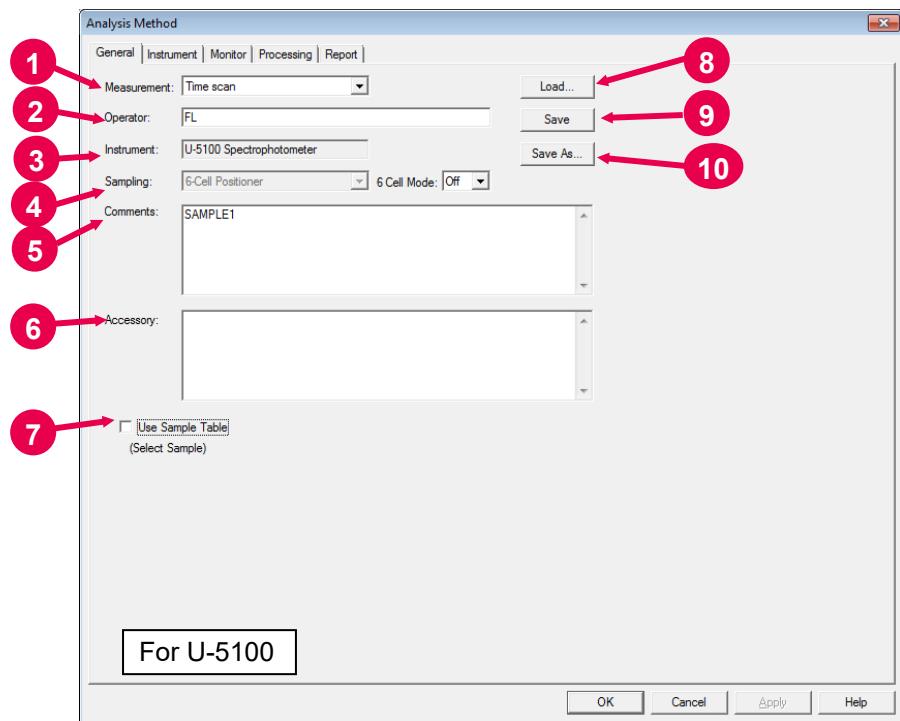
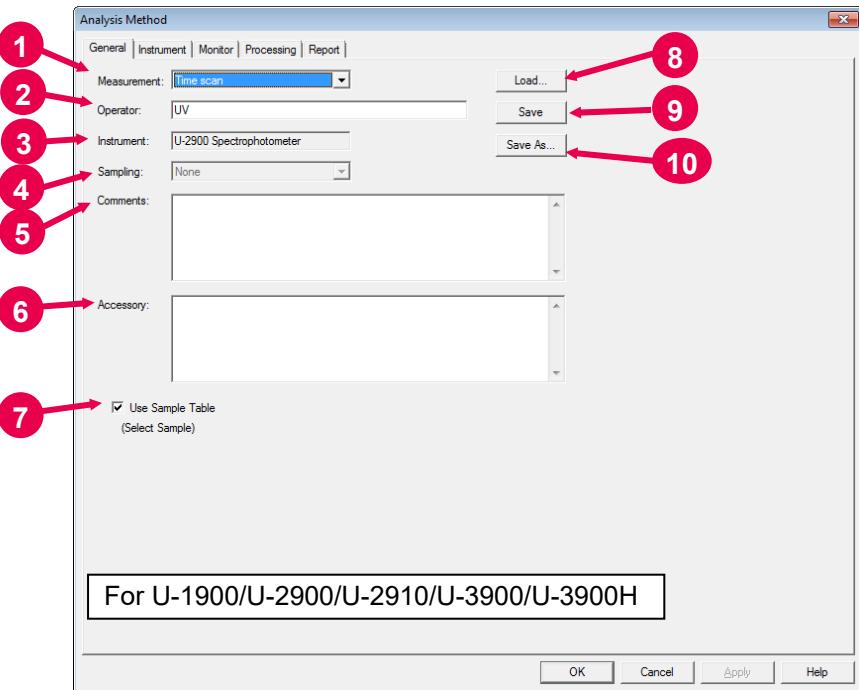
**Fig. 3-2 Analytical Conditions (Method)  
(for U-4100 / UH4150 / UH4150AD+)**

The Analysis Method window in time scan mode has the following tabs, which are explained below.

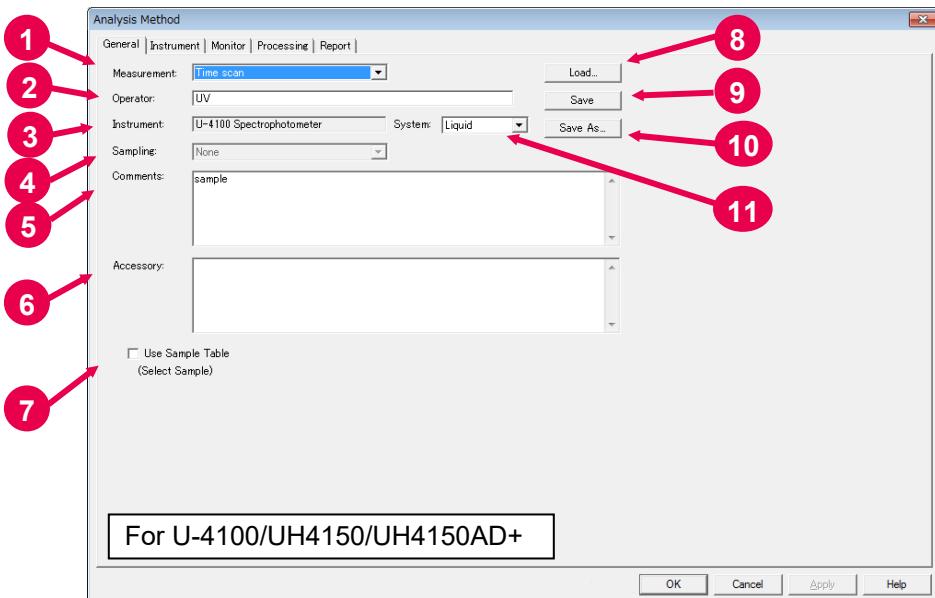
- General
- Instrument
- Monitor
- Processing
- Report

### 3.2.1 General Tab

The General tab contains the parameters shown in Fig. 3-3.  
Refer to Appendix F for the setting range of each parameter.



### 3.2 Setting Analytical Conditions



**Fig. 3-3 General Tab**

(1) Measurement

Select a measurement mode. Selection of “Time scan” is required here. For Wavelength scan and Photometry, refer to Chapters 2 and 4.

(2) Operator

Enter the name of the analyst.

(3) Instrument

The model of the connected spectrophotometer is indicated here.

(4) Sampling

- |                   |   |  |
|-------------------|---|--|
| None              | : | Indicates that samples will be exchanged manually. |
| Sipper            | : | Indicates that the auto sipper is connected.       |
| 6-Cell Positioner | : | Indicates that the 6-cell positioner is connected. |

## (5) Comments

An explanation on measurement condition or cautionary item can be entered here.

## (6) Accessory

Enter the name of an accessory that is mounted. In the abovementioned Sampling (option) field, the name of an accessory automatically recognized by the photometer is indicated. In this field, enter the name of an accessory that will not be automatically recognized, such as micro-cell holder.

## (7) Use Sample Table (Select Sample)

Put a check mark here for using the sample table.

## (8) Load

Click this button for loading the saved analytical conditions. Upon clicking, a window for opening will appear. Select a Method file on this window.

## (9) Save

When clicking this button after completion of parameter assignment, the analytical conditions will be overwritten and saved. In the case of new parameter assignment, clicking this button will display the Save As window, so enter a file name here.

## (10) Save As

Click this button for saving the set conditions with a change in the file name. When the Save As window appears, enter a file name.

### 3.2 Setting Analytical Conditions

#### (11) System

Displayed when the Model U-4100/UH4150/UH4150AD+ is used. Select the system depending on the connected system. If the UH4150AD+ is connected to the device, it will be set automatically.

Liquid: For U-4100 (liquid sample measurement system),

Solid: For U-4100 (solid sample measurement

system)(large-sample measurement system),

UV: For U-4100 (UV-region sample measurement system)

Direct Light Detector: For UH4150/UH4150AD+ Direct light detection system, Integrating Sphere: For

UH4150/UH4150AD+ integrating sphere detection system

Other: UH4150AD+

#### (12) 6 Cell Mode

Displayed when the Model U-5100 is used.

On : Be sure to set at ON for measurement with the 6-cell turret.

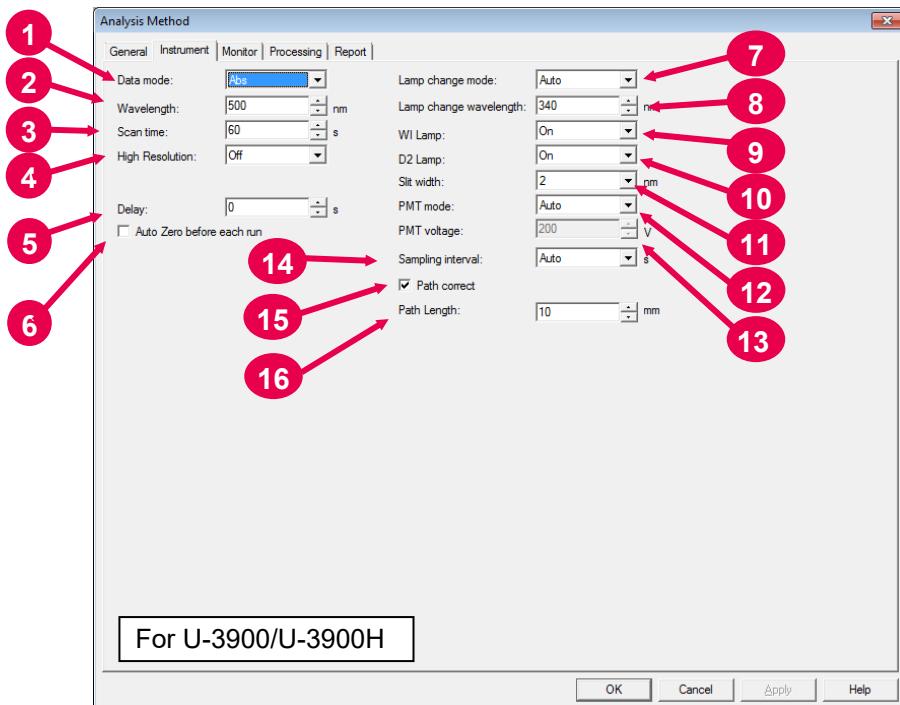
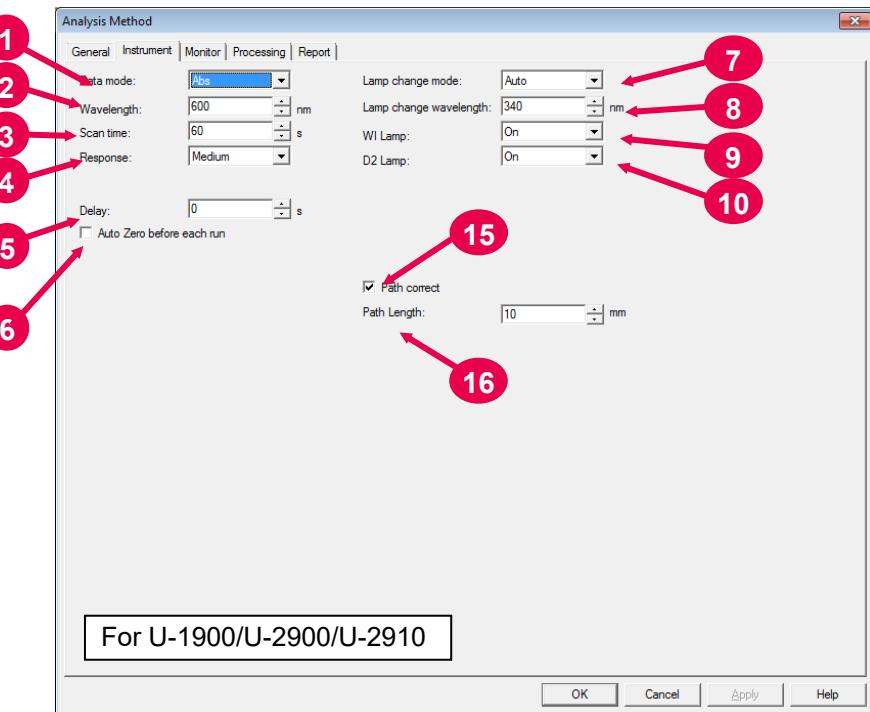
Off : Be sure to set at OFF for measurement with the single-cell holder, rectangular long cell holder, etc. other than the 6-cell turret.

#### (13) 6 cell control mode

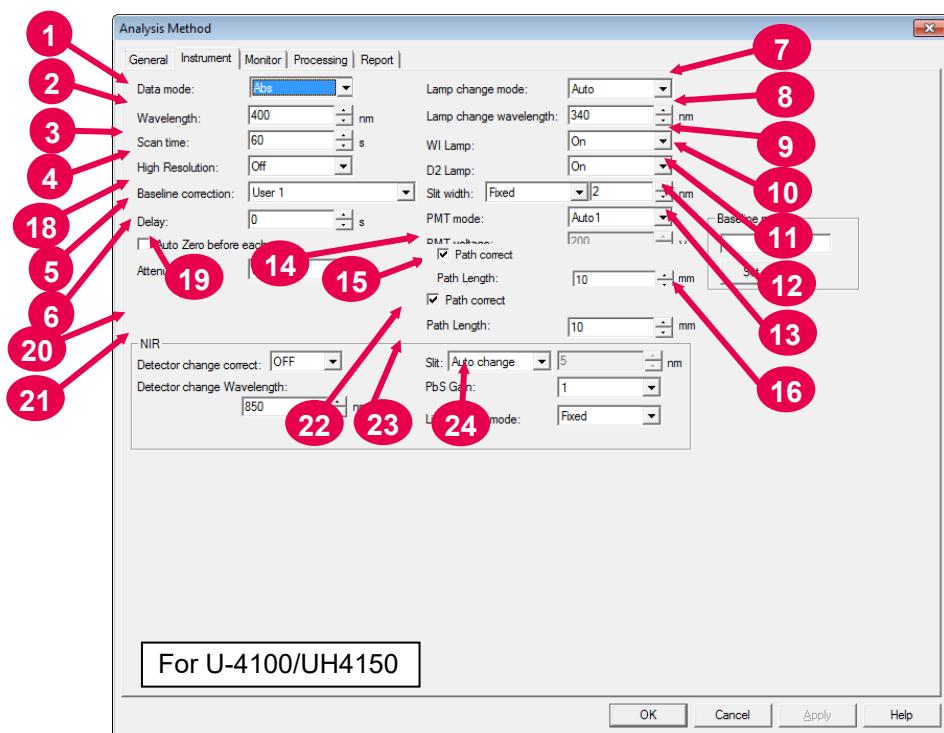
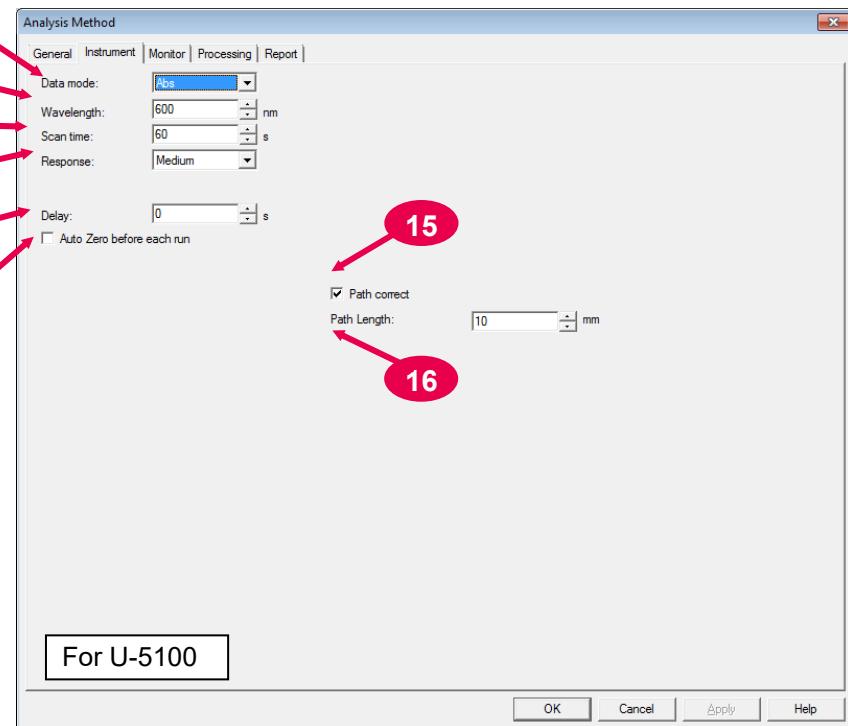
This function is used for measurement with the 6-cell positioner when the Model U-2900, U-2910, U-3900 or U-3900H is connected. Use of this control enables you to carry out measurement while automatically moving the 6-cell positioner.

### 3.2.2 Instrument Tab

This tab will appear upon selecting Time scan for Measurement mode under the General tab of Method window. Selection of the Instrument tab will bring up the window shown in Fig. 3-4. Refer to Appendix F for the setting range of each parameter.



### 3.2 Setting Analytical Conditions



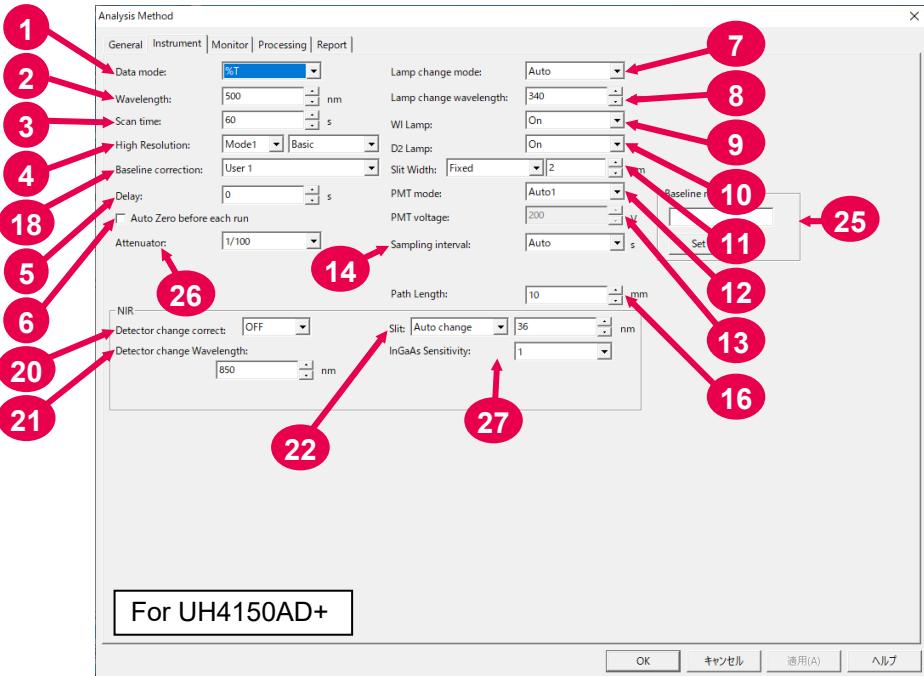


Fig. 3-4 Instrument Tab

## (1) Data mode

Select a data mode from the following.

%T : Set this mode for transmittance measurement.

Abs / O.D.:

Set this mode for absorbance measurement. Abs or O.D. is displayed.

E(S) : Set this mode for measuring the energy of sample beam.

E(R) : Set this mode for measuring the energy of reference beam.

%R : Set this mode for reflectance measurement.

Instrument Model	Settable Data Mode
U-1900	%T, Abs/O.D., E(S), E(R)
U-5100	%T, Abs/O.D.
U-2900, U-2910, U-3900, U-3900H, U-4100, UH4150, UH4150AD+	%T, Abs/O.D., E(S), E(R), %R

## (2) Wavelength

Select a wavelength for measurement.

### 3.2 Setting Analytical Conditions

#### (3) Scan time

A measurement time can be entered. Refer to Appendix H for the relation between measurement time and data sampling interval.

#### (4) High Resolution

<For U-3900/U-3900H/U-4100/UH4150>

High resolution measurement or smoothing is selectable.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

On : This setting is used for high-resolution measurement when measuring steep spectral signals.

Off : This setting is used for ordinary measurement.  
15-point data is smoothed by the Savitsky-Golay method. Through this operation, noise-suppressed data can be obtained.

<For UH4150AD+>

**Mode 1:** The measured data is smoothed by the Gaussian method. Data with less noise can be obtained while keeping the shape of the spectral waveform.

Normally you will use the basic.

High: Select "High" for high-resolution measurement when measuring steep spectral data.

Middle: Smooths data at 3 points with the Gaussian method.  
It is used when higher resolution measurement than standard is required.

Basic: Used for normal measurement. Smooths data at 5 points with the Gaussian method.

Low: Smooths data at 9 points with the Gaussian method.  
It can obtain data with least noise.

**Mode 2:** Same function with

U-3900/U-3900H/U-4100/UH4150

Select high resolution measurement or smoothing processing.

On : Select "On" for high-resolution measurement when measuring steep spectral data.

Off : Select "Off" for ordinary measurement. In the smoothing operation, 15-point data values are smoothed based on the Savitsky-Golay method. Through this operation, noise-suppressed data can be obtained with the spectral profile intact.

## (5) Delay

After the  (Start Series) button is pressed, the system waits for the time period set here and then begins measurement. This wait time allows the temperature to stabilize. In the case of repeat measurement, it indicates the time up to starting the first measurement. It doesn't apply to the second and subsequent measurements.

## (6) Auto Zero before each run

Before each measurement, auto zero measurement (100%T set in transmittance mode, 0 Abs set in absorbance mode) is to be carried out.

## (7) Lamp change mode

Selects the light source to be used for measurement.  
(Unavailable with U-5100)

## (8) Lamp change wavelength

When "Auto" is selected for lamp change mode, you can set here a wavelength for automatically changing over the D<sub>2</sub> lamp (for ultraviolet region) and WI lamp (for visible region).  
(Unavailable with U-1900 and U-5100)

## (9) WI Lamp

Used for turning on/off the WI lamp. By clicking the **OK** button and setting analytical conditions, the lamp will be turned on or off according to the setting made here.  
(Unavailable with U-5100)

## (10) D2 Lamp

Used for turning on/off the D<sub>2</sub> lamp. By clicking the **OK** button and setting analytical conditions, the lamp will be turned on or off according to the setting made here.  
(Unavailable with U-5100)

## (11) Slit width

Select a slit width here.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

### 3.2 Setting Analytical Conditions

#### (12) PMT mode

A function for controlling the high voltage for the photomultiplier detector.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

Fixed : This is used for measurement in energy mode.  
High voltage applied to the photomultiplier is fixed at the entered value.  
Auto : This mode is usually employed for measurement.

#### (13) PMT voltage

This is settable when “Fixed” has been selected for PMT mode.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

#### (14) Sampling interval

A data reading interval is set here. For details, refer to Appendix G.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

#### (15) Path correct

When measurement was performed using a cell other than a 10 mm rectangular one, the photometric value can be converted into the one measured with a 10 mm rectangular cell. When a check mark is applied here, conversion is made according to the set path length.  
For example, when the photometric value measured with a 5 mm cell is 0.500 Abs, it will be converted into 1.000 Abs as a value measured with a 10 mm cell.

**NOTE:** This function is effective in the Abs mode.

#### (16) Path Length

Set the optical path length of the cell to be used for measurement.

(17) Response

Select a response level from the following.

(Unavailable with U-3900, U-3900H, U-4100, UH4150 and UH4150AD+)

Slow : Select this level for minimizing a fluctuation in photometric value data.

Medium: Select this level for normal-level response.

Fast : Select this level for high-resolution measurement when measuring steep spectral data.

(18) Baseline correction

Baseline data is selectable. However, baseline measurement is used in the wavelength scan mode. Because the time scan mode corresponds to 1-wavelength measurement, the auto zero function is employed for this setting. So far as auto zero is executed before sample measurement, the same result as with baseline measurement is obtainable.

(19) Attenuation

In the U-4100/UH4150, an attenuation plate is inserted on the reference side. Of the attenuation plate, an attenuation factor can be set. This factor is usable for a sample whose absorbance is 4 Abs or higher or transmittance/reflectance is 0.1% or lower. For usage, implement the following procedure. In Analysis Method, select 1/10 or 1/100 for Attenuation (attenuation factor of the attenuator plate) and measure the baseline. Then, choose the Attenuation command from the Spectrophotometer menu.

For this command, you must select a factor of 1/10 or 1/100 whichever selected in Analysis Method. After completion of attenuation factor measurement, sample measurement can be carried out.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H, UH4150AD+)

None

1/10

1/100

### 3.2 Setting Analytical Conditions

#### (20) Detector change correct

This item is displayed when the U-4100/UH4150/UH4150AD+ is connected. Either "ON" or "OFF" selection of this compensation, if made here, is ineffective.

(Not displayed for U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

#### (21) Detector change Wavelength

With use of the U-4100/UH4150/UH4150AD+, you can set a wavelength for changeover between the UV-VIS and NIR region detectors.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Effective input range: 700.0 to 900.0 nm (U-4100/UH4150)

Effective input range: 700.0 to 920.0 nm (UH4150AD+)

#### (22) Slit

In the U-4100/UH4150/UH4150AD+, a slit width in the near infrared region can be set.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Fixed : A desired slit width can be input in increments of 0.1 nm within a range from 0.1 to 20.0 nm.

Auto change: Slit width is automatically controlled according to optical energy level. This is a function for keeping S/N (signal to noise ratio) as constant as possible in the measuring wavelength range. While this function is active, the slit width automatically changes within a range from about 0.1 to 36 nm.

This auto change cannot be set simultaneously with the light quantity control mode.

### (23) PbS Gain

In the U-4100/UH4150, sensitivity of the NIR-region detector can be set. This is a function for setting PbS sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (PbS sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a PbS sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H, and UH4150AD+)

### (24) Light Control mode

This is a mode for controlling NIR-region light quantity in the U-4100/UH4150/UH4150AD.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

Fixed : Usually this mode is used.

Auto change: This function is used when measurement with the slit width fixed cannot be carried out due to an excessive light quantity in the infrared region.

### (25) Baseline name

Input the user baseline name. Then click the Set button.

This inputted name is displayed in monitor window and the Baseline correct window. (Unavailable with U-1900／U-5100)

### 3.2 Setting Analytical Conditions

#### (26) Attenuator

This function is compatible with UH4150 AD+.

Set the attenuator on this window. The attenuator is automatically inserted on the reference side.

After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19 and 6.20.

None

1/10

1/100

1/1000

1/10000

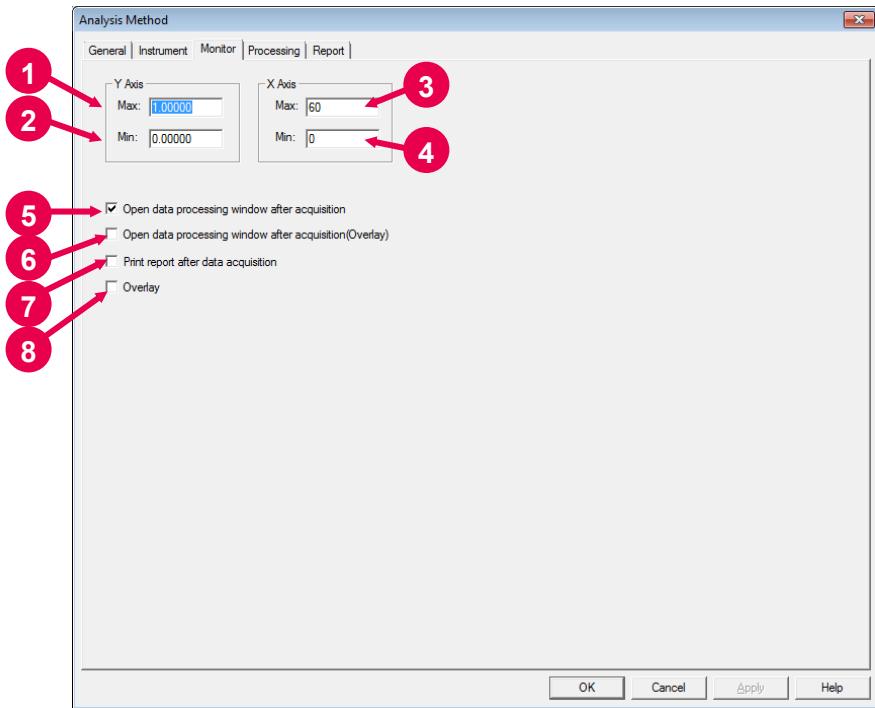
#### (27) InGaAs sensitivity

This function is compatible with UH4150 AD+.

Sensitivity of the NIR-region detector can be set. This is a function for setting InGaAs sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (InGaAs sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a InGaAs sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

### 3.2.3 Monitor Tab

Selecting the Monitor tab brings up a window as shown in Fig. 3-5. Refer to Appendix F for the setting range of each parameter.



**Fig. 3-5 Monitor Tab**

The following parameters are settable.

(1) Y Axis (Max.)

Enter the maximum value of ordinate on the monitor window.

(2) Y Axis (Min.)

Enter the minimum value of ordinate on the monitor window.

(3) X Axis (Max.)

Enter the maximum value of abscissa on the monitor window.

### 3.2 Setting Analytical Conditions

#### (4) X Axis (Min.)

Enter the minimum value of abscissa on the monitor window.

**NOTE:** The maximum and minimum values of abscissa stand for the time interval for display on the monitor window. For instance, when the maximum and minimum values are set at 60 and 30 respectively, display on the monitor window becomes 30-60s, 60-90s, 90-120s and so on.

#### (5) Open data processing window after acquisition

Select whether or not to open the data processing window after sample measurement. When a check mark is applied here, measurement will be followed by display of the data processing window for the measured data. Also, by putting a check mark at "Overlay", measurement will be followed by display of an icon for the measured data.

(An icon such as this will appear. →  )  
Upon opening this icon, data processing such as peak detection can be performed.

**NOTE:** Even when this item is turned ON, the data processing window won't open if the remaining memory capacity of your PC is inadequate (system resource is less than 20%). In such case, either close the presently active data processing window or else restart the UV Solutions program.

#### (6) Open data processing window after acquisition (Overlay)

Select whether or not to open the data processing window with overlay after sample measurement. This item is selectable when a check mark is applied at "Open data processing window after acquisition".

## (7) Print report after data acquisition

You can select whether or not to print a report after sample measurement. By putting a check mark here, printing will be performed automatically following measurement.

The items selected on the Report tab will be printed out.

## (8) Overlay

Spectra can be overlaid for display on the monitor window.

## 3.2 Setting Analytical Conditions

### 3.2.4 Processing Tab

Selecting the Processing tab opens a window as shown in Fig. 3-6. See Appendix F for the setting range for each parameter.

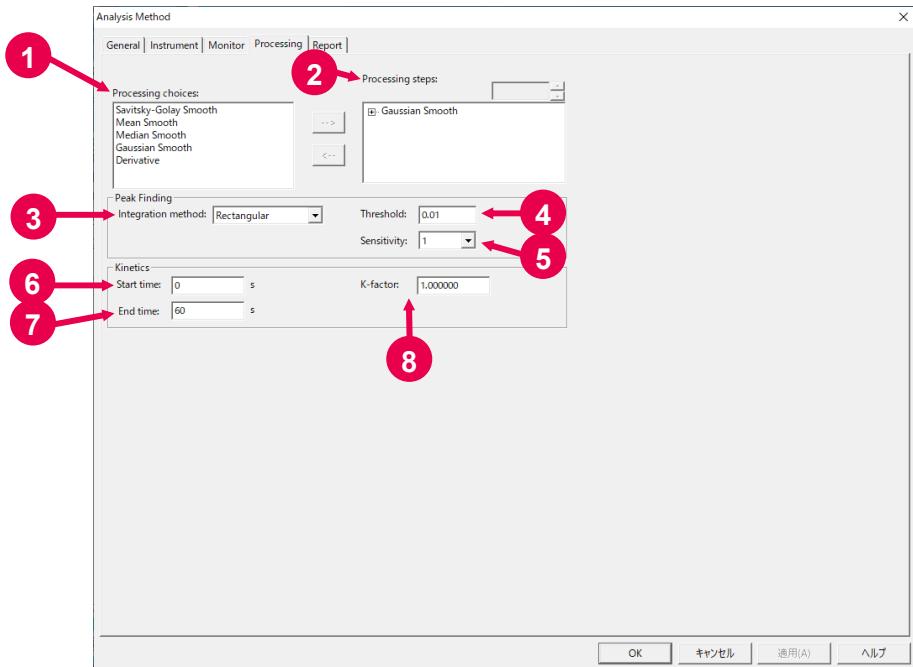


Fig. 3-6 Processing Tab

#### (1) Processing choices

A list of data processing methods appears. Select the desired data processing method and click the right-directional [ → ] arrow key, then the selected method will appear in the Processing steps field. For instance, by selecting “Derivative” and clicking [ → ] key, “Derivative” will appear in the Processing steps field as indicated in Fig. 3-7.

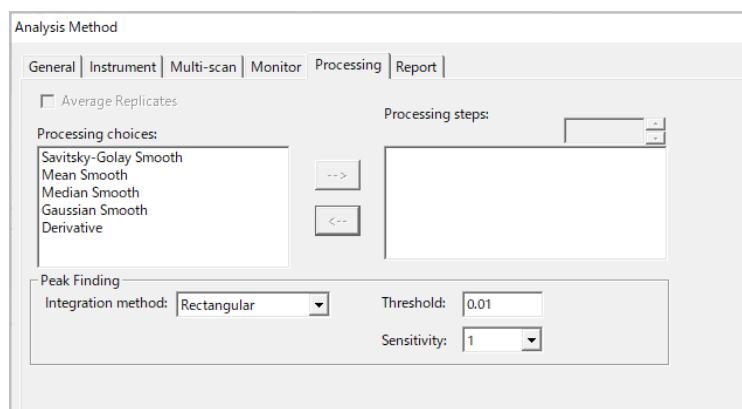


Fig. 3-7

## (2) Processing steps

Processing order is indicated here. Data processing will be executed in the order set here after measurement.

How to delete processing method:

To delete a processing method, select the method and click the left-directional [ ← ] arrow key, then the method will disappear from the processing order field.

Display/change of parameters:

Clicking the [+] part in the processing order field will display a list of parameters. Now click the parameter you wish to change and the parameter can be changed. For instance, to change the “Derivative” parameter, click [+] at the left of “Derivative” shown in Fig. 3-7. The parameters (Derivative order, Smoothing order, Number of points) related to the present derivative will now appear. To change the derivative order, click “Derivative order” and a status permitting change will be set up as shown in Fig. 3-8.

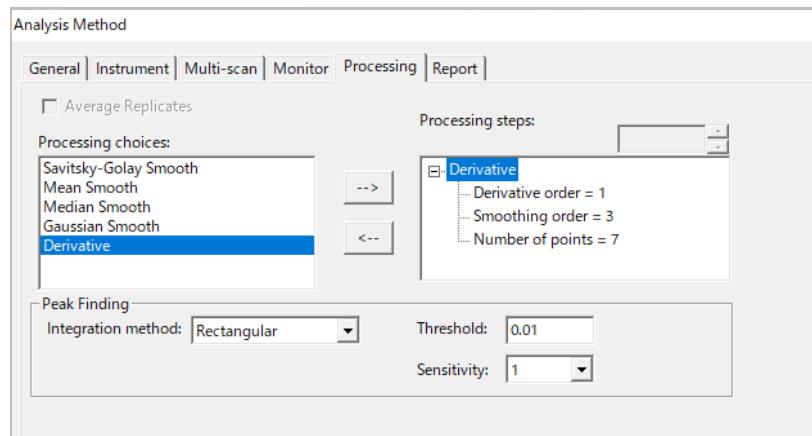


Fig. 3-8

## (3) Peak Finding: Integration method

Select a calculation method for peak area to be indicated in the peak table.

## (4) Peak Finding: Threshold

Set a detection limit on the photometric value axes for peak and valley. A peak or valley below the set value will not be detected.

### 3.2 Setting Analytical Conditions

(5) Peak Finding: Sensitivity

Select a number of data points in the abscissa direction.  
“1” should be selected for the sensitivity to ensure detection  
of sharp peaks. A sensitivity of “8” should be selected to  
detect broad peaks.

(6) Kinetics: Start time

Set a starting time for kinetics calculation.

(7) Kinetics: End time

Set an ending time for kinetics calculation.

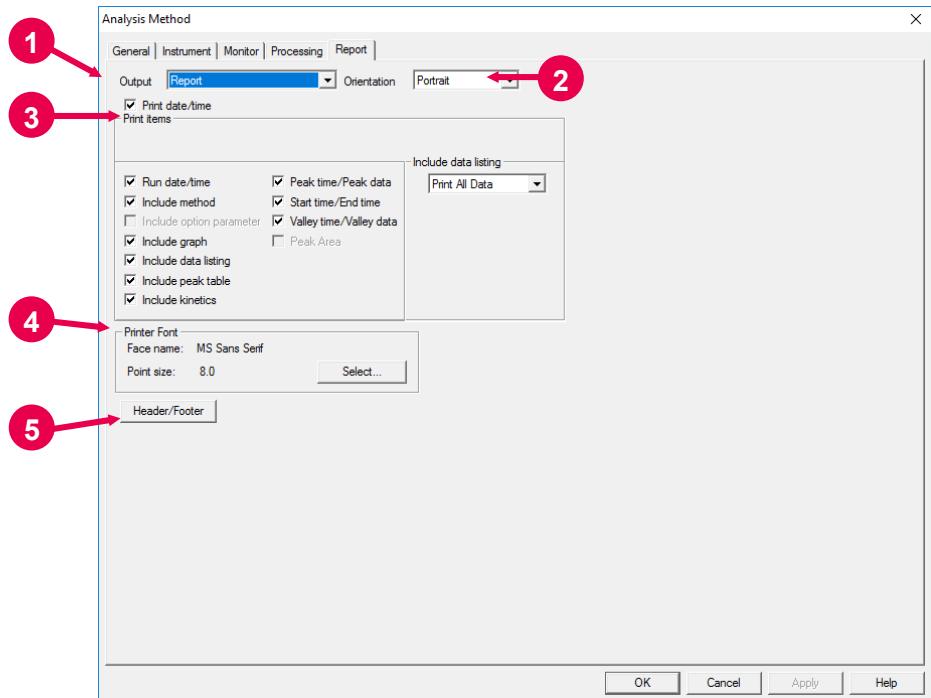
(8) Kinetics: K-factor

In kinetics calculation, set a factor for calculating an activity  
value.

Activity ( $C_i$ ) =  
(K factor)  $\times$  (slope  $D_i$  obtained by measurement)

### 3.2.5 Report Tab

Selection of the Report Tab opens a window as shown in Fig. 3-9.



**Fig. 3-9 Report Tab**

You can select a method and items for output of measurement results.

#### (1) Output

- Report

Selects printout. For printing method, refer to subsection 3.5.

- Use Microsoft Excel

Data will be transferred to Microsoft Excel. Refer to subsection 5.13 for the transfer method.

- Use print generator sheet

This method is selected for using the report generator (available separately). For usage, refer to the instruction manual for the report generator.

### 3.2 Setting Analytical Conditions

#### (2) Orientation

This entry is allowed when Report is selected for Output. Select a printing direction, either Portrait or Landscape direction. When Landscape is selected, date and analytical conditions can be printed.

#### (3) Print items

- Print date/time
- Run date/time: Date of analysis will be printed.
- Include method
- Include graph
- Include data listing

##### Print All Data

All data within the measurement range will be printed (transferred) at the sampling interval.

##### Constant

Data can be printed (transferred) at fixed intervals. Enter data interval, start time and end time.

##### Select data

Data at the specified wavelengths can be printed (transferred). Up to 12 wavelengths are specifiable. Clicking Time sets up the status to allow editing. Set a time within the measurement range specified via the Instrument tab.

- Include peak table

Select items to be output to a peak table. Putting a check mark at Include peak table allows selection of the following items.

Peak time/Peak data

Start time/End time

Valley time/Valley data

Peak Area

- Include kinetics

#### (4) Printer Font

To change the font used for reporting, click the **Select** button.

#### (5) Header/Footer

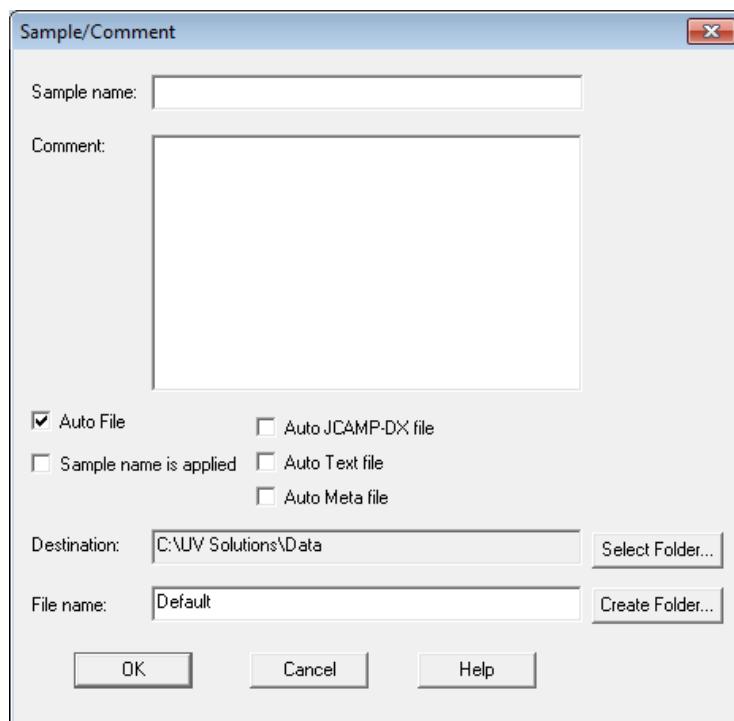
If it is desired to use header/footer in the report, click this button.

### 3.3 Defining a Sample

#### 3.3.1 When Not Using a Sample Table

When “Use Sample Table” is not selected in Analysis Method setting, take the following procedure for defining a sample prior to measurement. (Refer to “3.3.2 When Using a Sample Table” when “6 Cell Mode On” and “6 cell control mode On” are selected on the General tab page with the U-5100 connected.)

- (1) Click the  button, and a window as shown in Fig. 3-10 will appear.



**Fig. 3-10**

- (2) Enter a sample name and comment.

Maximum number of input characters (half-size)

Sample name : 40 characters

Comment : 255 characters

For automatic saving of data, put a check mark at “Auto File” and specify a file name. Click **Select** button, specify a save location and enter the file name.

### 3.3 Defining a Sample

By putting a check mark at “Auto File” and check marks at “Auto JCAMP-DX file”, “Auto Text file” and “Auto Meta file”, a time scan data file can be automatically saved together with files of the formats given below.

- JCAMP-DX Files (\*.dx)
- ASCII Text Files (\*.txt)
- Graph Meta Files (\*.wmf)

Specified files will be saved under the file names at the save destination.

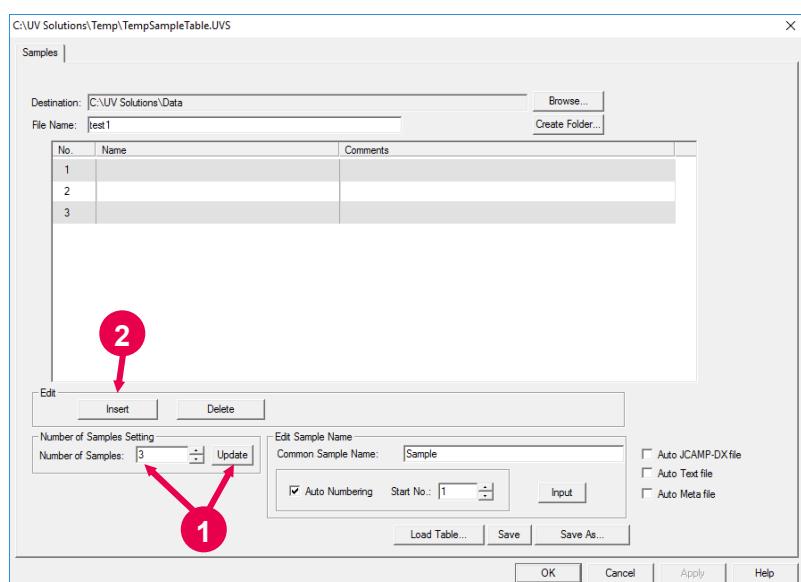
- (3) When your setting is completed, click **OK** button.

### 3.3.2 When Using a Sample Table

When “Use Sample Table” is selected in Analysis Method setting, take the following procedure for defining a sample prior to measurement. (With the U-5100, a sample table is also usable on condition that “6 Cell Mode” and “6 cell control mode” are both activated on the General tab page. In this case, the maximum number of samples is limited to 5. The set number of samples will automatically be measured.)

Open the monitor window and click the  (Edit Sample Table) button. The Sample Table dialog box will appear as shown in Fig. 3-11, so enter sample names and desired comments. Then, specify a destination folder for saving data, and set up a file name.

- (1) To create a new sample table, enter the number of samples and click **Update** button. For instance, when there are five samples, enter “5” at Number of Samples and click **Update**.



**Fig. 3-11 Sample Table**

When a sample table has already been created, a confirmation message stating “Changing the number of sample entries will clear all existing records. Are you sure you want to continue?” will appear.

Clicking **Yes** will create a new sample table for the specified number of samples.

Clicking **No** will halt the processing.

### 3.3 Defining a Sample

- (2) To add a line to the end of the sample table, click the **Insert** button. A line will be added at each click of this button.
- (3) To delete an unnecessary line in the table, click the No. of the line to be deleted to make it active as shown in Fig. 3-12. Then click the **Delete** button.

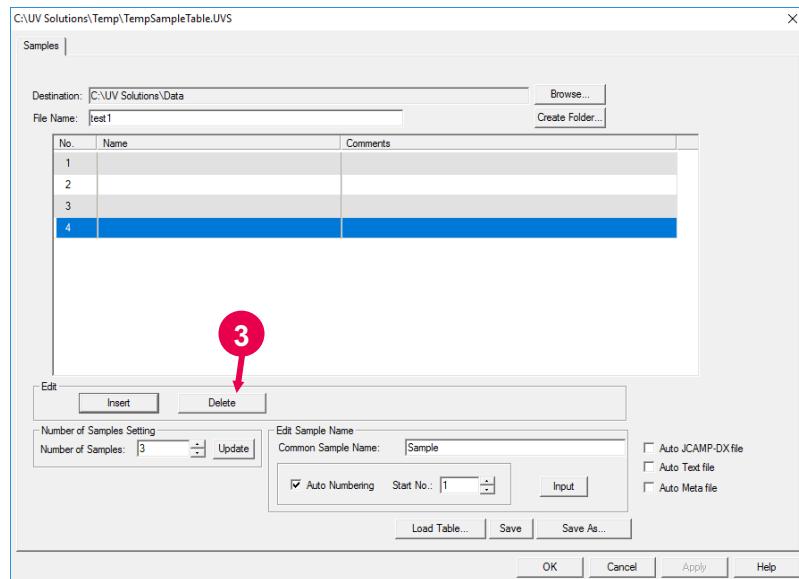


Fig. 3-12

The activated line is thus deleted.

- (4) It is possible to click the sample name and comment columns for each sample and enter the necessary data directly.

Maximum number of input characters (half-size)

Name : 40 characters

Comments : 255 characters

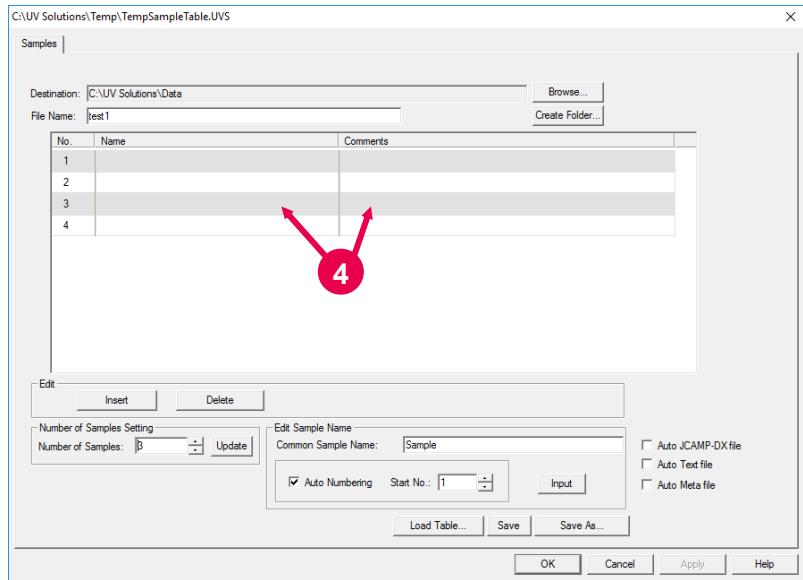


Fig. 3-13

For the U-5100, the function for auto zero before sequence is provided. When the check box for this function is turned on, auto zero will be carried out with cell A before sample measurement. After the auto zero operation, sample measurement is carried out. Unless the check box is turned on, sample measurement starts without auto zero operation. Therefore, auto zero operation is always required before start of measurement.

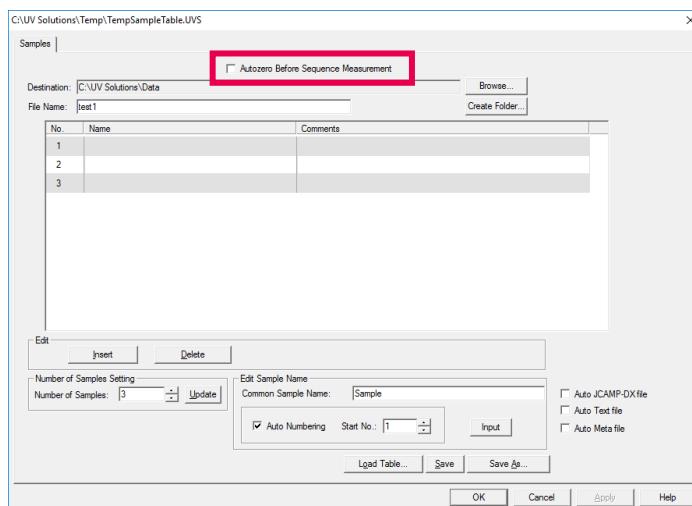


Fig. 3-14 Function for Auto Zero before Sequence in U-5100

### 3.3 Defining a Sample

#### (5) Collective Input of Sample Names

It is possible to set sample names collectively, such as Common Sample Name + Start No., Common Sample Name + (Start No. + 1) ..., in the following procedure.

- (a) Enter a common name for the samples at Common Sample Name. A maximum of 36 half-size characters can be entered. (Example: SampleB)
- (b) Put a check mark at Auto Numbering and enter a Start No. (Example: Start No. = 1)
- (c) Click the No. column of the sample table and select the top line for collective input of sample names.  
While holding down the Ctrl key, click the No. part of the sample name to be set and select several lines.

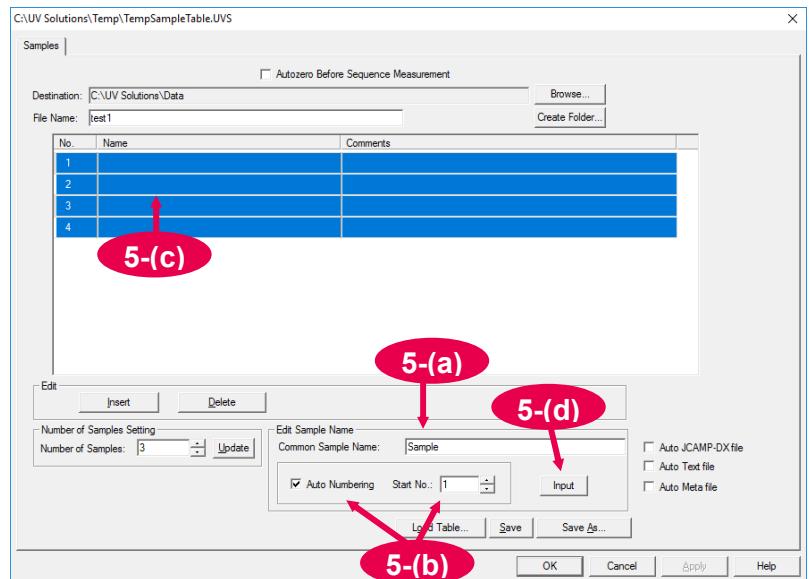


Fig. 3-15

- (d) Now click Input key, and the Common Sample Name + Start No., Common Sample Name + (Start No. + 1)... will be set. ("SampleA001 to SampleA005" are set for the sample name in Fig. 3-16.)  
By pressing the Input key without putting a check at Auto Numbering, setting will be made at the lines on which the sample common name has been activated.

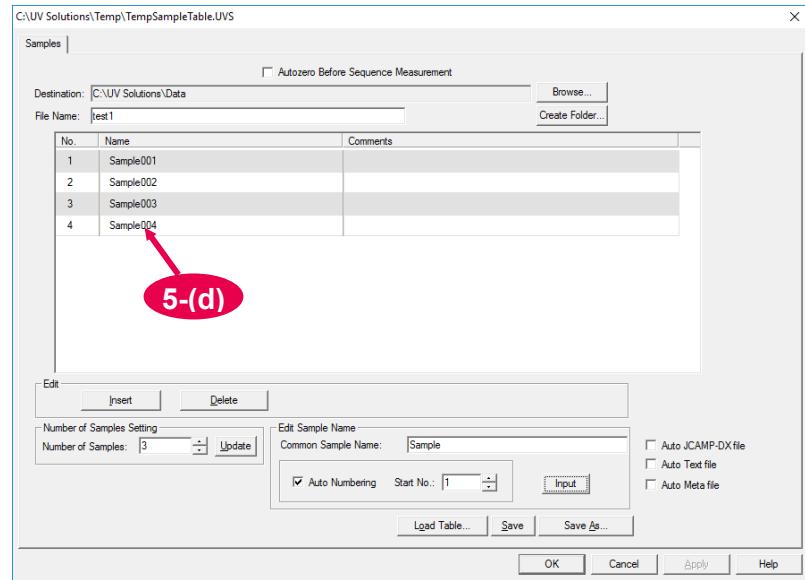


Fig. 3-16

- (6) Specify a save destination folder for the data files, in the following procedure.
- (a) When a save destination folder has been created, display a folder reference dialog by means of the Browse button. After folder selection, click the **OK** button on the Browse for Folder dialog shown in Fig. 3-18.

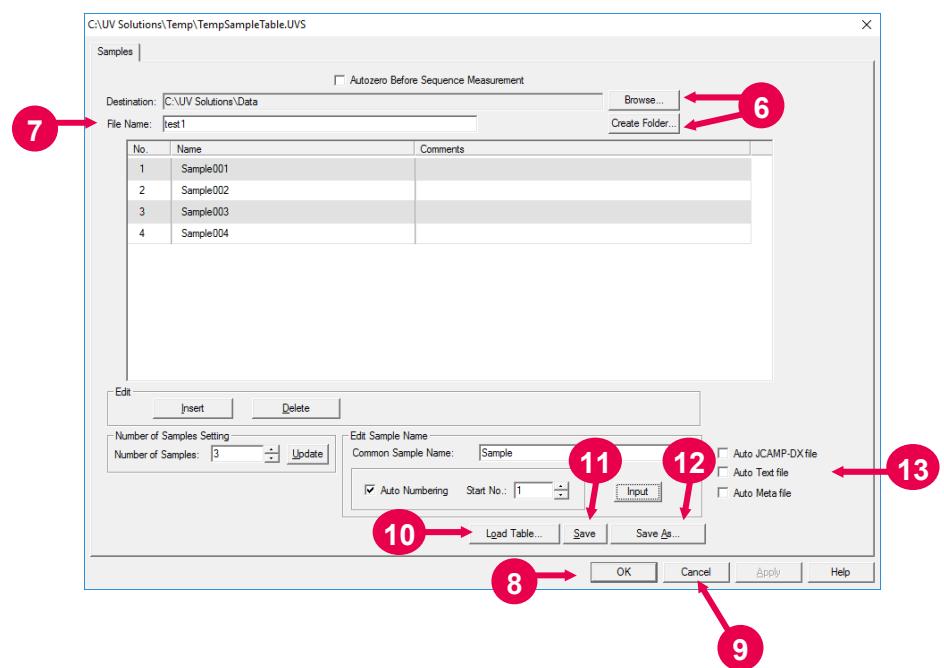
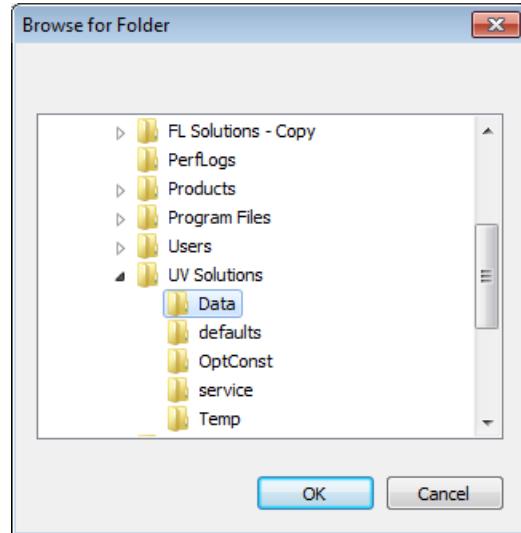


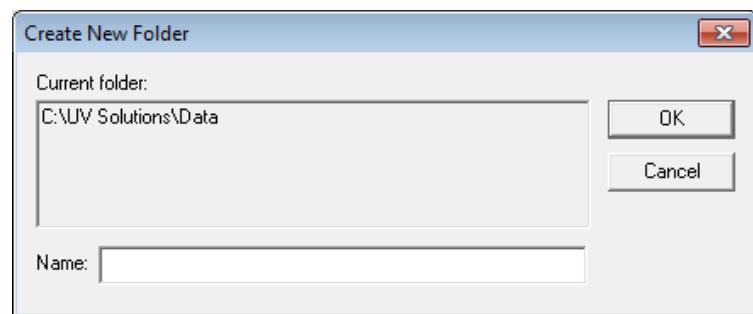
Fig. 3-17

### 3.3 Defining a Sample



**Fig. 3-18 Browse for Folder Dialog**

- (b) Take the following procedure for newly creating a folder.
- 1) Click the **Browse** button to display a folder reference dialog as in Fig. 3-18. Specify a path for creating a folder.
  - 2) Click the **Create Folder** button and a Create New Folder dialog as shown in Fig. 3-19 will appear. Enter a folder name in the Name column and click **OK** button. A folder having the name specified under Current folder will thus be created.



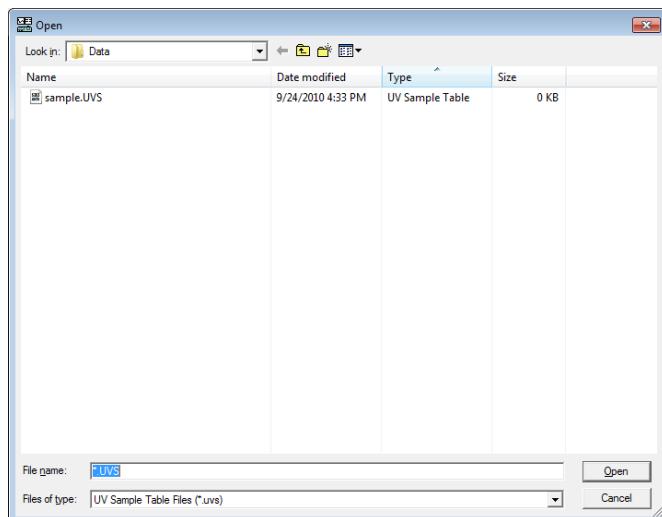
**Fig. 3-19 Create New Folder Dialog**

- (7) Enter a file name. (Example: test1)  
 The data file name will be saved in the destination folder as "File name – sample No." (Example: test1-001.udt)  
 If the same file name already exists, the file will be saved as "Data file name + measurement date/time".  
 (Example: test1-001\_20100811164856.udt)
- (8) When the necessary information has been entered for the sample table, check it and then click **OK** button.
- (9) **Cancel** Button

Clicking this button will prevent the entered information from being reflected on the process.

(10) **Load Table** Button

This is used for loading an existing sample table.  
 Clicking this button will display a dialog for opening a file.



**Fig. 3-20 Dialog for Opening a File**

Upon selecting a sample table and clicking **Open** button, the specified sample table will be loaded.

(11) **Save** Button

Clicking this button will overwrite and save the altered contents. When a table has been newly created, the Save As dialog will appear.

### 3.3 Defining a Sample

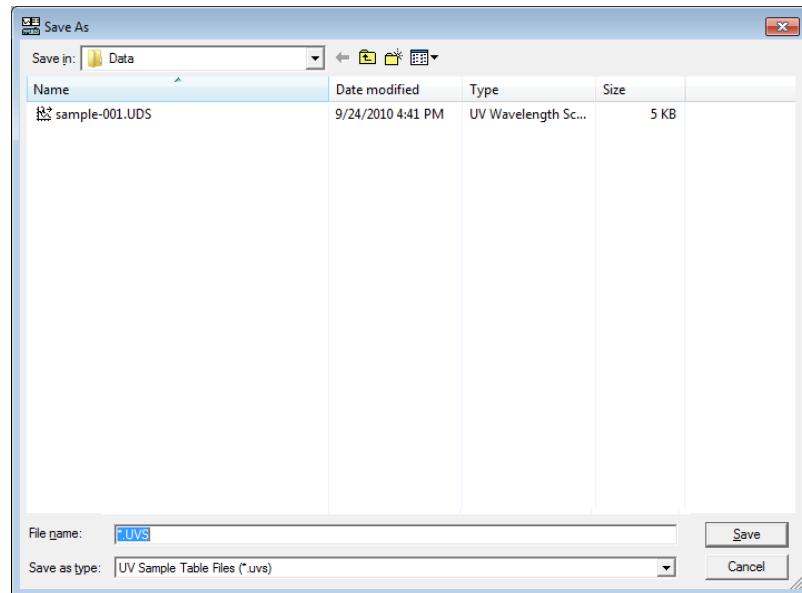
(12) **Save As Button**

This is used for saving a file under a new name.  
Clicking this button will open the Save As dialog.

(13) **Auto file Button**

Use this button to save a file after measurement automatically.

- Auto JCAMP-DX file
- Auto Text file
- Auto Meta File



**Fig. 3-21 Save As Dialog**

Select a location for saving, enter a file name and then click **Save** button.

## 3.4 Measurement

### 3.4.1 When Not Using a Sample Table

[With U-1900, U-5100 (6-cell mode OFF), U-2900, U-2910, U-3900, U-3900H, U-4100 ,UH4150 and UH4150AD+]

- (1) When “Use Sample Table” has not been set in Analysis Method setting, click the  (Sample/Comment) button and check that sample definition has been completed.
- (2) Set a sample blank in the sample compartment and click  (Zero) button.
- (3) After executing auto zero, set an unknown sample in place and click  (Start Series) button to start measurement. With the start of measurement, a spectrum appears on the screen.  
To halt the measurement midway, click the  (Stop Command) button.
- (4) When measurement is finished, the measurement data will be automatically saved under the specified file name at the specified destination provided that auto save has been set. If the same file name already exists, the data will be saved as “data file name + measurement date/time”.  
(Example: data1\_20100811164856.udt)

If auto save has not been set, then select the Save As command from the File menu for saving the data.

Upon opening the file, a data processing window as in Fig. 3-22 will appear. This window shows a spectrum and the result of kinetics (rate calculation). Although a peak table can also be displayed, it cannot be displayed together with the result of kinetics. Display items are selectable via the View menu.

### 3.4 Measurement

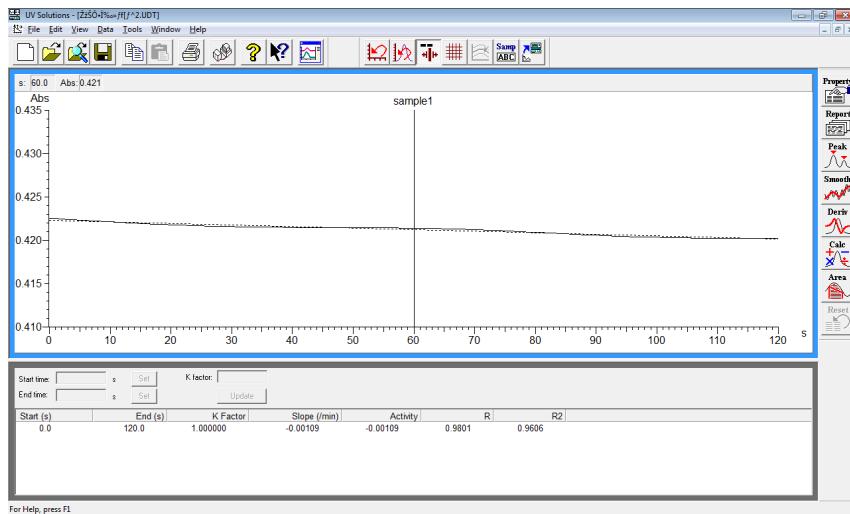


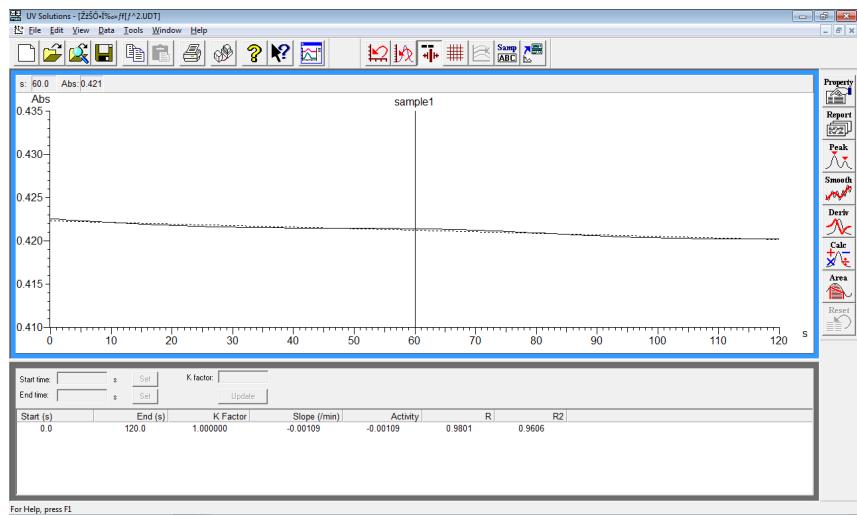
Fig. 3-22 Data Processing Window (Time Scan)

[With U-5100 (6 Cell Mode On)]

- (1) Click the (Sample/Comment) button and check that sample definition has been completed.
- (2) Set a sample blank in cell A of the sample compartment and click (Zero) button.
- (3) After executing auto zero, set an unknown sample at a desired cell position. Click the (Move Cell) button to move the 6-cell turret to the cell position for measurement. Click the (Start Series) button. The measurement of the sample will be carried out, and its spectrum will be displayed.  
To halt the measurement midway, click the (Stop Command) button.
- (4) When measurement is finished, the measurement data will be automatically saved under the specified file name at the specified destination provided that auto save has been set. If the same file name already exists, the data will be saved as "data file name + measurement date/time".  
(Example: data1\_20100811164856.udt)

If auto save has not been set, then select the Save As command from the File menu for saving the data.

Upon opening the file, a data processing window as in Fig. 3-23 will appear. This window shows a spectrum and the result of kinetics (rate calculation). Although a peak table can also be displayed, it cannot be displayed together with the result of kinetics. Display items are selectable via the View menu.



**Fig. 3-23 Data Processing Window (Time Scan)**

- (5) For measuring the next sample, click the button again to move the 6-cell turret to a desired cell position for measurement. Then, click the button.

### 3.4 Measurement

#### 3.4.2 When Using a Sample Table

[With U-1900, U-5100 (6 Cell Mode Off), U-2900, U-2910, U-3900, U-3900H, U-4100, UH4150 and UH4150AD+]

- (1) Click the  (Edit Sample Table) button and confirm that sample definition has been completed.
- (2) Set a sample blank in the sample compartment and click  (Zero) button.
- (3) After execution of auto zero, set an unknown sample in place and click  (Start Series) button to initiate measurement.
- (4) With the start of measurement, a window as in Fig. 3-24 will appear. Click **Yes** button. If you need to have confirmation dialog of setting a sample, please check (1).

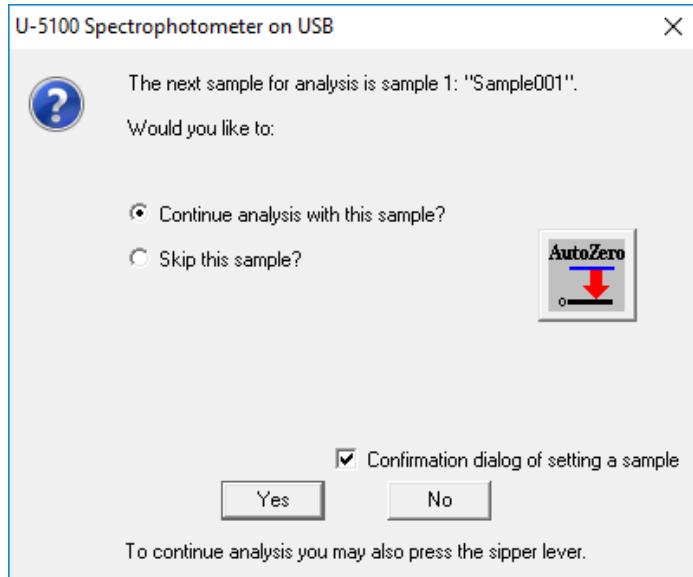
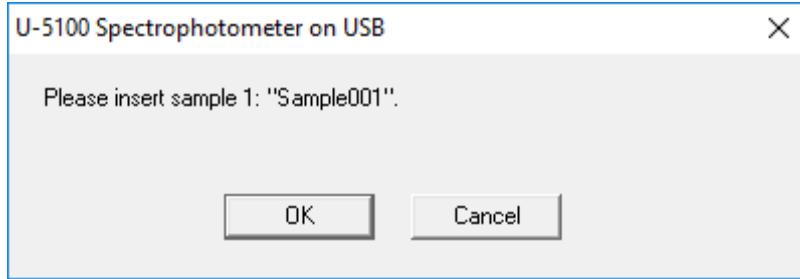


Fig. 3-24

- (5) A window as in Fig. 3-25 will now appear.



**Fig. 3-25**

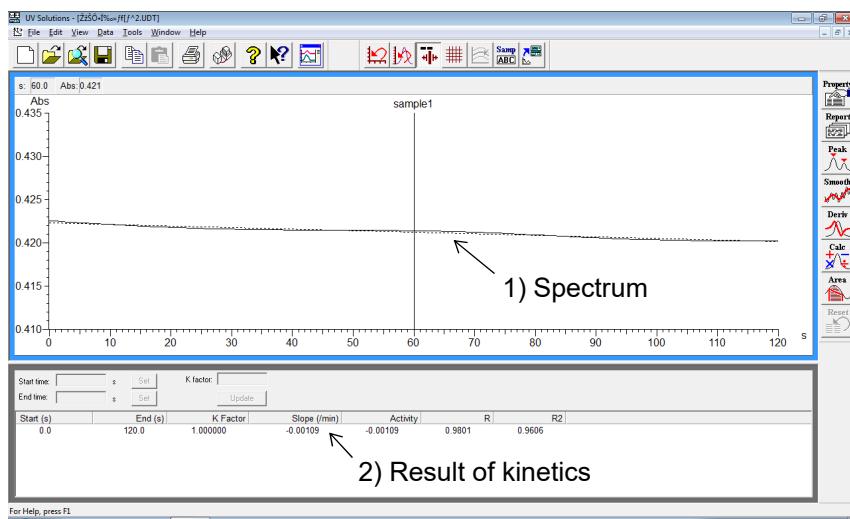
Set an unknown sample in place and click **OK** button.

Measurement will start and a spectrum will appear.

To halt the measurement midway, click the (Stop Command) button.

Measurement of the number of samples set in the sample table will be executed according to the message guide.

- (6) When measurement is finished, the measurement data will be automatically saved under the specified file name at the specified destination. Upon opening the file, a data processing window as in Fig. 3-26 will appear. This window shows a spectrum and the result of kinetics (rate calculation). Although a peak table can also be displayed, it cannot be displayed together with the result of kinetics. Display items are selectable via the View menu.



**Fig. 3-26 Data Processing Window (Time Scan)**

### 3.4 Measurement

#### 1) Spectrum

A spectrum of the measured sample is displayed.

#### 2) Result of kinetics

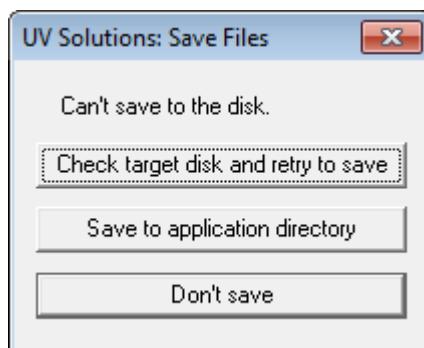
The results of kinetics (slope, activity, R, R2) are displayed. Start time and end time can be set by entering numerals or by moving the line cursor and then clicking **Set**. After setting, click **Update** and recalculation will be made. Refer to Appendix B for the method of calculating kinetics.

Upon selecting peak table, the peak time, valley time, peak start and end times and peak area will be indicated.

**NOTE:** 1. In the following situation, measurement result data will be automatically saved in “¥UV Solutions¥Data”.

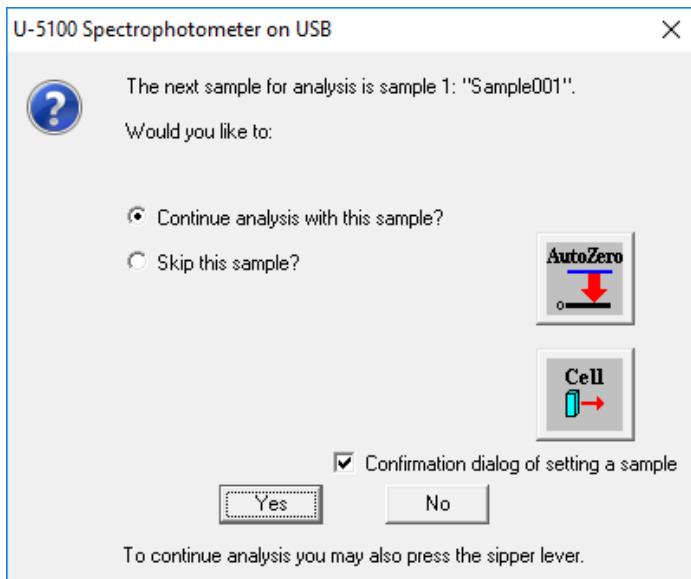
(Example: C:¥UV Solutions¥Data)

- A measurement is carried out under the condition that the sample table is not used and the function “Auto File” is turned on in the absence of a file name.
2. For the data measured under the following conditions, a guidance “Can't save to the disk” will be displayed. According to the guidance, select the subsequent measure.
- There is insufficient free space in the destination medium for saving (floppy disk, MO disk, etc.).
  - Writing is inhibited.



[With U-5100 (6 Cell Mode On)]

- (1) Click the  (Edit Sample Table) button and confirm that sample definition has been completed.
- (2) Set a sample blank in cell A of the sample compartment and click  (Zero) button.
- (3) After execution of auto zero, set an unknown sample at a desired cell position. Click the  (Move Cell) button to move the 6-cell turret to the cell position for measurement. Click  (Start Series) button to initiate measurement.
- (4) With the start of measurement, a window as in Fig. 3-27 will appear. Click **Yes** button.



**Fig. 3-27**

To halt the measurement midway, click the  (Stop Command) button.

Measurement of the number of samples set in the sample table will be executed according to the message guide.

### 3.4 Measurement

- (5) When measurement is finished, the measurement data will be automatically saved under the specified file name at the specified destination. Upon opening the file, a data processing window as in Fig. 3-28 will appear. This window shows a spectrum and the result of kinetics (rate calculation). Although a peak table can also be displayed, it cannot be displayed together with the result of kinetics. Display items are selectable via the View menu.

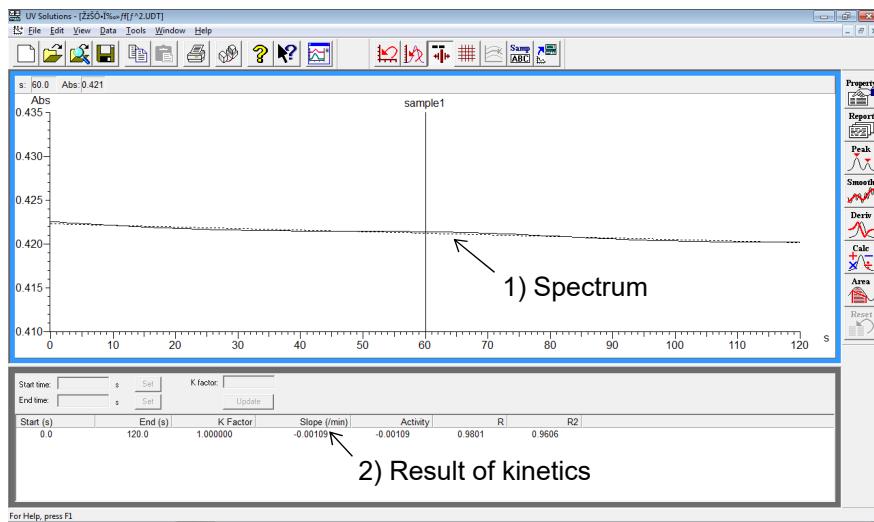


Fig. 3-28 Data Processing Window (Time Scan)

#### 1) Spectrum

A spectrum of the measured sample is displayed.

#### 2) Result of kinetics

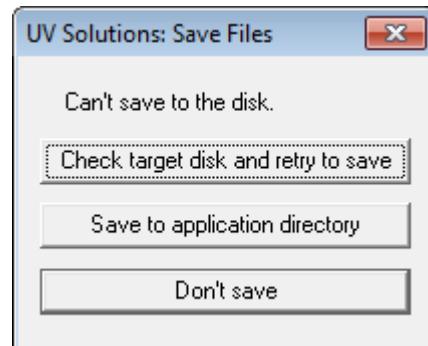
The results of kinetics (slope, activity, R, R<sup>2</sup>) are displayed. Start time and end time can be set by entering numerals or by moving the line cursor and then clicking **Set**. After setting, click **Update** and recalculation will be made. Refer to Appendix B for the method of calculating kinetics.

Upon selecting peak table, the peak time, valley time, peak start and end times and peak area will be indicated.

**NOTE:** 1. In the following situation, measurement result data will be automatically saved in “¥UV Solutions¥Data”.

(Example: C:¥UV Solutions¥Data)

- A measurement is carried out under the condition that the sample table is not used and the function “Auto File” is turned on in the absence of a file name.
2. For the data measured under the following conditions, a guidance “Can't save to the disk” will be displayed. According to the guidance, select the subsequent measure.
- There is insufficient free space in the destination medium for saving (floppy disk, MO disk, etc.).
  - Writing is inhibited.



### 3.5 Printing of Data

#### 3.5 Printing of Data

Either of the following two procedures is usable for printing of data after measurement besides the auto printing function.

[Printout from file menu]

Upon clicking the spectrum window, its profile will turn blue.

Now select the Print command on the File menu and click the **OK** button, or click the  (Print) button on the toolbar. In this case, the field that is active on the data processing window (1) in Fig. 3-28) will be printed. The items indicated (Fig. 3-29) by clicking the Print Preview command in the File menu will be printed.

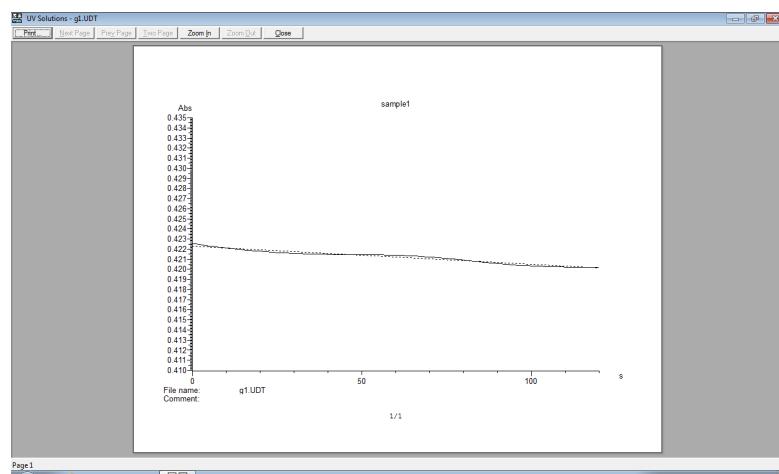
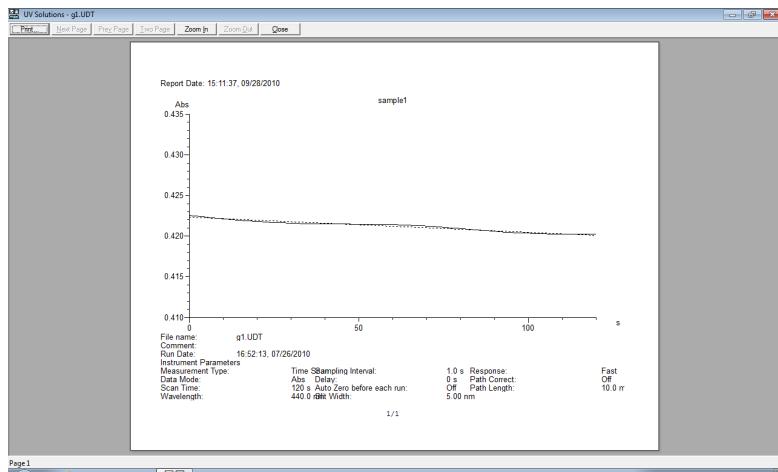


Fig. 3-29

[Printout from **Print** button]

Select the Report command on the Data menu, or click the  (Report) button on the toolbar. A Print Preview window will appear as shown in Fig. 3-30. Check the contents and click **Print**.



**Fig. 3-30**

**NOTE:** If characters run out of the print sheet frame in overprint or the like, change the print format setting on Report tab of Property menu from vertical to horizontal for printing.

## 4. PHOTOMETRY

### 4.1 Flow of Operation

This section describes how to determine the concentration of a sample with a calibration curve generated.

Measurement is to be carried out in the flow as shown below.

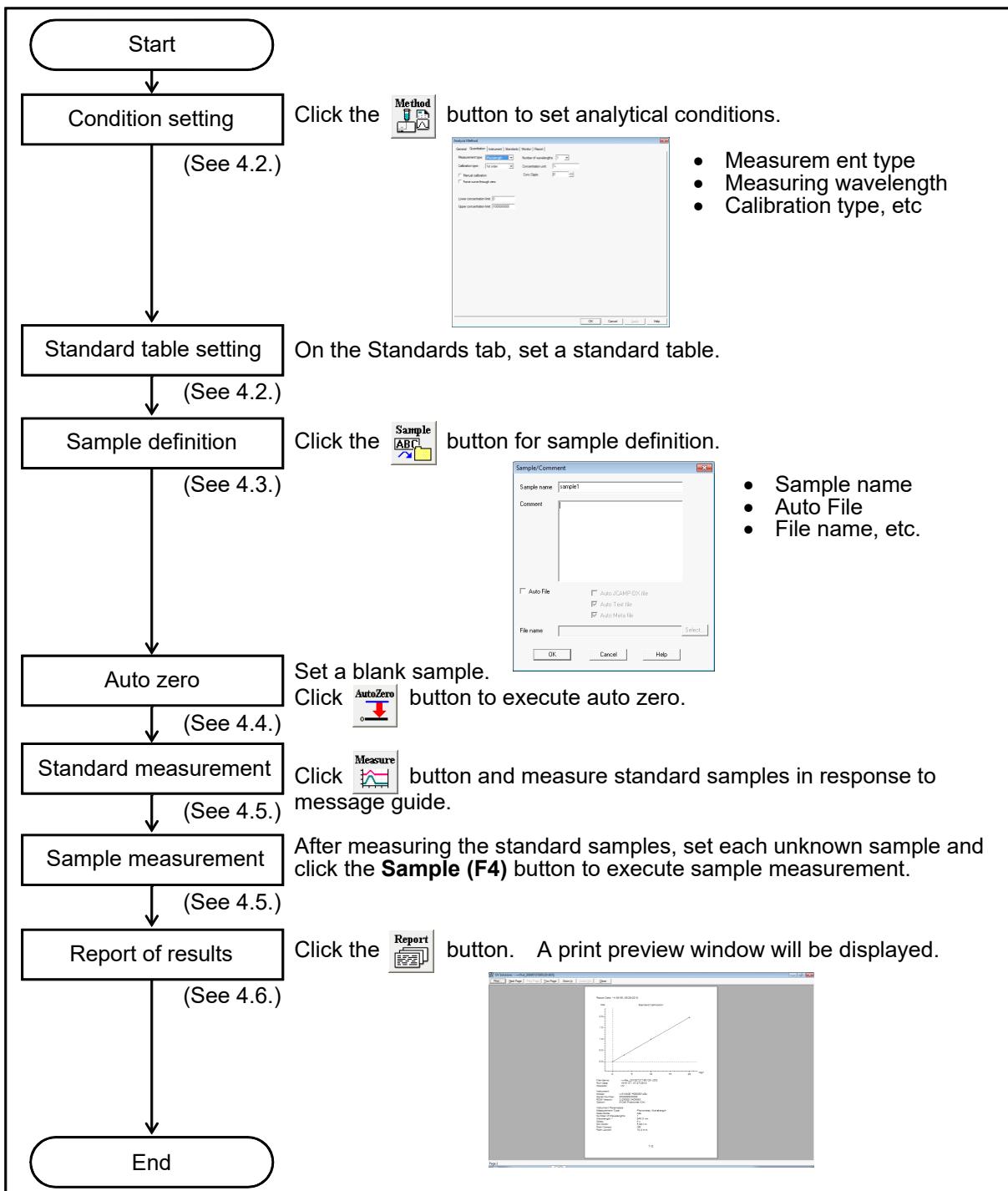


Fig. 4-1 Flow of Operation (photometry)

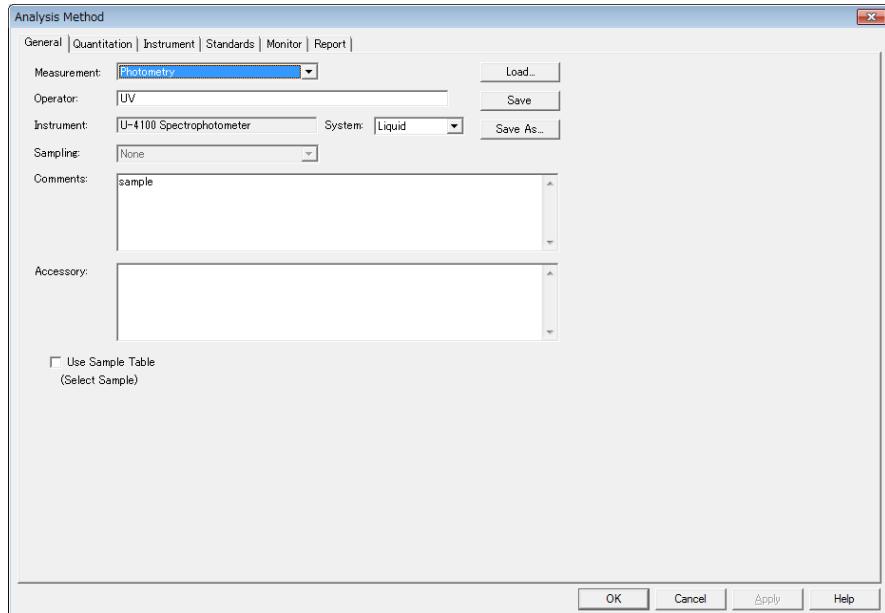
## 4.2 Setting Analytical Conditions

### 4.2 Setting Analytical Conditions

Analytical conditions need to be set before measurement.

Click the  (Edit Method) button on the measurement toolbar, and a window as shown in Fig. 4-2 will be displayed.

(Or, select the “Method” command from the “Edit” menu on the menu bar.)



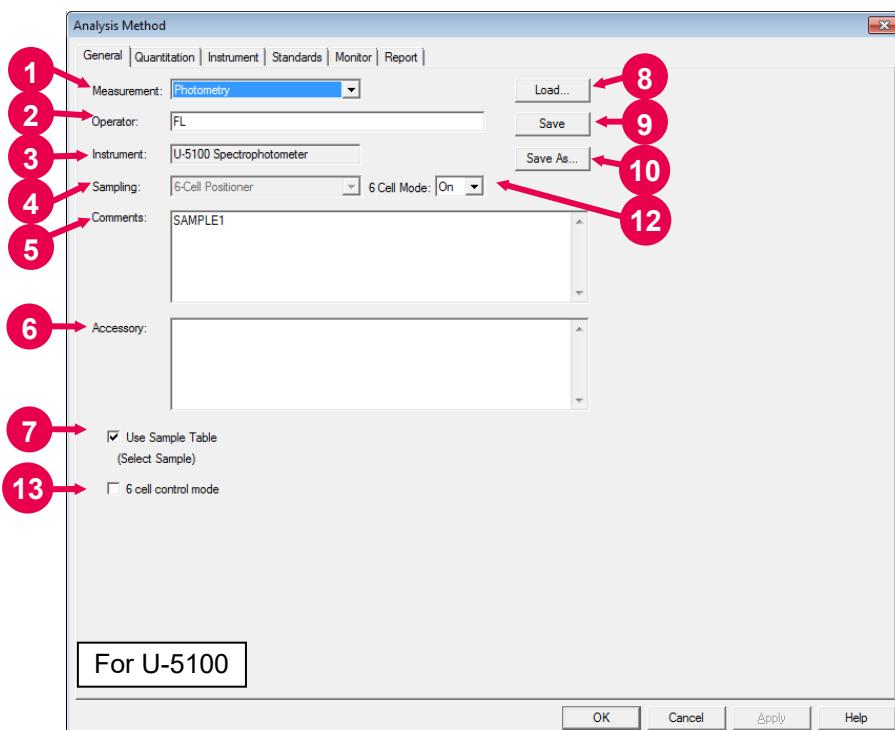
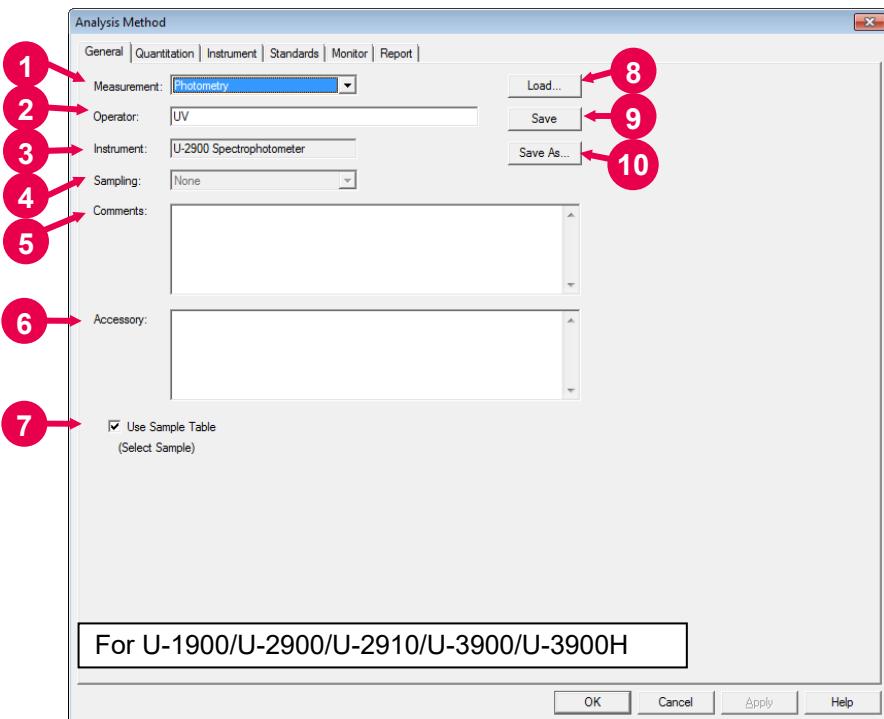
**Fig. 4-2 Analytical Condition (Method)  
(for U-4100/UH4150/UH4150AD+)**

The Analysis Method window in the photometry mode has the following tabs. These tabs are detailed below.

- General
- Quantitation
- Instrument
- Standards
- Monitor
- Report

#### 4.2.1 General Tab

The General tab contains the parameters shown below.  
For the settable range of each parameter, refer to Appendix F.



## 4.2 Setting Analytical Conditions

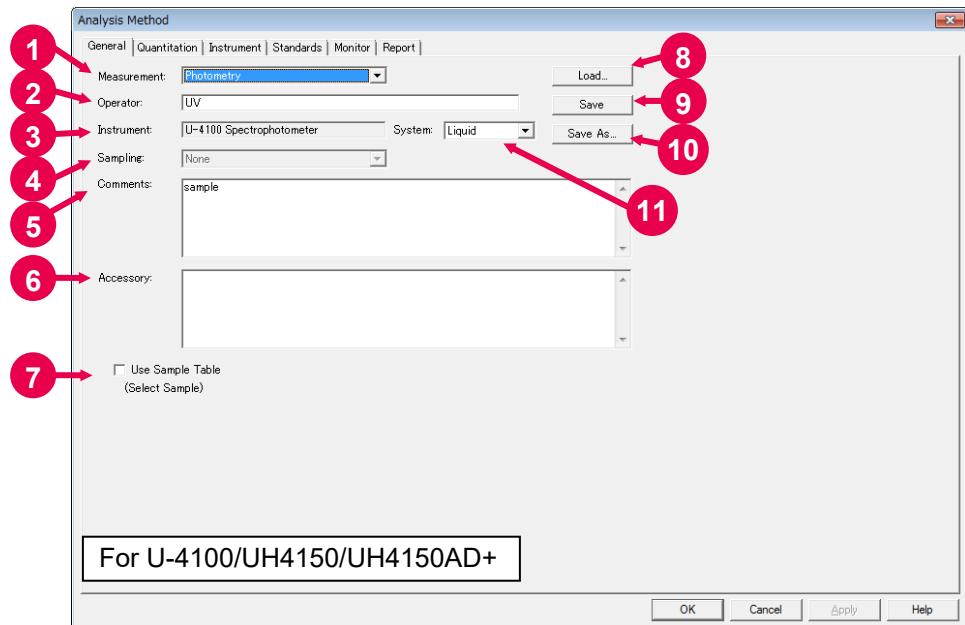


Fig. 4-3 General Tab

### (1) Measurement

Measurement mode is selectable. "Photometry" should be selected here. For Wavelength scan and Time scan, refer to Sections 2 and 3, respectively.

### (2) Operator

Input the name of analyst.

### (3) Instrument

The model of the actually connected spectrophotometer is indicated.

### (4) Sampling

None : Samples need to be exchanged manually.

Sipper : The auto sipper is now connected.

6-Cell Positioner : The 6-cell positioner is now connected. (For Model U-5100, "6-Cell Positioner" is indicated because this instrument is equipped with the 6-cell turret.)

## (5) Comments

An explanation of measurement condition or caution can be entered.

## (6) Accessory

Input the name of a mounted accessory. In the above Sampling field, the name of an optional unit which is automatically recognized by the spectrophotometer is displayed. The name of micro-cell holder or the like accessory which will not be recognized automatically by the spectrophotometer should be input here.

## (7) Use Sample Table (Select Sample)

Put a check mark for using a sample table.

## (8) Load

Check this button for loading the saved analytical conditions. On clicking, a window for opening will appear. In the window, select the Method file.

## (9) Save

When clicking this button after completion of parameter assignment, analytical conditions can be overwritten. For new generation of analytical conditions, the Save As window appears when clicking this button. So input your file name.

## (10) Save As

Click this button for saving the set conditions in a file name newly given. The Save As window will appear. So input your file name.

## 4.2 Setting Analytical Conditions

### (11) System

Displayed when the Model U-4100/UH4150/UH4150AD+ is used. Select the system depending on the connected system. If the UH4150AD+ is connected to the device, it will be set automatically.

Liquid: For U-4100 (liquid sample measurement system),

Solid: For U-4100 (solid sample measurement system)(large-sample measurement system),

UV: For U-4100 (UV-region sample measurement system)

Direct Light Detector: For UH4150/UH4150AD+ Direct light detection system, Integrating Sphere: For

UH4150/UH4150AD+ integrating sphere detection system

Other: UH4150AD+

### (12) 6 Cell Mode

Displayed when the Model U-5100 is used.

On : Be sure to set at ON for measurement with the 6-cell turret.

Off : Be sure to set at OFF for measurement with the single-cell holder, rectangular long cell holder, etc. other than the 6-cell turret.

### (13) 6 cell control mode

This function is used for measurement with the 6-cell positioner when the Model U-2900, U-2910, U-3900 or U-3900H is connected. Use of this control enables you to carry out measurement while automatically moving the 6-cell positioner.

With the U-5100, this field appears when the 6-cell mode is activated (ON). Use this control for measurement through automatic movement of the 6-cell turret. For details, refer to the following table.

**Table 4-1 Setting of 6-cell Condition for Different Usages in Model U-5100**

Usage Setting Method	With 6-cell Turret		Without 6-cell Turret
	Continuous Measurement in Auto Mode	Sample by Sample Measurement	Measurement with Single-cell Holder or Rectangular Long Cell Holder
6 Cell Mode	On	On	Off
6 cell control mode	On *1	Off *2	Off *2

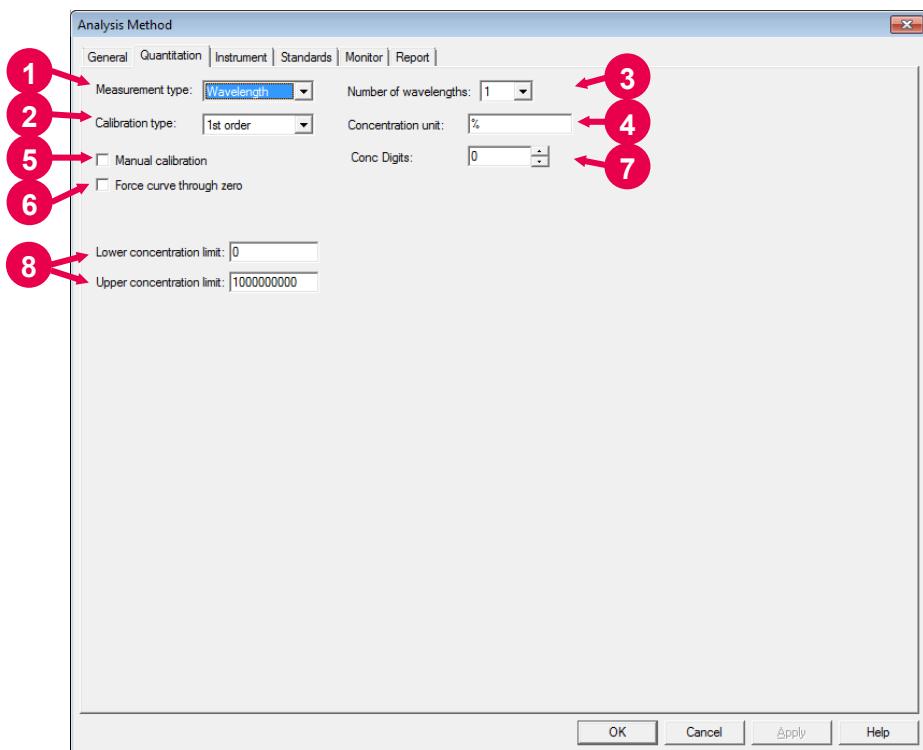
\*1 On : Turn on the check box (put check mark).

\*2 Off : Turn off the check box (remove check mark).

#### 4.2.2 Quantitation Tab

Selecting the Quantitation tab opens a window as shown in Fig. 4-4.

For the settable range of each parameter, refer to Appendix F.



**Fig. 4-4 Quantitation Tab**

##### (1) Measurement type

Any of the Wavelength, Peak area, Peak height, Derivative and Ratio methods is selectable. The spectra measured by the Peak area, Peak height and Derivative methods can be checked. (Refer to 5.20.)

##### (a) Wavelength

When you select Wavelength for Measurement type and None for Calibration type, photometric value(s) at the wavelength(s) specified in Number of wavelengths can be acquired. Data mode setting parameter will appear. Select any of Abs, %T and %R. In this case, no calibration curve will be generated.

## 4.2 Setting Analytical Conditions

**Table 4-2**

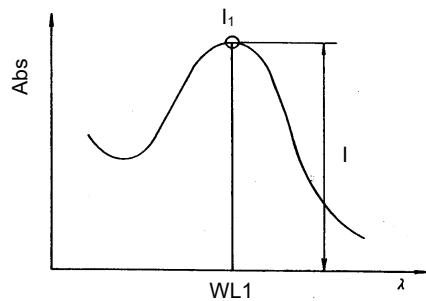
Model	Settable Item
U-1900, U-5100	%T, Abs/O.D.
U-2900, U-2910, U-3900, U-3900H, U-4100, UH4150/UH4150AD+	%T, Abs/O.D., %R

When you select Wavelength for Measurement type and 1st order, 2nd order, 3rd order or Segmented for Calibration type, calibration curve data and sample data will be obtained by the 1-wavelength calculation, 2-wavelength calculation or 3-wavelength calculation according to your selection of wavelength number.

(i) 1-wavelength calculation

This is the most common method.

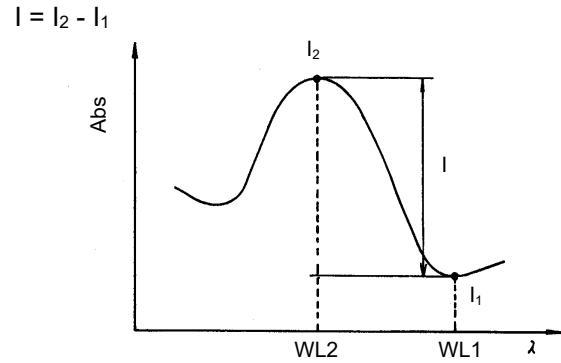
When specifying 1 for “Number of wavelengths” and setting the wavelength value on the Instrument tab, calibration curve and concentration will be determined according to the absorbance value  $I$  at the set wavelength as shown in Fig. 4-5 (a).



**Fig. 4-5 (a)**

(ii) 2-wavelength calculation

When specifying 2 for Number of wavelengths and setting 2 different wavelength values on the Instrument tab, the  $I$  value will be obtained by the equation below replacing the absorbance values at the two wavelengths with  $I_1$  and  $I_2$  as shown in Fig. 4-5 (b), according to which calibration curve and concentration will be determined. For WL1, set a wavelength to be used for correction, and for WL2, set a wavelength at which a sample will have an absorption.

**Fig. 4-5 (b)**

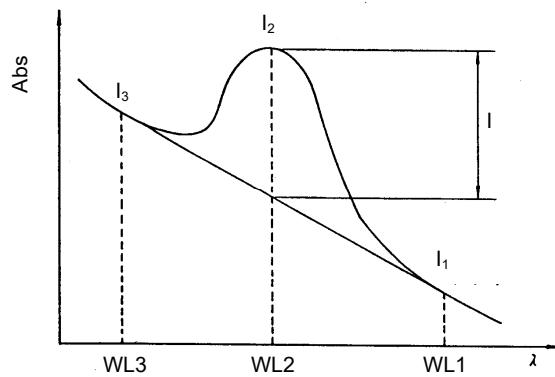
Two wavelengths to be set denote the following.  
 WL1: Wavelength 1  
 WL2: Wavelength 2

## (iii) 3-wavelength calculation

The  $I$  value is obtained by the equation below replacing the absorbance values at 3 wavelengths with  $I_1$ ,  $I_2$  and  $I_3$  as shown in Fig. 4-5 (c), according to which calibration curve and concentration are determined. For WL1 and WL3, set wavelengths to be used for correction, and for WL2, set a wavelength at which a sample will have an absorption.

$$I = I_2 - \frac{I_1(WL3 - WL2) + I_3(WL2 - WL1)}{WL3 - WL1}$$

Where,  $WL1 < WL2 < WL3$  or  $WL1 > WL2 > WL3$

**Fig. 4-5 (c)**

Three wavelengths to be set denote the following.  
 WL1: Wavelength 1  
 WL2: Wavelength 2  
 WL3: Wavelength 3

## 4.2 Setting Analytical Conditions

### (b) Peak Area

Input a peak wavelength and its accuracy range.

Select “Integration method” from among Rectangular, Trapezoid and Romberg. (Refer to “Integration Method” in Appendix D.2.) Set peak defining “Threshold” and “Sensitivity.”

Measurement will be performed in the wavelength range set via the Instrument tab. Peak wavelength is determined according to the specified threshold and sensitivity. For a peak detected within the peak wavelength  $\pm$  accuracy range, peak area is determined by the selected integration method and a calibration curve is generated.

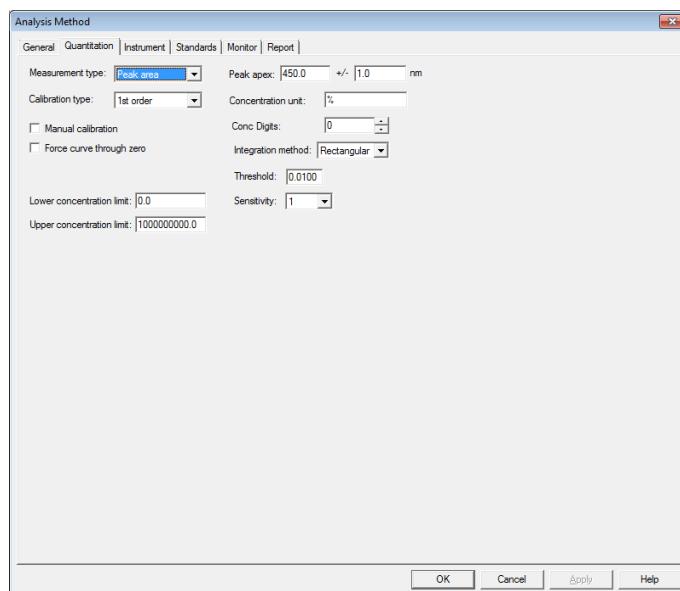
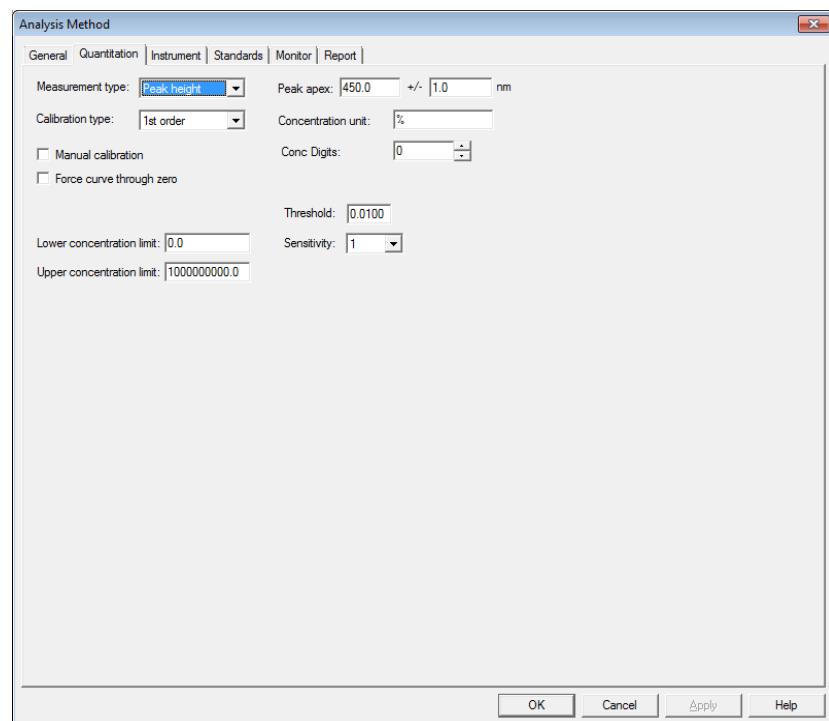


Fig. 4-6 Quantitation Tab (Peak area)

## (c) Peak Height

Input a peak wavelength and its accuracy range. Measurement will be performed in the wavelength range set via the Instrument tab. A peak is searched according to the specified threshold and sensitivity, and with reference to the height of a peak detected within the peak wavelength  $\pm$  accuracy range, a calibration curve is generated.



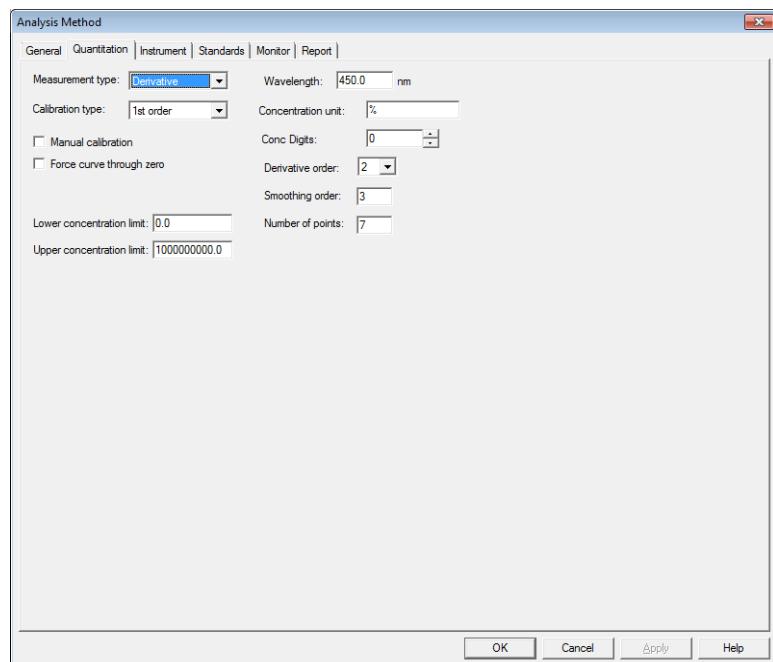
**Fig. 4-7 Quantitation Tab (Peak height)**

## 4.2 Setting Analytical Conditions

### (d) Derivative

For “Wavelength,” input a value (wavelength for calibration curve generation). Measurement will be performed in the wavelength range set via the Instrument tab and a calibration curve is generated according to the derivative value at the input Wavelength.

Differentiation parameters (Derivative order, Smoothing order, Number of points) need to be set.

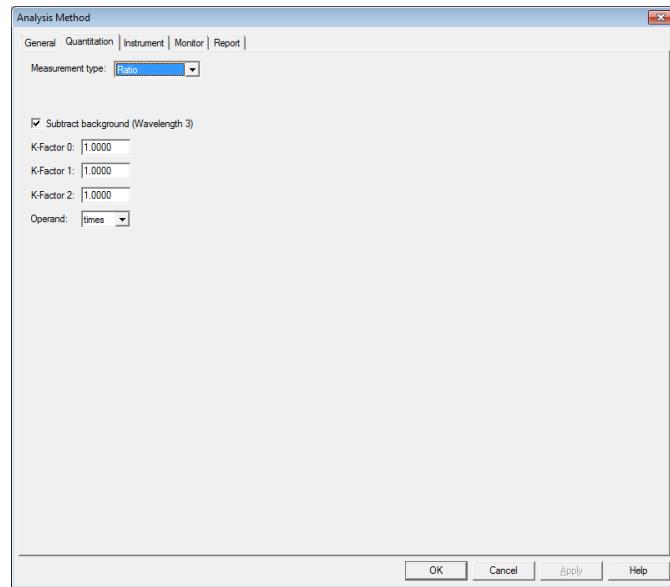


**Fig. 4-8 Quantitation Tab (Derivative)**

### (e) Ratio

Selection of Ratio (peak ratio) will display each field for inputting 3 factors (K-Factor 0, K-Factor1, K-Factor 2) and for setting a calculation method (plus, minus, times).

**NOTE:** In the ratio mode, a calibration curve cannot be generated.



**Fig. 4-9 Quantitation Tab (Ratio)**

Calculation is performed by the following equation.

$$\text{RATIO} = \frac{\text{K1} (\text{A}(\text{WL1}) - \text{A}(\text{WL3}))}{\text{K2} (\text{A}(\text{WL2}) - \text{A}(\text{WL3}))} \ #K0$$

# (calculation method): Plus, minus, times

WL1, 2, 3 : Specified wavelengths

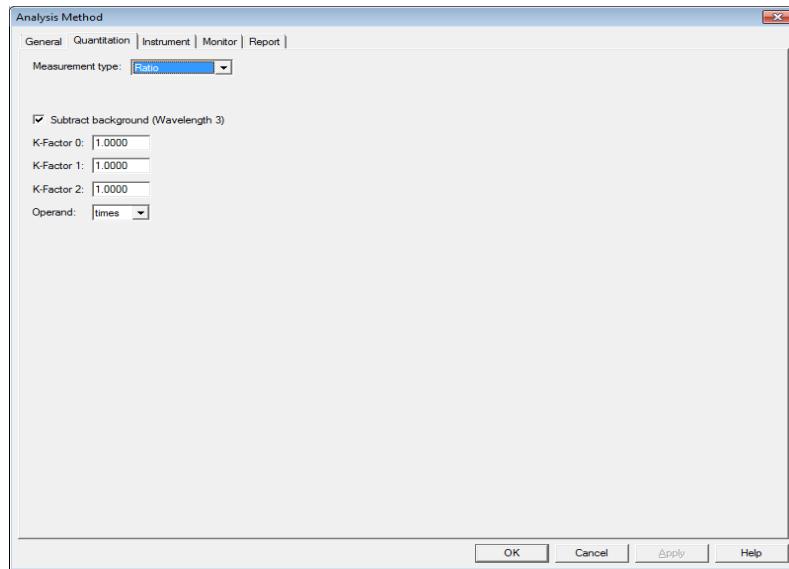
WL3 : Wavelength for background correction

A ( ) : Absorbance at the specified wavelength

For example, setting is required as shown below for measuring the absorbance ratio between 260 and 280 nm through background correction (at 320 nm). That is, K-Factor of 0, 1 and 2 need to be set on the Quantitation tab for the case given by the following equation.

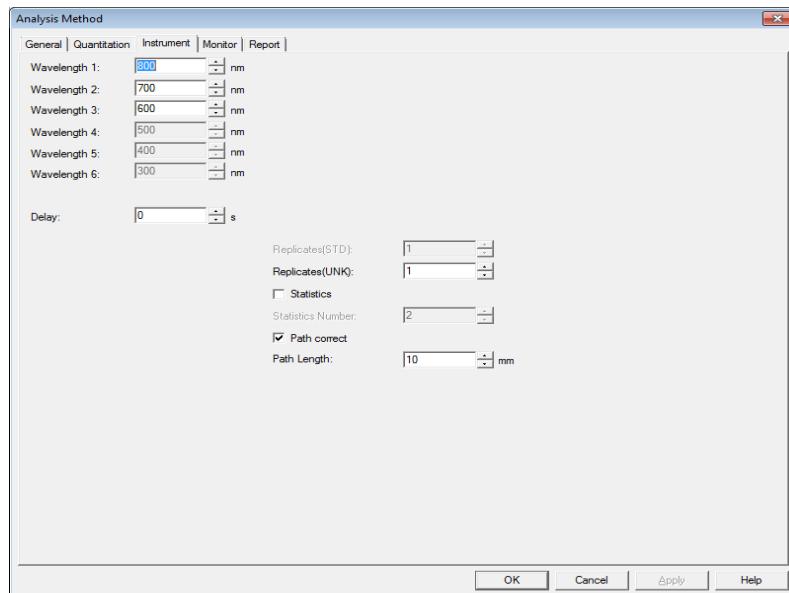
$$\text{RATIO} = \frac{\text{A}(260) - \text{A}(320)}{\text{A}(280) - \text{A}(320)}$$

## 4.2 Setting Analytical Conditions



**Fig. 4-10 Quantitation Tab**

Next, input wavelengths WL1 to WL3 on the Instrument tab. (See Fig. 4-11.) For WL3, input a wavelength for background correction.



**Fig. 4-11 Instrument Tab (for U-5100)**

The result of measurement will be indicated as shown below.

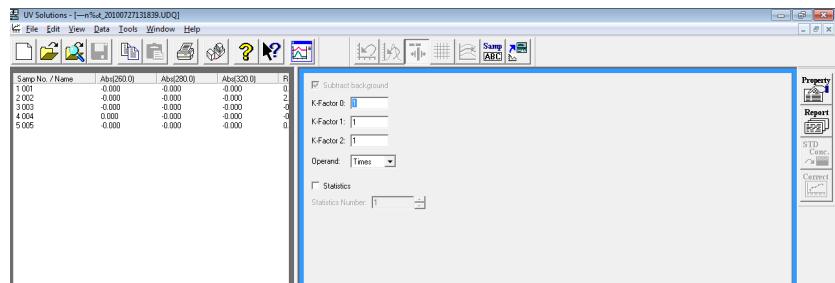


Fig. 4-12 Rate Data Processing Window

After measurement, the specified factor values K0, K1 and K2, and calculation method can be changed.

After change of setting, press the [Enter] key on the keyboard. Calculation will be repeated using the set factors and calculation method.

## (2) Calibration type

The order of calibration curve approximation formula is settable here. The 1st, 2nd and 3rd orders use the linear, quadratic and cubic curves, respectively, for approximation to generate a calibration curve.

Also, when the formula and factors of a calibration curve are known and sample concentration is to be determined by using the factors, turn on the “Manual calibration” check box, and input A0 and A1 values for the linear curve, A0, A1 and A2 values for the quadratic curve and A0, A1, A2 and A3 values for the cubic curve. Factor input values in this case vary with the “Calibration” conditions on the “Processing” tab page in 1.8.3. Details are given below.

[When calibration curve condition is Conc = f(Abs)]

### (a) None

Calibration curve will not be generated.

When Wavelength is set for Measurement type and None is selected for Calibration type, a multi-wavelength measurement of up to 6 wavelengths can be performed. However, spectra cannot be displayed.

## 4.2 Setting Analytical Conditions

(b) 1st order

Calibration curve will be generated using the linear curve. Calibration curve formula is expressed below.

$$x = A_1y + A_0$$

Where, x : Sample concentration

y : Sample absorbance

(c) 2nd order

Calibration curve will be generated using the quadratic curve. Calibration curve formula is expressed below.

$$x = A_2y^2 + A_1y + A_0$$

Where, x : Sample concentration

y : Sample absorbance

(d) 3rd order

Calibration curve will be generated using the cubic curve. Calibration curve formula is expressed below.

$$x = A_3y^3 + A_2y^2 + A_1y + A_0$$

Where, x : Sample concentration

y : Sample absorbance

(e) Segmented

According to each measured standard sample or input data, a polygonal line is drawn by connecting the data of each standard sample by a straight line.

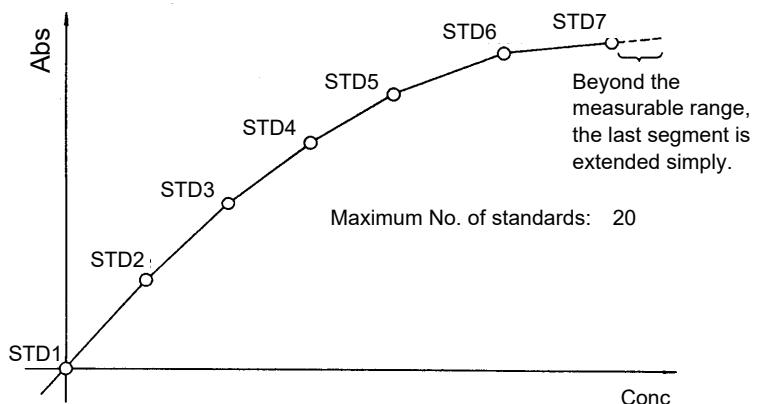


Fig. 4-13 Polygonal-line Calibration Curve

**NOTE:** A correct calibration curve can be generated when absorbance increases or decreases monotonously with respect to concentration value. In case of monotonous increase, the calibration curve has the origin at standard 1 (STD1). In case of monotonous decrease, STD1 and STD5 of the calibration curve are plotted on the absorbance axis and concentration axis, respectively. For this example, the number of standards is set to 5.

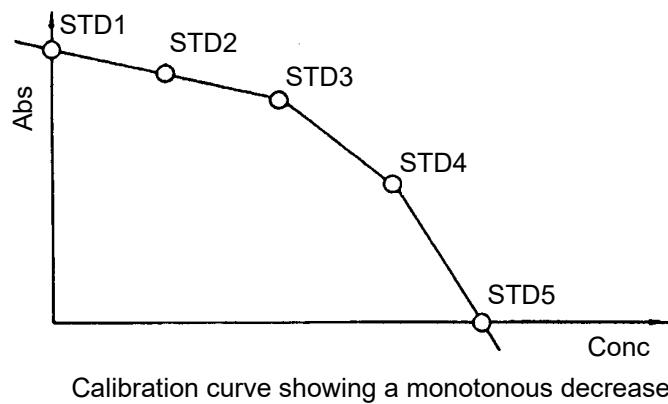
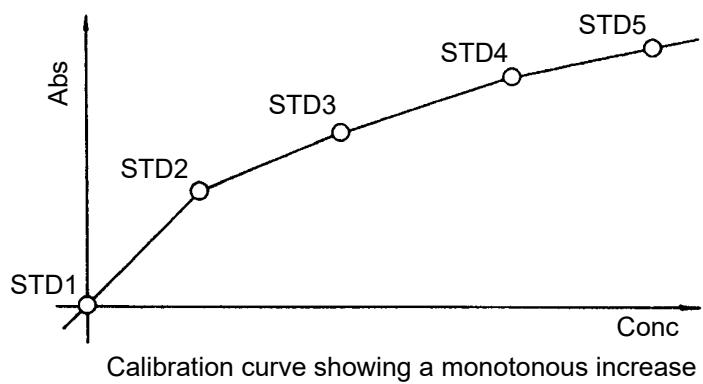


Fig. 4-14

## 4.2 Setting Analytical Conditions

[When calibration curve condition is Abs = f(Conc)]

- (a) None

Calibration curve will not be generated.

When Wavelength is set for Measurement type and None is selected for Calibration type, a multi-wavelength measurement of up to 6 wavelengths can be performed. However, spectra cannot be displayed.

- (b) 1st order

This is the most common calibration curve type.

Calibration curve will be generated using the linear curve. Calibration curve formula is expressed below.

$$y = A_1x + A_0$$

Where, x : Sample concentration

y : Sample absorbance

- (c) 2nd order

Calibration curve will be generated using the quadratic curve. Calibration curve formula is expressed below.

$$y = A_2x^2 + A_1x + A_0$$

Where, x : Sample concentration

y : Sample absorbance

- (d) 3rd order

Calibration curve will be generated using the cubic curve. Calibration curve formula is expressed below.

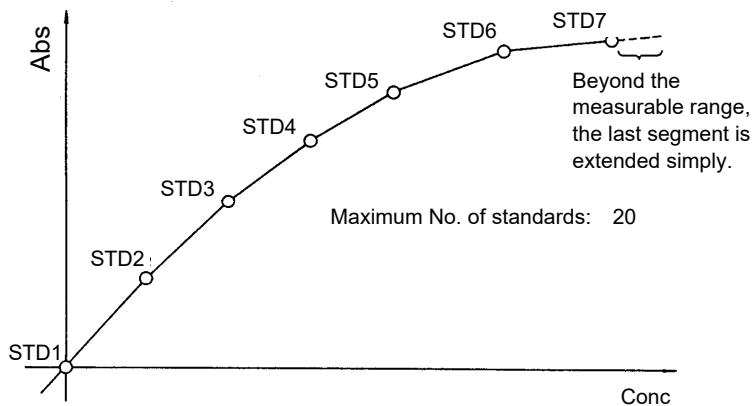
$$y = A_3x^3 + A_2x^2 + A_1x + A_0$$

Where, x : Sample concentration

y : Sample absorbance

## (e) Segmented

According to each measured standard sample or input data, a polygonal line is drawn by connecting the data of each standard sample by a straight line.



**Fig. 4-15 Polygonal-line Calibration Curve**

**NOTE:** A correct calibration curve can be generated when absorbance increases or decreases monotonously with respect to concentration value. In case of monotonous increase, the calibration curve has the origin at standard 1 (STD1). In case of monotonous decrease, STD1 and STD5 of the calibration curve are plotted on the absorbance axis and concentration axis, respectively. For this example, the number of standards is set to 5.

## 4.2 Setting Analytical Conditions

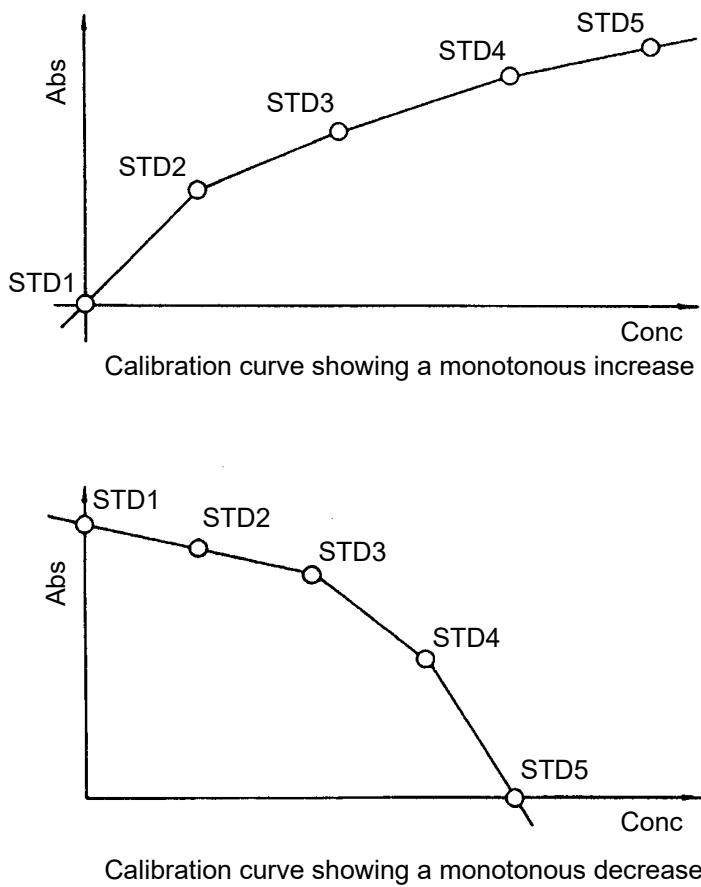


Fig. 4-16

### (3) Number of wavelengths

Input the number of wavelengths to be used for measurement. When Measurement type is "Wavelength" and Calibration type is "1st order," "2nd order," "3rd order" or "Segmented," settings (1) to (3) can be made. And when Calibration type is "None," settings (1) to (6) can be made. For setting method, also refer to "(1) Measurement type" in "4.2.2 Quantitation Tab."

## (4) Concentration unit

Input a concentration unit (such as mg/mL) from the keyboard.

## (5) Manual calibration

For generating a calibration curve according to factors, put a check mark in this box. Factors should be input according to the selected calibration curve type.

## (6) Force curve through zero

When checking this box, a calibration curve will be generated so that factor  $A_0$  automatically takes value 0.

## (7) Conc Digits

Input the number of digits below decimal point for indicating the calculated concentration of each measured sample. A concentration value will be rounded off at the digit just after the set number of digits.

## (8) Lower concentration limit/Upper concentration limit

These limits are input for determining the normal value range of sample concentration measured.

If the concentration value is larger than the upper limit specified here, HIGH is indicated in the Conc column cell as shown in Fig. 4-17. And, if the concentration value is smaller than the lower limit, LOW is indicated.

Samp No. / Name	Abs(590.0)	Conc(%)	Avg Conc [SD][CV] (%)
1	0.422	2.7 HIGH	
2	0.326	2.1 HIGH	2.4 [0.4277][17.821] HIGH
3	0.000	0.0 LOW	
4	0.000	0.0 LOW	0.0 [0.0010][****] LOW
5	1.261	8.0 HIGH	



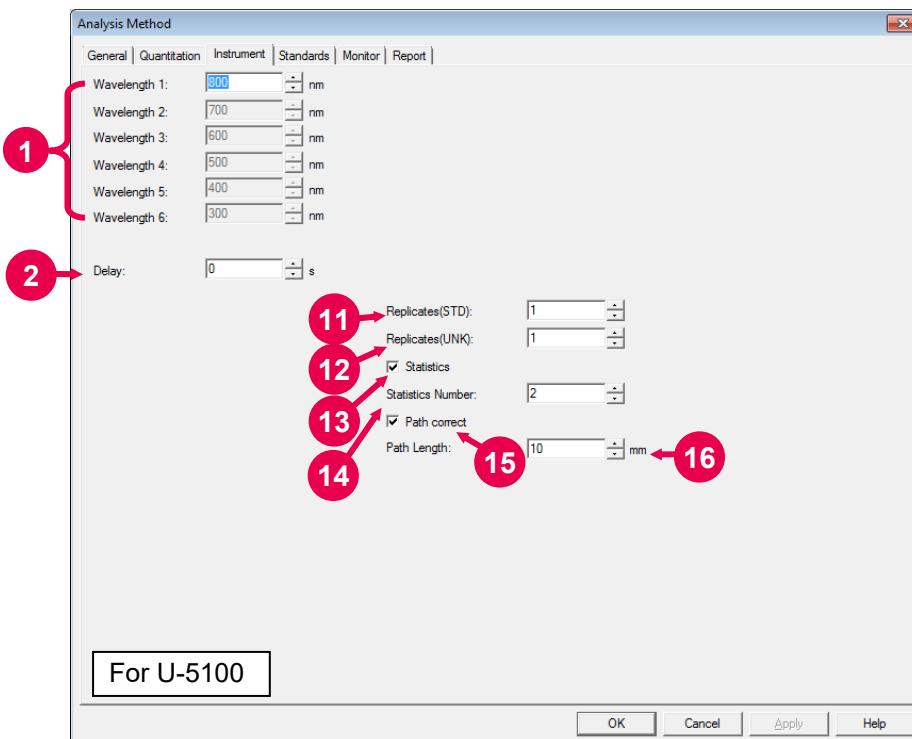
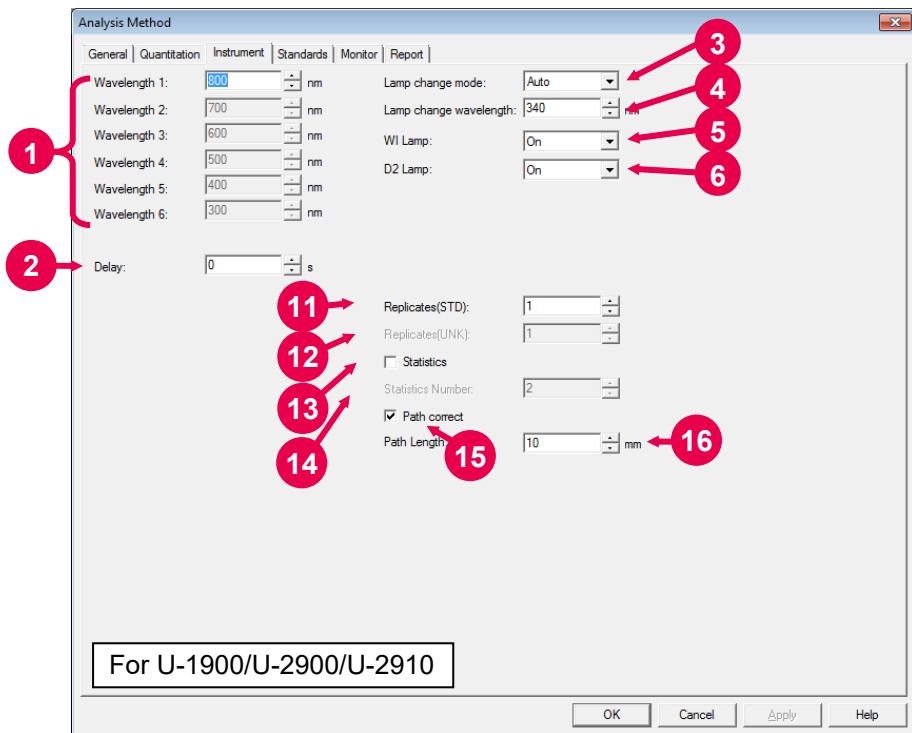
Sample[F4]	Blank[F5]	Interrupt[F7]	Remeasure[F8]	End[F9]
------------	-----------	---------------	---------------	---------

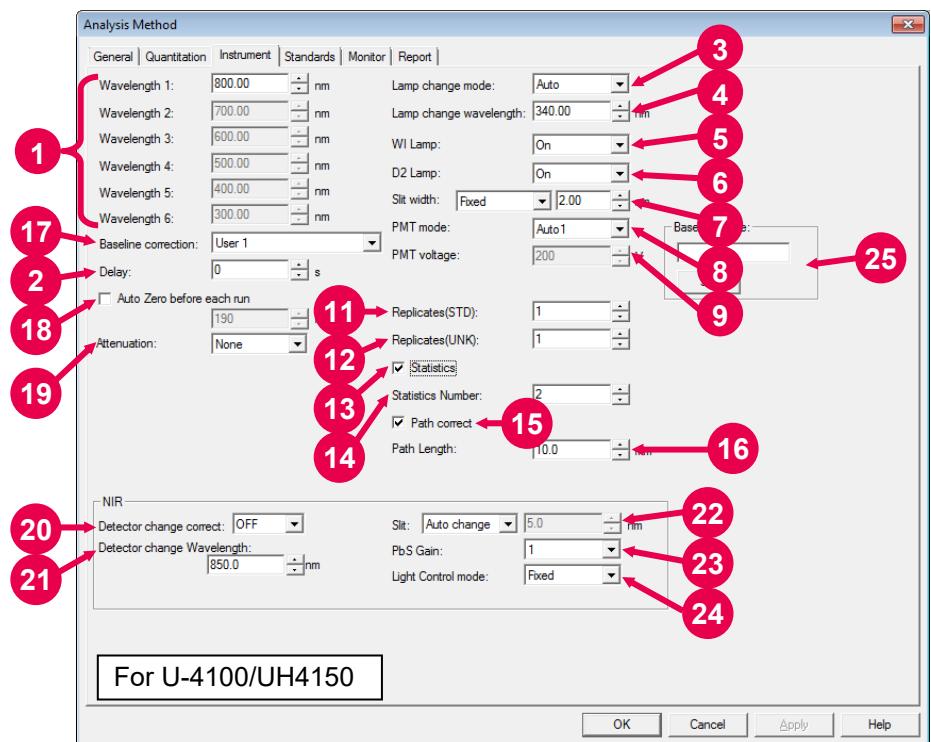
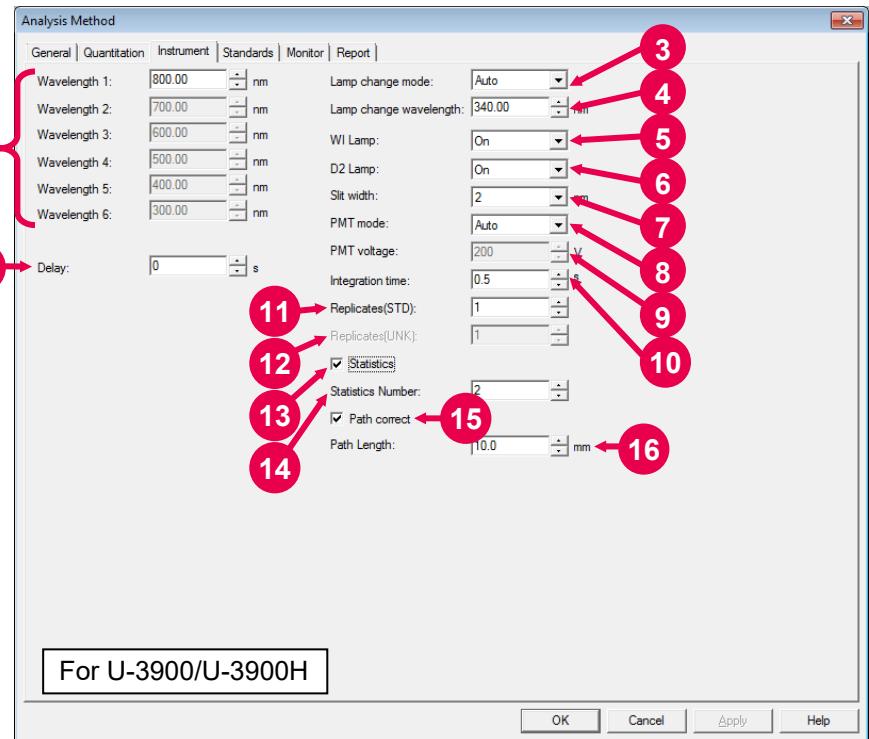
**Fig. 4-17 (Example measurements when upper limit is 5)**

## 4.2 Setting Analytical Conditions

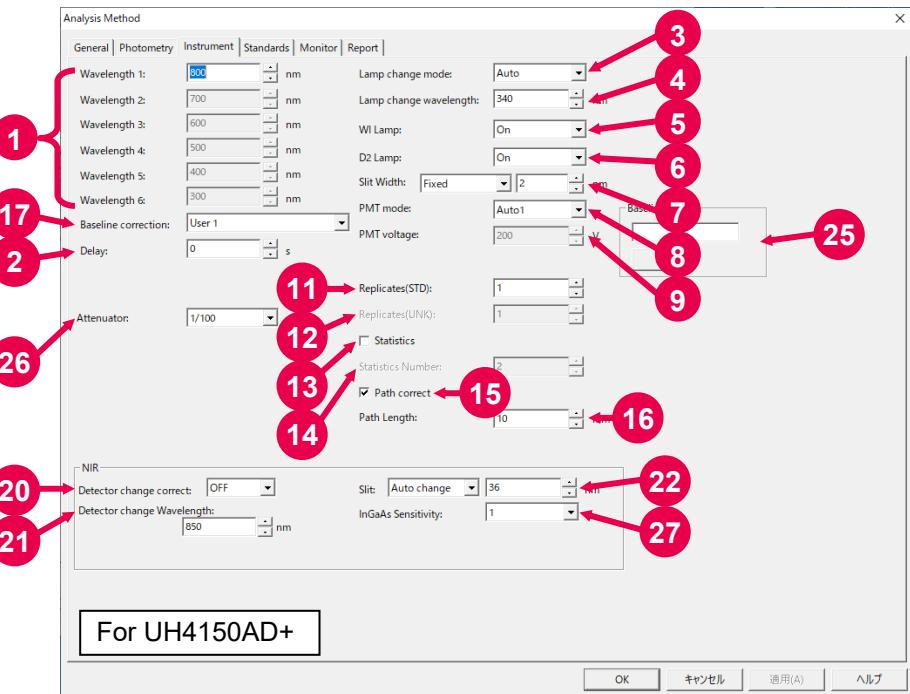
### 4.2.3 Instrument Tab (Measurement type: Wavelength or Ratio)

When you select the Instrument tab with Wavelength or Ratio set for Measurement type, a window as shown in Fig. 4-18 will be displayed. For the settable range of each parameter, refer to Appendix F.





## 4.2 Setting Analytical Conditions



**Fig. 4-18 Instrument Tab**

### (1) Wavelength (1 - 6)

In this field, input wavelength value by the number of wavelengths entered on the Quantitation tab.

### (2) Delay

After the (Start Series) button is pressed, the system waits for the time period set here and then measurement begins. This setting is used for temperature stabilization after sample setting and the like purposes.

In case of repetitive measurement, Delay corresponds to a wait time till the first measurement after pressing the button. This parameter does not concern the second measurement onward.

### (3) Lamp change mode

Selects the light source to be used for measurement.  
(Unavailable with U-5100)

## (4) Lamp change wavelength

When Auto is selected for Lamp change mode, it is required to input a wavelength for automatic changeover between the UV light source D<sub>2</sub> lamp and the VIS light source WI lamp.  
(Unavailable with U-1900 and U-5100)

## (5) WI Lamp

Selects on/off status of the WI lamp. When the analytical conditions are set by clicking the **OK** button, the WI lamp will turn on or off according to your selection.  
(Unavailable with U-5100)

(6) D<sub>2</sub> Lamp

Selects on/off status of the D<sub>2</sub> lamp. When the analytical conditions are set by clicking the **OK** button, the D<sub>2</sub> lamp will turn on or off according to your selection.  
(Unavailable with U-5100)

## (7) Slit width

Selects a slit width.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (8) PMT mode

You can select the function for controlling the high voltage for detector photomultiplier.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

Fixed : This mode is used for measurement in energy mode.  
The high voltage applied to the photomultiplier is fixed to the input value.  
Auto : Usually, this mode is employed.

## (9) PMT voltage

This parameter is settable when Fixed is selected in the PMT mode.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## 4.2 Setting Analytical Conditions

### (10) Integration time

This is a function for averaging data in the specified time period in order to obtain stable data.

(Unavailable with U-5100/U-4100/UH4150/UH4150AD+)

### (11) Replicates (STD)

Input the number of measurement repetitions for standard samples. This parameter is settable when “Use Sample Table” is selected (by putting a check mark) on the General tab.

### (12) Replicates (UNK)

Input the number of measurement repetitions for unknown samples.

### (13) Statistics

Average value, SD (standard deviation) and CV (coefficient of variation) are to be calculated when a check mark is put in the check box of this parameter.

### (14) Statistics Number

This parameter is effective when a check mark is put for Statistics. Average value, SD (standard deviation) and CV (coefficient of variation) will be calculated for the specified number of samples. For example, when 6 samples are to be measured, input of 2 for Statistics Number will effect statistic calculation in units of 2 data.

#### [Reference]

In order to obtain the average value and standard deviation in the repetitive measurement of 1 sample, measurement is required with this parameter set as given below. For using this function, a sample table needs to be used.

Statistics Number : 1,

Replicates (UNK) : 2 or more

## (15) Path correct

This function is usable when “Abs” is selected for data mode on the “Quantitation” tab page. When measurement was performed using a cell other than 10 mm rectangular cell, the photometric value can be converted into the one measured with a 10 mm rectangular cell. When this function is selected (check mark is applied), the photometric value will be converted at the set cell length.

For example, when the photometric value measured with a 5 mm cell is 0.500 Abs, it will be converted into 1.000 Abs as a value measured with a 10 mm cell.

**NOTE:** This function is effective in the Abs/O.D. mode.

## (16) Path Length

Sets the optical path length of a cell used for measurement.

## (17) Baseline correction

Baseline data is selectable. However, baseline measurement is used in the wavelength scan mode. Because the time scan mode corresponds to 1-wavelength measurement, the auto zero function is employed for this setting. So far as auto zero is executed before sample measurement, the same result as with baseline measurement is obtainable.

## (18) Auto Zero before each run

Before each sample measurement, auto zero measurement (“zero” corresponds to 100%T in transmittance mode, and 0 Abs in absorbance mode) can be carried out.

## 4.2 Setting Analytical Conditions

### (19) Attenuation

In the U-4100/UH4150/UH4150AD, an attenuation plate is inserted on the reference side. Of the attenuation plate, an attenuation factor can be set. This factor is usable for a sample whose absorbance is 4 Abs or higher or transmittance/reflectance is 0.1% or lower. For usage, implement the following procedure. In Analysis Method, select 1/10 or 1/100 for Attenuator Factor (attenuation factor of the attenuator plate) and measure the baseline. Then, choose the Attenuator Factor command from the Spectrophotometer menu.

For this command, you must select a factor of 1/10 or 1/100 whichever selected in Analysis Method. After completion of attenuation factor measurement, sample measurement can be carried out.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

None  
1/10  
1/100

### (20) Detector change correct

This item is displayed when the U-4100/UH4150/UH4150AD+ is connected. Either "ON" or "OFF" selection of this compensation, if made here, is ineffective.

(Not displayed for U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

### (21) Detector change Wavelength

With use of the U-4100/UH4150/UH4150AD+, you can set a wavelength for changeover between the UV-VIS and NIR region detectors.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Effective input range: 700.0 to 900.0 nm (U-4100/UH4150)  
Effective input range: 700.0 to 920.0 nm (UH4150AD+)

## (22) Slit

In the U-4100/UH4150/UH4150AD+, a slit width in the near infrared region can be set.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Fixed : A desired slit width can be input in increments of 0.1 nm within a range from 0.1 to 20.0 nm.

Auto change: Slit width is automatically controlled according to optical energy level. This is a function for keeping S/N (signal to noise ratio) as constant as possible in the measuring wavelength range. While this function is active for U-4100/UH4150, the slit width automatically changes within a range from about 0.1 to 36 nm.

This auto control cannot be set simultaneously with the light quantity control mode. For UH4150AD+, the upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.

## (23) PbS Gain

In the U-4100/UH4150/UH4150AD, sensitivity of the NIR-region detector can be set. This is a function for setting PbS sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (PbS sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a PbS sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

## 4.2 Setting Analytical Conditions

### (24) Light Control mode

This is a mode for controlling NIR-region light quantity in the U-4100/UH4150.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

Fixed : Usually this mode is used.

Auto change: This function is used when measurement with the slit width fixed cannot be carried out due to an excessive light quantity in the infrared region.

### (25) Baseline name

Set the name of the user baseline. Input the user baseline name. Then click the Set button. This inputted name is displayed in monitor window and the Baseline correct window. (Unavailable with U-1900/U-5100)

### (26) Attenuator

This function is compatible with UH4150 AD+.

Set the attenuator on this window. The attenuator is automatically inserted on the reference side.

It can be used for samples with 4 Abs or more, transmittance and reflectance of 0.1% or less.

After selecting the attenuator on the method window, perform baseline measurement.

Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured.

None

1/10

1/100

1/1000

1/10000

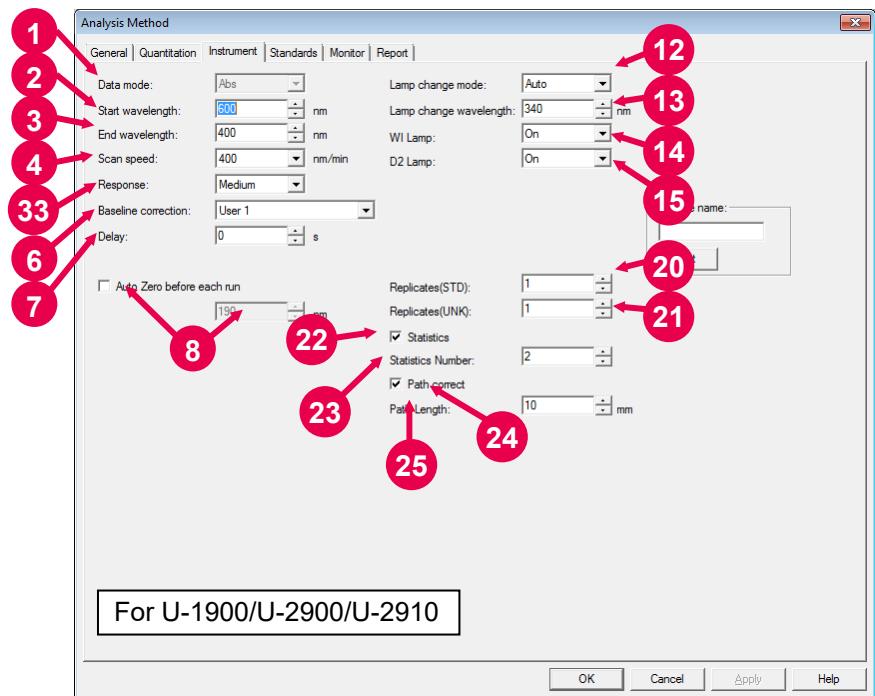
### (27) InGaAs sensitivity

This function is compatible with UH4150 AD+. Sensitivity of the NIR-region detector can be set. This is a function for setting InGaAs sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (InGaAs sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a InGaAs sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

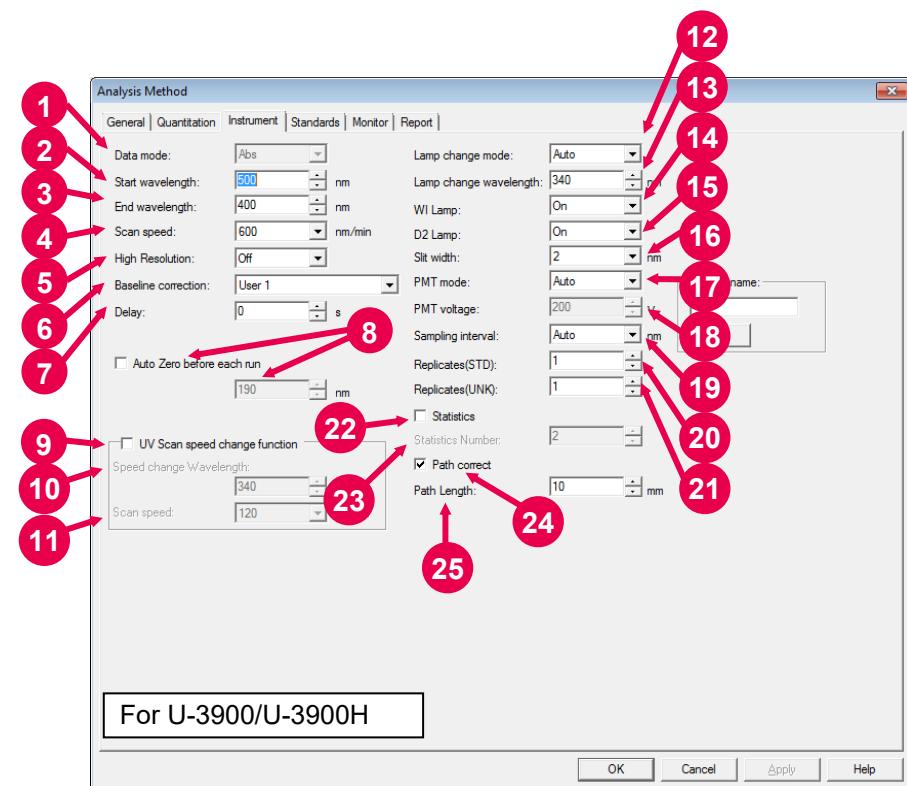
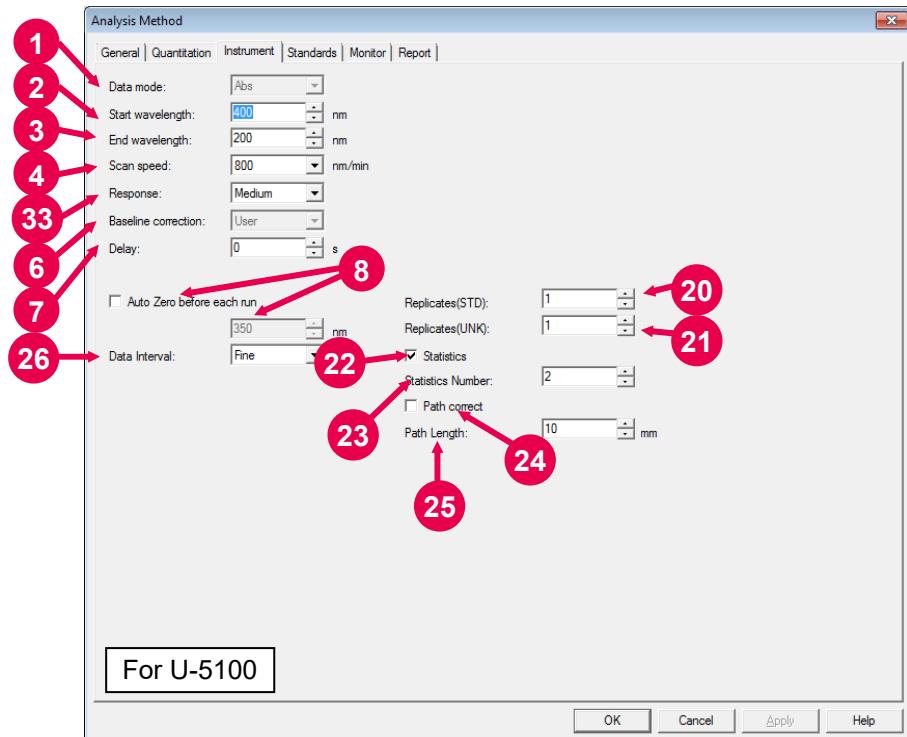
#### 4.2.4 Instrument Tab (Measurement type: Peak height, Peak area or Derivative)

When you select the Instrument tab with Peak height, Peak area or Derivative set for Measurement type, a window as shown in Fig. 4-19 will be displayed.

For the settable range of each parameter, refer to Appendix F.



## 4.2 Setting Analytical Conditions



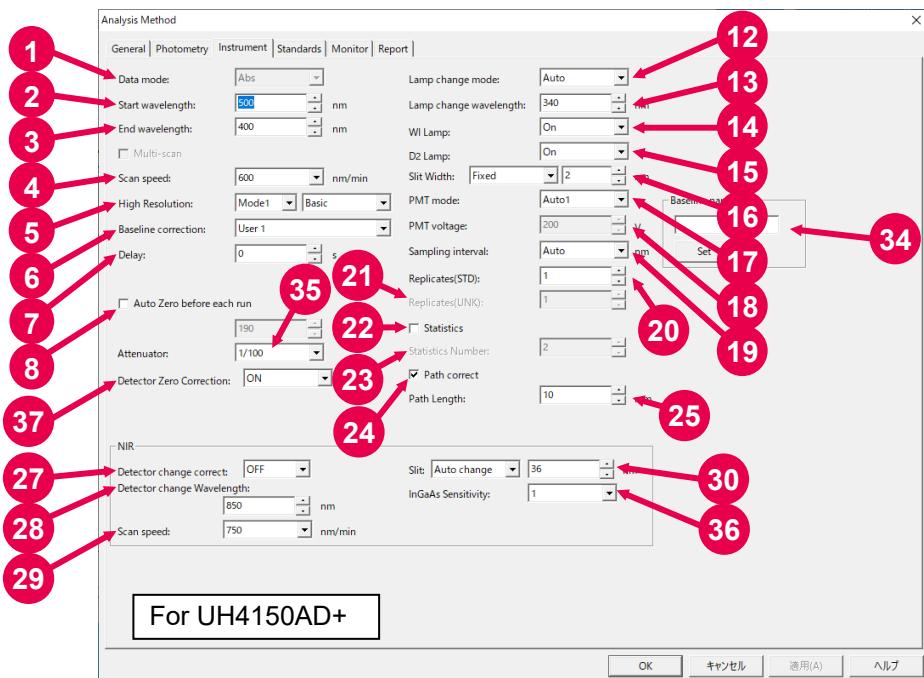
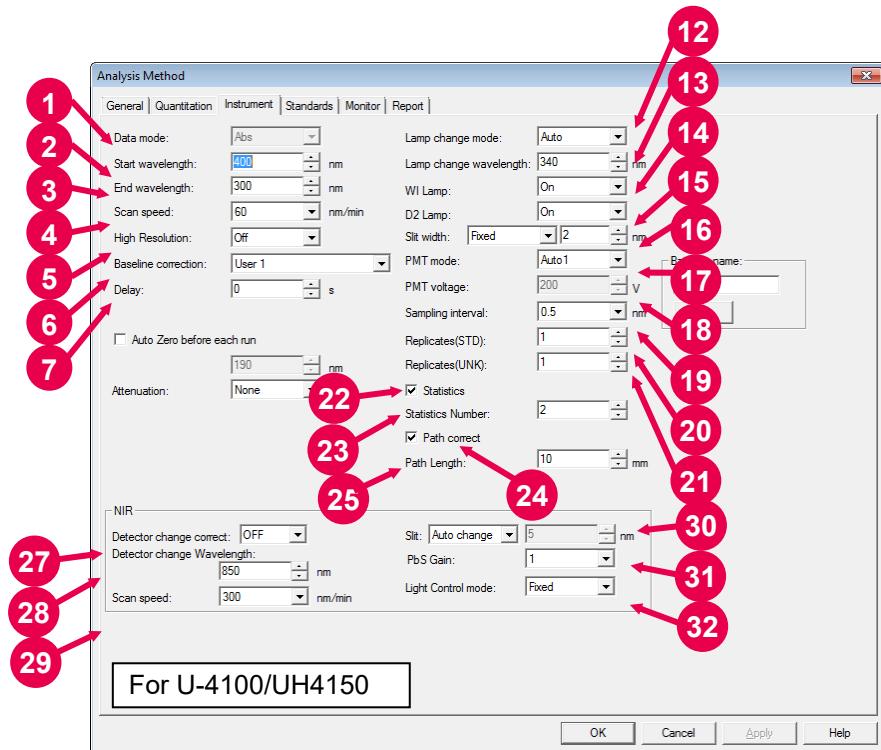


Fig. 4-19 Instrument Tab

## (1) Data mode

Only Abs or O.D. mode is allowed.

## 4.2 Setting Analytical Conditions

### (2) Start wavelength

Determines the start wavelength in wavelength scan.  
Input the longer wavelength side within a measuring wavelength range.

### (3) End wavelength

Determines the end wavelength in wavelength scan.  
Input the shorter wavelength side within a measuring wavelength range.

### (4) Scan speed

Sets a scan speed.

### (5) High Resolution

<For U-3900/U-3900H/U-4100/UH4150>

Either high resolution measurement or smoothing is selectable here.

(Unavailable with U-1900, U-5100, U-2900 and U-2910)

On : Measured data is all employed. This function is used for measuring sharp spectra.

Off : This is a usual setting. Fifteen points of data will be smoothed by Savitsky-Golay method.

Keeping spectral waveform as is, noise can be suppressed in data.

<For UH4150AD+>

**Mode 1:** The measured data is smoothed by the Gaussian method. Data with less noise can be obtained while keeping the shape of the spectral waveform.

Normally you will use the basic.

High: Select "High" for high-resolution measurement when measuring steep spectral data.

Middle: Smooths data at 3 points with the Gaussian method. It is used when higher resolution measurement than standard is required.

Basic: Used for normal measurement. Smooths data at 5 points with the Gaussian method.

Low: Smooths data at 9 points with the Gaussian method. It can obtain data with least noise.

**Mode 2:** Same function with

U-3900/U-3900H/U-4100/UH4150

Select high resolution measurement or smoothing processing.

On : Select “On” for high-resolution measurement when measuring steep spectral data.

Off : Select “Off” for ordinary measurement. In the smoothing operation, 15-point data values are smoothed based on the Savitsky-Golay method. Through this operation, noise-suppressed data can be obtained with the spectral profile intact.

#### (6) Baseline correction

Baseline correction data is selectable. When “None” is selected, raw data without baseline correction can be obtained. (For baseline measuring operation, refer to 2.4.) (Unavailable with U-1900 and U-5100)

- NOTES:**
1. For usual measurement, use the user baseline.
  2. Whenever changing a measurement condition or spectrophotometer condition or turning on the spectrophotometer power supply, the user baseline must be measured.

#### (7) Delay

After the  (Start Series) button is pressed, the system waits for the time period set here and then measurement begins. This setting is used for temperature stabilization after sample setting and the like purposes.

In case of repetitive measurement, Delay corresponds to a wait time till the first measurement after pressing the  button. This parameter does not concern the second measurement onward.

#### (8) Auto Zero before each run

Before each measurement, auto zero measurement (100%T set in transmittance mode and 0 Abs set in absorbance mode) is to be carried out at the specified wavelength. However, when Wavelength or Ratio is selected for Measurement type, this parameter is not displayed.

## 4.2 Setting Analytical Conditions

### (9) UV Scan speed change function

This is used for measurement with scan speed change in UV region.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-4100, UH4150 and UH4150AD+)

### (10) Speed change Wavelength

Input a scan speed changeover wavelength in UV scan speed changeover measurement.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-4100, UH4150 and UH4150AD+)

**NOTES:**

1. Setting is required so that the changeover wavelength in UV scan speed changeover measurement is shorter than or equal to light source changeover wavelength.
2. The following condition should be met.  
Measurement end wavelength < changeover wavelength in UV scan speed changeover measurement < measurement start wavelength

### (11) Scan speed

Input a scan speed for UV scan speed changeover measurement.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-4100, UH4150 and UH4150AD+)

### (12) Lamp change mode

Selects the light source to be used for measurement.  
(Unavailable with U-5100)

### (13) Lamp change wavelength

When Auto is selected for Lamp change mode, it is required to input a wavelength for automatic changeover between the UV light source D<sub>2</sub> lamp and the VIS light source WI lamp.

(Unavailable with U-1900 and U-5100)

## (14) WI Lamp

Selects on/off status of the WI lamp. When the analytical conditions are set by clicking the **OK** button, the WI lamp will turn on or off according to your selection.  
(Unavailable with U-5100)

## (15) D2 Lamp

Selects on/off status of the D<sub>2</sub> lamp. When the analytical conditions are set by clicking the **OK** button, the D<sub>2</sub> lamp will turn on or off according to your selection.  
(Unavailable with U-5100)

## (16) Slit width

Selects a slit width.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (17) PMT mode

You can select the function for controlling the high voltage for detector photomultiplier.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

Fixed : This mode is used for measurement in energy mode.  
The high voltage applied to the photomultiplier is fixed to the input value.  
Auto : Usually, this mode is employed.

## (18) PMT voltage

This parameter is settable when Fixed is selected in the PMT mode.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (19) Sampling interval

Input a data sampling interval.  
(Unavailable with U-1900, U-5100, U-2900 and U-2910)

## (20) Replicates (STD)

Input the number of measurement repetitions for standard samples.

## 4.2 Setting Analytical Conditions

### (21) Replicates (UNK)

Input the number of measurement repetitions for unknown samples. This parameter is settable when “Use Sample Table” is selected (by putting a check mark) on the General tab.

### (22) Statistics

Average value, SD (standard deviation) and CV (coefficient of variation) are to be calculated when a check mark is put in the check box of this parameter.

### (23) Statistics Number

This parameter is effective when a check mark is put for Statistics. Average value, SD (standard deviation) and CV (coefficient of variation) will be calculated for the specified number of samples. For example, when 6 samples are to be measured, input of 2 for Statistics Number will effect statistic calculation in units of 2 data.

#### [Reference]

In order to obtain the average value and standard deviation in the repetitive measurement of 1 sample, measurement is required with this parameter set as given below. For using this function, a sample table needs to be used.

Statistics Number : 1,  
Replicates (UNK) : 2 or more

### (24) Path correct

This function is usable when “Abs” is selected for data mode on the “Quantitation” tab page. When measurement was performed using a cell other than 10 mm rectangular cell, the photometric value can be converted into the one measured with a 10 mm rectangular cell. When this function is selected (check mark is applied), the photometric value will be converted at the set cell length. For example, when the photometric value measured with a 5 mm cell is 0.500 Abs, it will be converted into 1.000 Abs as a value measured with a 10 mm cell.

**NOTE:** This function is effective in the Abs/O.D. mode.

## (25) Path Length

Sets the optical path length of a cell used for measurement.

## (26) Data Interval

This parameter is displayed when the U-5100 is connected.  
Set up an interval of data acquisition.

(Unavailable with U-1900, U-2900, U-2910, U-3900,  
U-3900H, U-4100, UH4150 and UH4150AD+)

Fine : Normal interval will be set.

High resolution : Measurement can be carried out at an  
interval shorter than "Normal."

## (27) Detector change correct

This item is displayed when the U-4100/UH4150/  
UH4150AD+ is connected. Either "ON" or "OFF" selection  
of this compensation, if made here, is ineffective.  
(Not displayed for U-1900, U-5100, U-2900, U-2910,  
U-3900, and U-3900H)

## (28) Detector change Wavelength

With use of the U-4100/UH4150/UH4150AD+, you can set a  
wavelength for changeover between the UV-VIS and NIR  
region detectors.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900,  
and U-3900H)

Effective input range: 700.0 to 900.0 nm (U-4100/UH4150)

Effective input range: 700.0 to 920.0 nm (UH4150AD+)

## (29) Scan speed

In the U-4100/UH4150/UH4150AD+, a scan speed in the  
near infrared region is settable.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900,  
and U-3900H)

0.75nm/min

7.5

37.5

75

150

300

750

1500

3000

6000

## 4.2 Setting Analytical Conditions

### (30) Slit

In the U-4100/UH4150/UH4150AD+, a slit width in the near infrared region can be set.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, and U-3900H)

Fixed : A desired slit width can be input in increments of 0.1 nm within a range from 0.1 to 20.0 nm.

Auto change: Slit width is automatically controlled according to optical energy level. This is a function for keeping S/N (signal to noise ratio) as constant as possible in the measuring wavelength range. While this function is active for U-4100/UH4150, the slit width automatically changes within a range from about 0.1 to 36 nm.

This auto control cannot be set simultaneously with the light quantity control mode. For UH4150AD+, the upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.

### (31) PbS Gain

In the U-4100/UH4150, sensitivity of the NIR-region detector can be set. This is a function for setting PbS sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level.

For high resolution measurement in the near infrared region, etc., a high sensitivity level (PbS sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a PbS sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

(32) Light Control mode

This is a mode for controlling NIR-region light quantity in the U-4100/UH4150.

(Unavailable with U-1900, U-5100, U-2900, U-2910, U-3900, U-3900H and UH4150AD+)

Fixed : Usually this mode is used.

Auto change: This function is used when measurement with the slit width fixed cannot be carried out due to an excessive light quantity in the infrared region.

(33) Response

Select a response level from the following.

(Unavailable with U-3900, U-3900H, U-4100, UH4150 and UH4150AD+)

Slow : Select this level for minimizing a fluctuation in photometric value data.

Medium: Select this level for normal-level response.

Fast : Select this level for high-resolution measurement when measuring steep spectral data.

(34) Baseline name

Set the name of the user baseline. Input the user baseline name. Then click the Set button. This inputted name is displayed in monitor window and the Baseline correct window. (Unavailable with U-1900/U-5100)

(35) Attenuator

This function is compatible with UH4150 AD+.

Set the attenuator on this window. The attenuator is automatically inserted on the reference side.

After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured.

Regarding to setting attenuator, refer to 6.19 and 6.20.

None

1/10

1/100

1/1000

1/10000

## 4.2 Setting Analytical Conditions

### (36) InGaAs sensitivity

This function is compatible with UH4150 AD+.

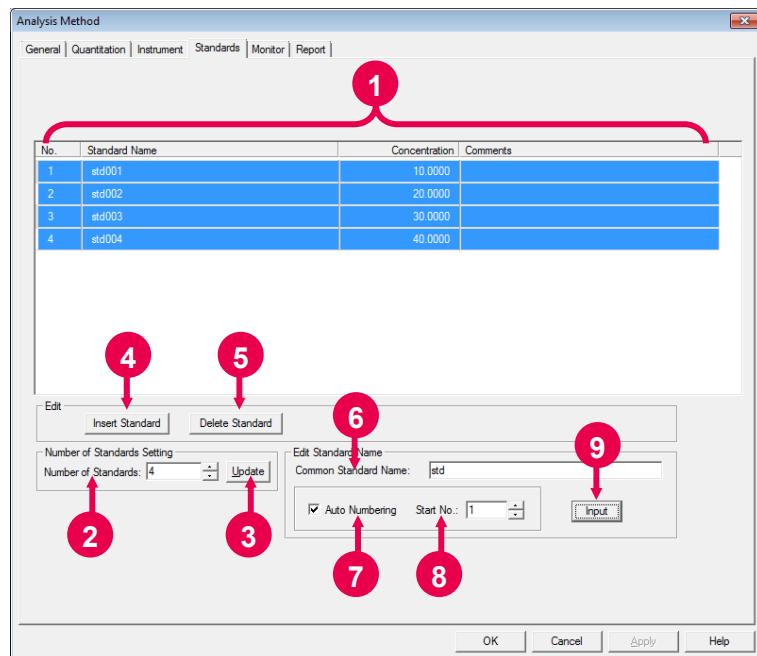
Sensitivity of the NIR-region detector can be set. This is a function for setting InGaAs sensitivity at 4 levels. The sensitivity rises to twofold, fourfold and eightfold values with respect to "1" as a reference level. For high resolution measurement in the near infrared region, etc., a high sensitivity level (InGaAs sensitivity level 3 or 4) should be used. At a high sensitivity level, however, a rise in noise is unavoidable. For general practice, a InGaAs sensitivity level of 2 is recommended. Level 1 should be used for measuring a very flat spectrum with only a slight change in absorption or checking only a rough spectral feature under a low noise.

### (37) Detector Zero Correction

This function is compatible with UH4150 type. By selecting "ON", 0% T zero level is measured at baseline correction execution under the set measurement condition. Correct the transmittance / absorbance of the sample measurement using its 0% T zero level. Depending on the measured wavelength, it is recommended to use when the transmittance is about 0.1% or less and the absorbance is about 3 or more. When "ON" is selected, guidance for Detector Zero Correction is displayed during baseline correction. Follow the guidance and run Baseline correction and Detector Zero Correction. (Except for U-1900 / U-5100 / U-2900 / U-2910 / U-3900 / U-3900H / U-4100).

#### 4.2.5 Standards Tab

When selecting the Standards tab, a window as shown in Fig. 4-20 is displayed. For the settable range of each parameter, refer to Appendix F.



**Fig. 4-20 Standards Tab**

##### (1) Standards Table

This table lists standard samples for measurement and calibration curve. Table has the headers described below.

- No. : Indicates the number assigned to each sample. The standard samples are measured starting from the lowest number in this table.
- Standard Name : Inputs the name of each standard sample. Names can be input collectively using (6) to (9) in the “Edit Standard Name” field.
- Comments : Enter your comment on each standard sample.
- Concentration : Enter the concentration of each standard sample.

## 4.2 Setting Analytical Conditions

**NOTE:** The size of each column in this table is changeable. Bring the cursor to the marginal line between table headers, and it will turn as shown below.



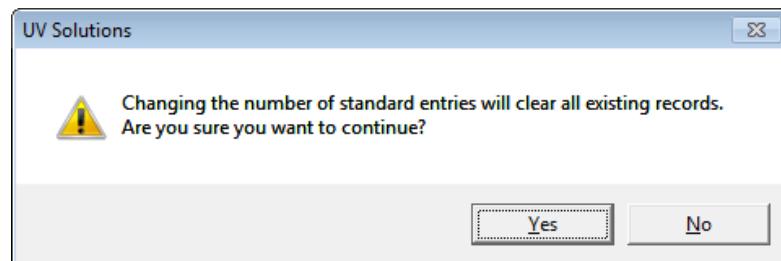
Click the line with the mouse button and move it to the left and right to obtain the desired column size.

### (2) Number of Standards

For creating a new standards table, enter the number of standard samples, and then click the **Update** button.

### (3) Update

Clicking of this button will be followed by display of a confirmation message if a standards table has already been created.



When you select **Yes**, the old standard sample names and comments are cleared and the rows for the set number of standard samples are given. (For concentration, initial value is entered.)

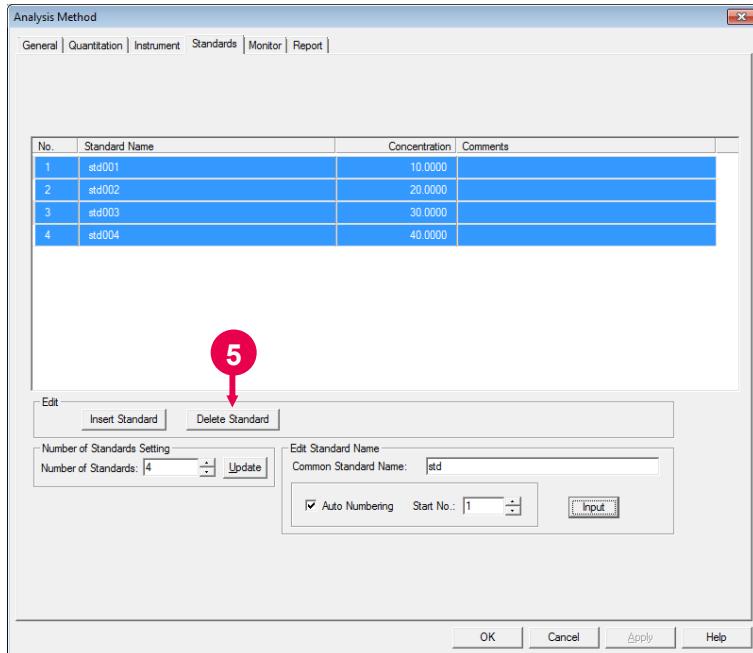
For adding a row after the present end of this table, use the **Insert Standard** button.

### (4) Insert Standard

Clicking the **Insert Standard** button will add 1 row after the last row of the present table.

## (5) Delete Standard

Click the number of the row to be deleted so that it turns active. Then click the **Delete Standard** button, and the row will be deleted.



**Fig. 4-21 Standards Tab (row No. selection)**

## (6) Common Standard Name

A common name among standard samples can be entered. Entry will be received in up to 36 half-size characters.

## (7) Auto Numbering

When check mark is applied, a Start No. can be set.

## (8) Start No.

Enter a start No. to be added to the common name of standard samples.

## (9) Input

Select the first row by clicking "No." of this table. Plural rows can be selected by clicking the sample numbers for entering standard names in order with the Ctrl key held down.

## 4.2 Setting Analytical Conditions

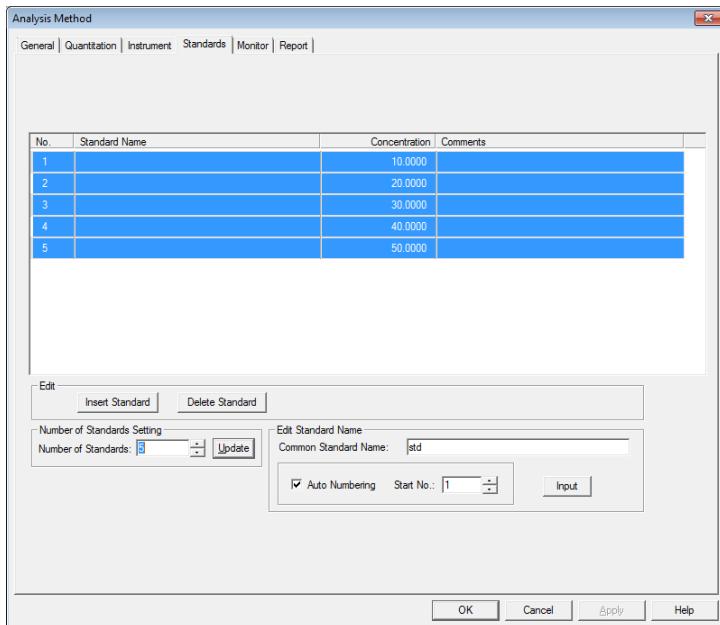


Fig. 4-22 Selection of Plural Rows

Then click the **Input** button, and standard sample names will be set in the following way; Common Standard Name + Start No., Common Standard Name + (Start No. + 1), and so forth. (Standard names STD001 to STD004 shown in Fig. 4-23 will be set.)

If you click the **Input** button without putting a check mark for “Auto Numbering,” the common standard sample name alone will be set on active row.

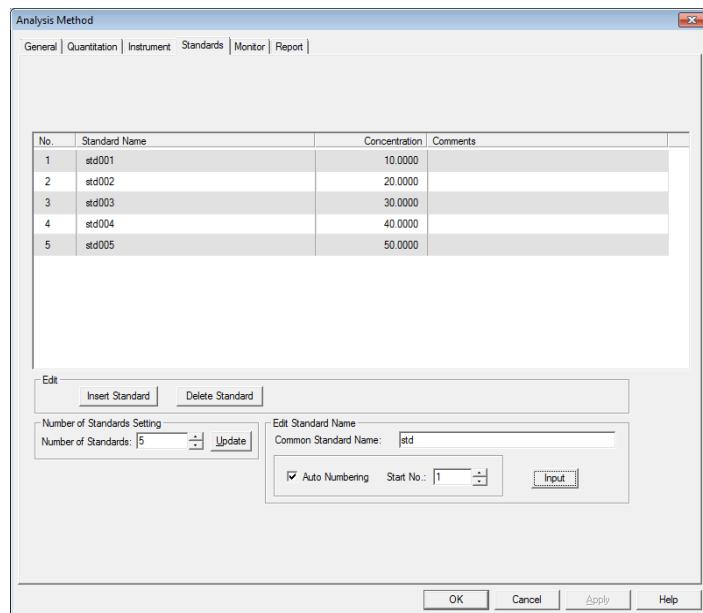
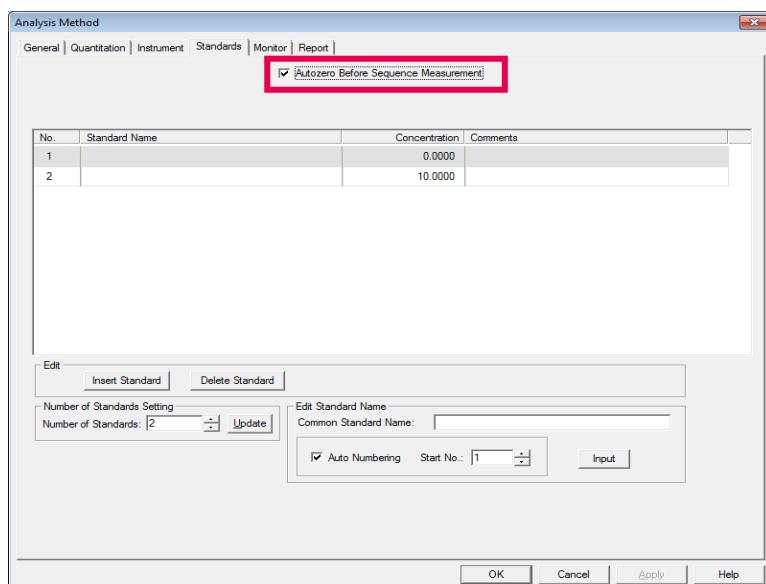


Fig. 4-23

**[With U-5100 Spectrophotometer]**

For the U-5100, the function for auto zero before sequence is provided. This function is usable when “6 Cell Mode” is activated on the “General” tab page. That is, when the check box for this function is turned on, auto zero will automatically be carried out with cell A as soon as sample measurement starts. Unless the check box is turned on, auto zero will not be carried out automatically.

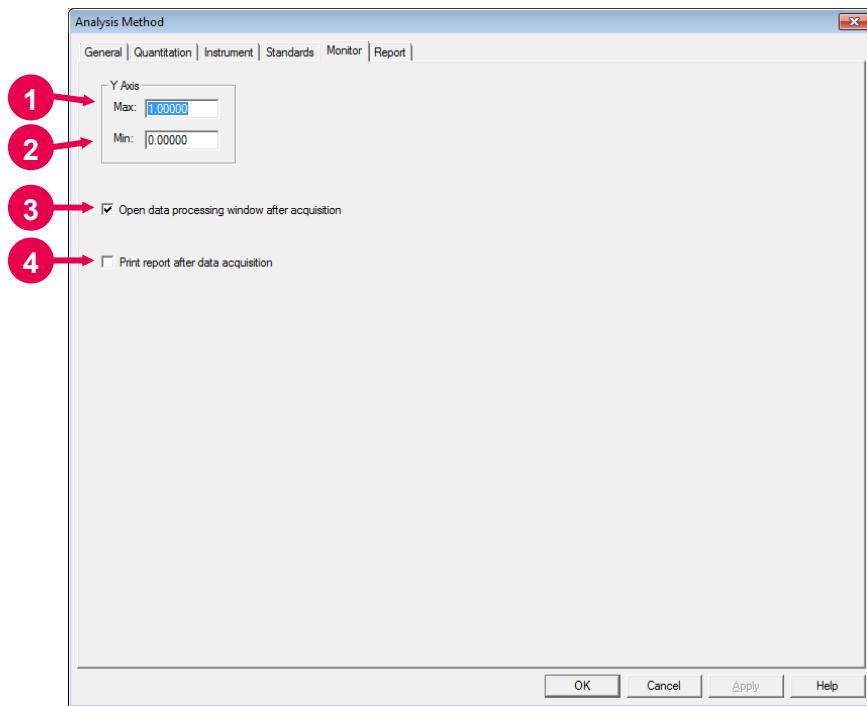
Therefore, auto zero operation is required before start of measurement. And, when Peak area, Peak height or Derivative is selected for Measurement type on the Quantitation tab page, you are requested to avoid using “Autozero Before Sequence Measurement” and carry out baseline correction before measurement.

**Fig. 4-24**

## 4.2 Setting Analytical Conditions

### 4.2.6 Monitor Tab

When selecting the Monitor tab, a window as shown in Fig. 4-25 is displayed. For the settable range of each parameter, refer to Appendix F.



**Fig. 4-25 Monitor Tab**

The following parameters are settable.

- (1) Y Axis (Max.)

Input the maximum value of ordinate in the monitor window.

- (2) Y Axis (Min.)

Input the minimum value of ordinate in the monitor window.

(3) Open data processing window after acquisition

Select whether or not the data processing window is opened after sample measurement. When opening is selected (check mark is put), measurement will be followed by automatic file saving and the relevant data file is displayed in an icon like  on the screen.

And opening a saved file allows data processing such as peak detection. If this function is not selected, the same file can be loaded for data processing by selecting [File]-[Open].

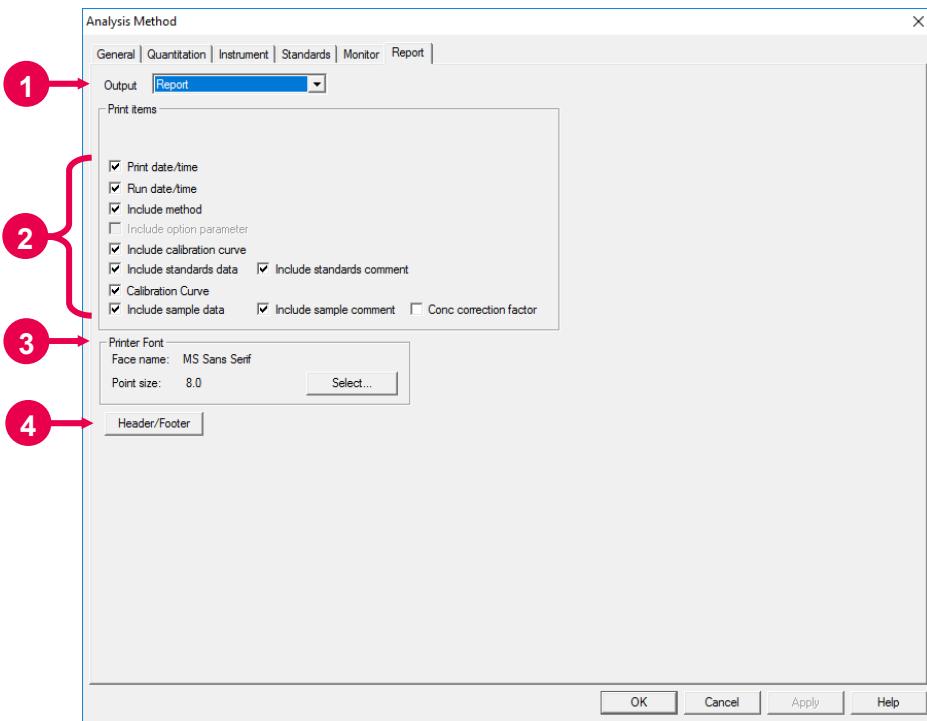
(4) Print report after data acquisition

You can select or avoid printing after sample measurement. If printing is selected (check mark is put), data will automatically be printed after measurement. The items set via the Report tab in Analysis Method are to be printed.

## 4.2 Setting Analytical Conditions

### 4.2.7 Report Tab

When you select the Report tab, a window as shown in Fig. 4-26 is displayed.



**Fig. 4-26 Report Tab**

In this window, you can select items to be contained in an analysis report.

#### (1) Output

- Report  
Selects printout. For printing method, refer to 4.6.
- Use Microsoft Excel  
Data will be transferred to Microsoft Excel.  
For transferring method, refer to 5.13.
- Use print generator sheet  
This method is selected for using the report generator (separately available). For usage, refer to the instruction manual of the report generator.

## (2) Print items

- Print date/time
- Run date/time
- Include method
- Include calibration curve
- Include standards data
- Include standards comment
- Calibration Curve
- Include sample data
- Include sample comment
- Conc. correction factor

## (3) Printer Font

Click the **Select** button for changing the font used for reporting.

## (4) Header/Footer

If it is desired to use header/footer in the report, click this button.

## 4.3 Defining Sample

### 4.3 Defining Sample

#### 4.3.1 Without Sample Table

When “Use Sample Table” is avoided in Analysis Method, samples must be defined in the following procedure before measurement.

- (1) Click the  button. A window as shown in Fig. 4-27 will appear.

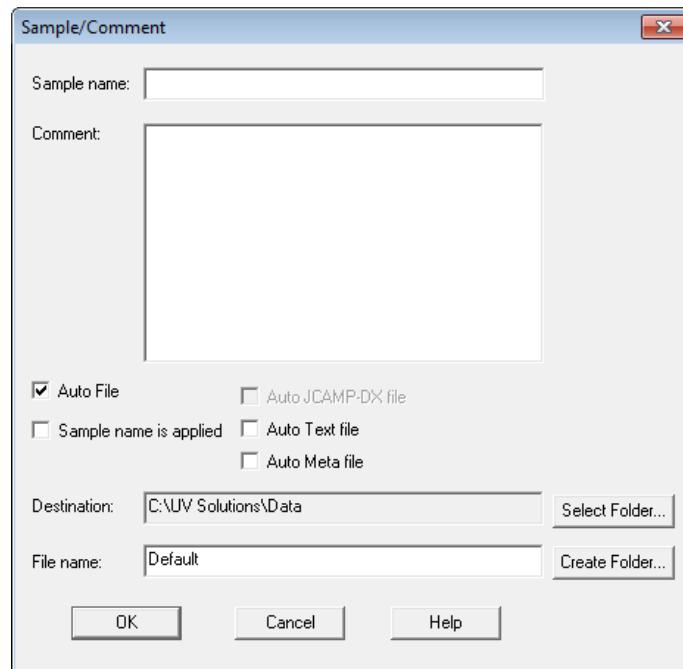


Fig. 4-27

- (2) Enter the sample name and comment.  
Maximum enterable characters (half-size)

Sample name : 40 characters  
Comment : 255 characters

For automatic saving, put a check mark for “Auto File” and specify a file name. Click the Select button, and then specify a saving location and enter a file name.

When a check mark is put for “Auto File” and for “Auto Text file” or “Auto Meta file,” a photometric data file can automatically be saved in the following file format.

- ASCII Text Files (\*.txt)
- Graph Meta Files (\*.wmf)

The file will be saved in the name specified for “File name.”

- (3) After entry, click **OK**.

#### 4.3.2 With Sample Table

When “Use Sample Table” is selected in Analysis Method, samples must be defined in the following procedure before measurement.

(With the U-5100, a sample table is also settable under the condition that “6 Cell Mode” and “6 cell control mode” are both activated on the General tab page. In this case, the maximum number of samples is limited to 5. The set number of samples will automatically be measured.)

Open the monitor window and click the  (Edit Sample Table) button. When a sample table window as shown in Fig. 4-28 is displayed, you should input each name and comment of samples to be measured.

- (1) For creating a sample table newly, enter the number of samples and click the **Update** button. For example, when there are 5 samples, enter “5” for Number of Samples and click the **Update** button.

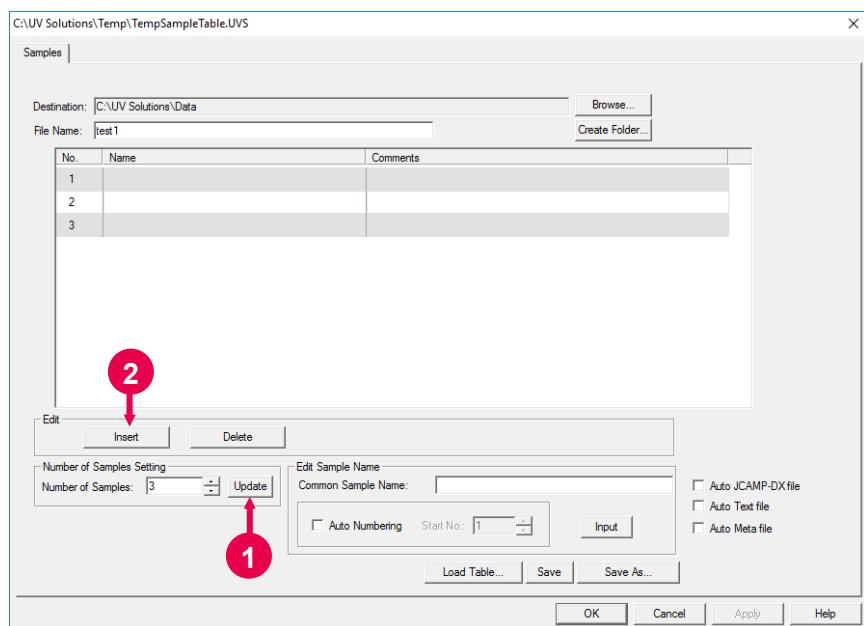


Fig. 4-28 Sample Table

When a sample table has already been created, a confirmation message such as “Changing the number of sample entries will clear all existing records. Are you sure you want to continue?” will be displayed.

#### 4.3 Defining Sample

Yes : A sample table for the specified number of samples will be created newly.

No : Execution will be stopped.

- (2) For adding a row after the last row of the present sample table, click the **Insert** button.
- (3) For deleting an unnecessary row as shown in Fig. 4-29, click the No. cell of that row to make it active. Then, click the **Delete** button.

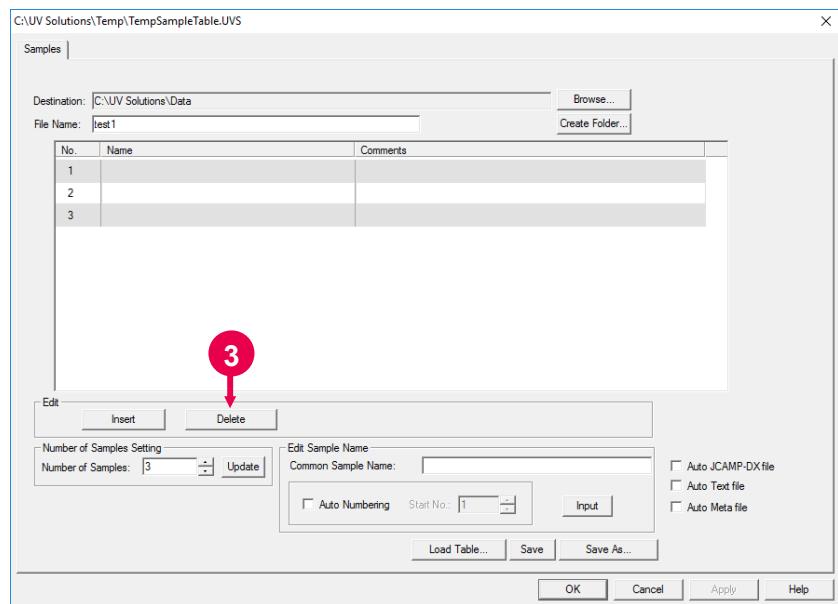


Fig. 4-29

The active row will be deleted.

- (4) Sample name and comment of each sample can be directly input by clicking the respective columns.

Maximum enterable characters (half-size)

Name : 40 characters

Comments : 255 characters

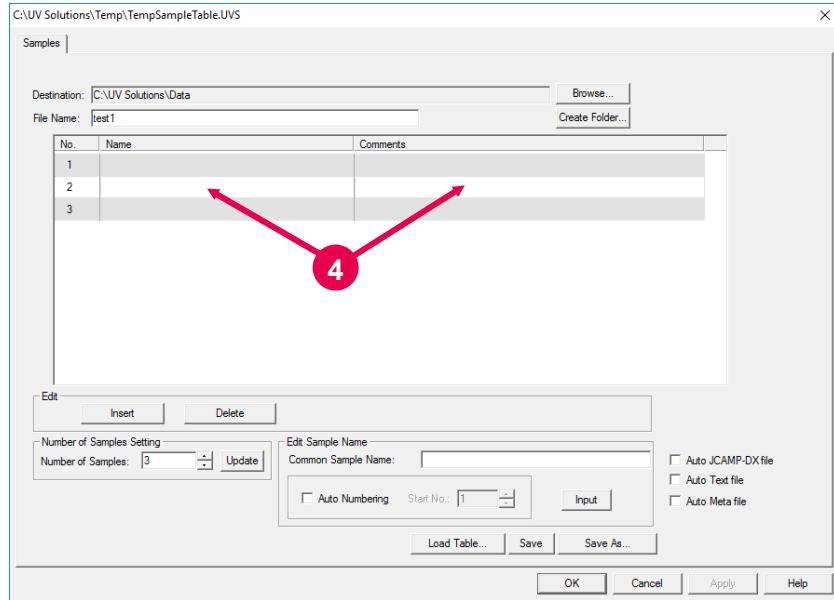


Fig. 4-30

For the U-5100, the function for auto zero before sequence is provided. When the check box for this function is turned on, auto zero will automatically be carried out with cell A before sample measurement. After the auto zero operation, sample measurement is carried out. Unless the check box is turned on, sample measurement starts without auto zero operation. Therefore, auto zero operation is always required before start of measurement.

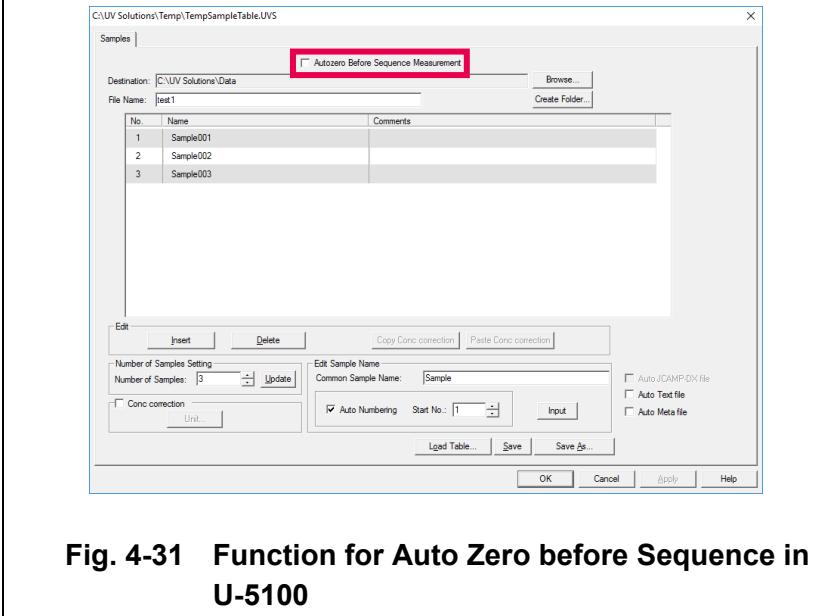


Fig. 4-31 Function for Auto Zero before Sequence in U-5100

#### 4.3 Defining Sample

##### (5) Collective Input of Sample Names

Sample names of Common Sample Name + Start No., Common Sample Name + (Start No. + 1), ... can collectively be entered in the following procedure.

- (a) Enter a common sample name for "Common name." A maximum of 36 half-size characters can be entered.  
(Example: SampleA)
- (b) Apply a check mark to "Auto Numbering" and enter a start No.  
(Example: Start No. = 1)
- (c) Select the first row for collective input of sample names by clicking "No." in this sample table. Plural rows are selectable by clicking the numbers for sample name setting with the Ctrl key held down.

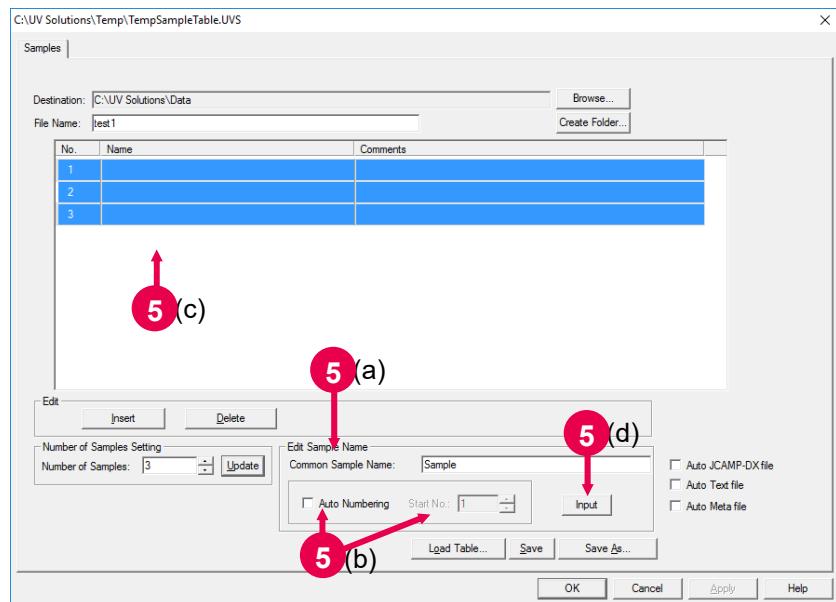


Fig. 4-32

- (d) Then, click the [Input] key, and the sample names of Common Sample Name + Start No., Common Sample Name + (Start No. + 1), ... will be entered.  
(Sample names of stdA001 to stdA005 shown in Fig. 4-33 will be entered.)  
If you click the [Input] key without applying a check mark for Auto Numbering, the common sample name will be entered for active row.

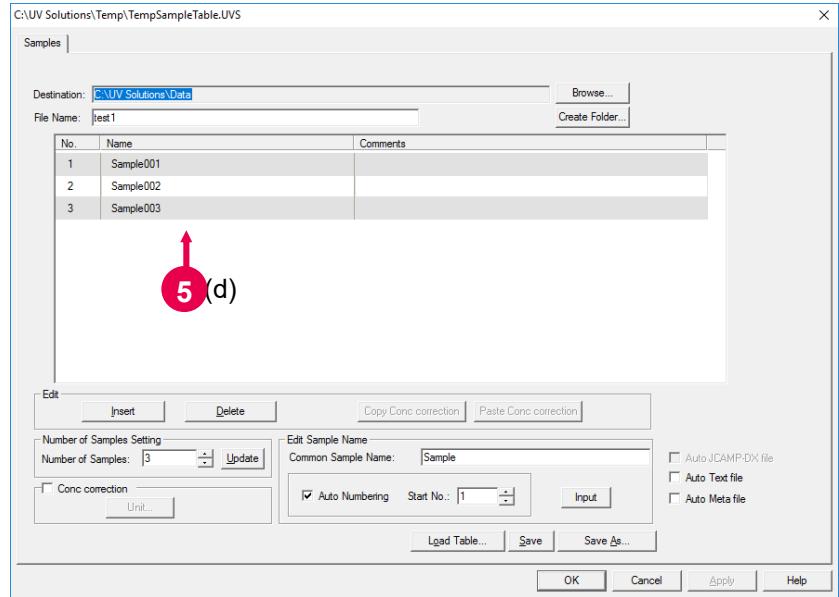


Fig. 4-33

## (6) Specify a data file saving folder.

For specifying a data file saving folder, implement the following procedure.

- (a) When this folder has already been saved, you should display the “Browse for Folder” dialog box by clicking the **Browse** button. After folder selection, click the **OK** button.

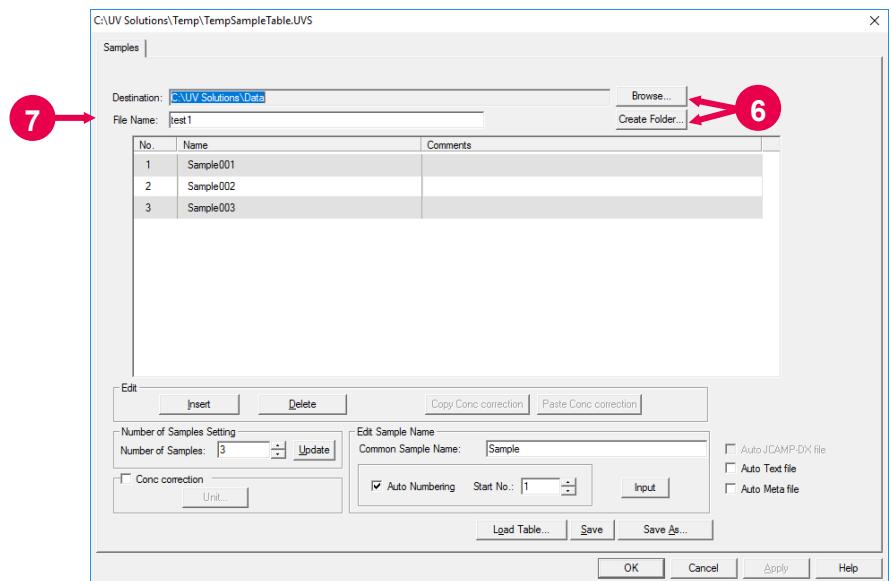


Fig. 4-34

#### 4.3 Defining Sample

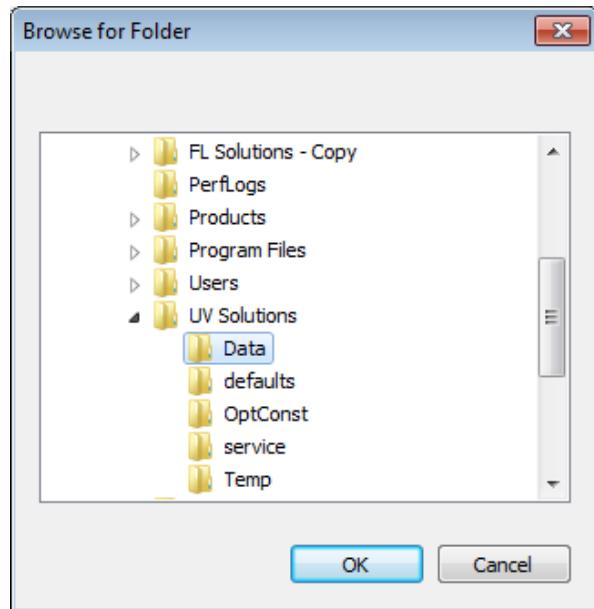


Fig. 4-35

(b) For creating a folder newly, carry out the following procedure.

- 1) Display the "Browse for Folder" dialog box as shown in Fig. 4-35 by clicking the **Browse** button. Specify a path for folder creation.
- 2) Click the **Create Folder** button to display the "Create New Folder" dialog box as shown in Fig. 4-36. Enter a folder name for "Name" and click the **OK** button.  
Maximum enterable characters (half size):  
20 characters  
A folder of the specified name will be created under "Current folder."

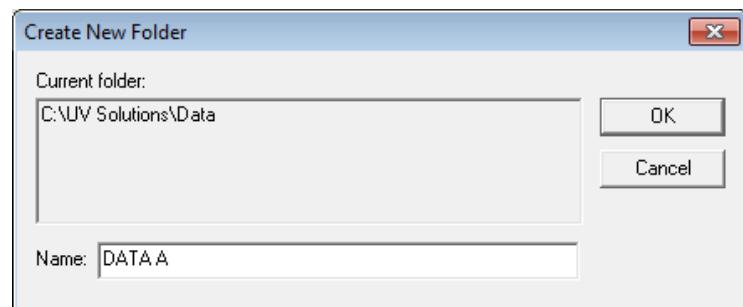


Fig. 4-36 Create New Folder Dialog

- (7) Enter a file name. (Example: test1)  
 Maximum enterable characters (half size): 40 characters

Data file will be saved in the name “File name.udq” into the file saving folder. (Example: test1.udq)

When a file of the same name as entered here has already been created, your data file will be saved in “data file name + measurement date.”

(Example: test1\_20100811164856.udq)

In case of the measurement in which a concentration correction coefficient need not be entered, check your entries, and then click the **OK** button. This is the end of sample table setting.

For entering a concentration correction coefficient, go to step (8).

- (8) A concentration correction coefficient can be entered.  
 For this purpose, proceed as follows.

- (a) Put a check mark for Conc correction.

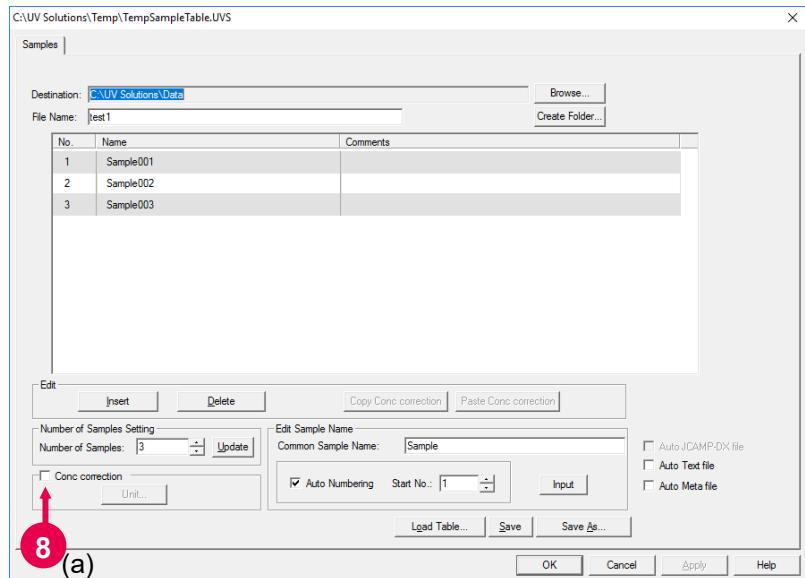


Fig. 4-37

### 4.3 Defining Sample

- (b) A concentration correction coefficient table is now displayed as shown in Fig. 4-38. Each value of Weight, Solvent, Dilution and Correction factor is listed. Click a column cell for change and enter your value directly there.  
For each item, entry is allowed within 0.000001 to 999999 and in up to 6 significant digits.

No.	Name	Weight(g)	Solvent(mL)	Dilution	Correction factor	Comments
1	Sample001	1.00000	1.00000	1.00000	1.00000	
2	Sample002	1.00000	1.00000	1.00000	1.00000	
3	Sample003	1.00000	1.00000	1.00000	1.00000	

Fig. 4-38

- (c) After a change on 1 row of concentration correction coefficient, the new row can be copied onto other rows. In Fig. 4-38, change Weight, Solvent and Dilution to 10, 100 and 10 on only one row and activate the source row for copying by clicking its row No. (Fig. 4-39)

No.	Name	Weight(g)	Solvent(mL)	Dilution	Correction factor	Comments
1	Sample001	2.00000	10.0000	1.00000	1.00000	
2	Sample002	1.00000	1.00000	1.00000	1.00000	
3	Sample003	1.00000	1.00000	1.00000	1.00000	

Fig. 4-39

- (d) Click the **Copy Conc correction**. Then, the **Paste Conc correction** button will turn active.
- (e) Select the first row for collective entry of concentration correction coefficient by clicking “No.” of the sample table. Select plural rows for sample name change by clicking their row numbers with the Ctrl key held down.

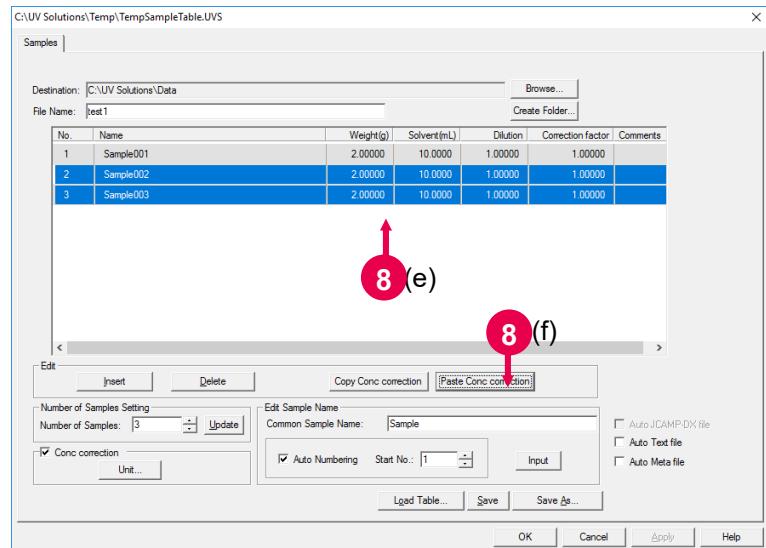


Fig. 4-40

- (f) Click the **Paste Conc correction** button. Concentration correction coefficient on the source row will be copied onto the plural active rows. (Fig. 4-41) Sample name and the contents of comment will not be copied.

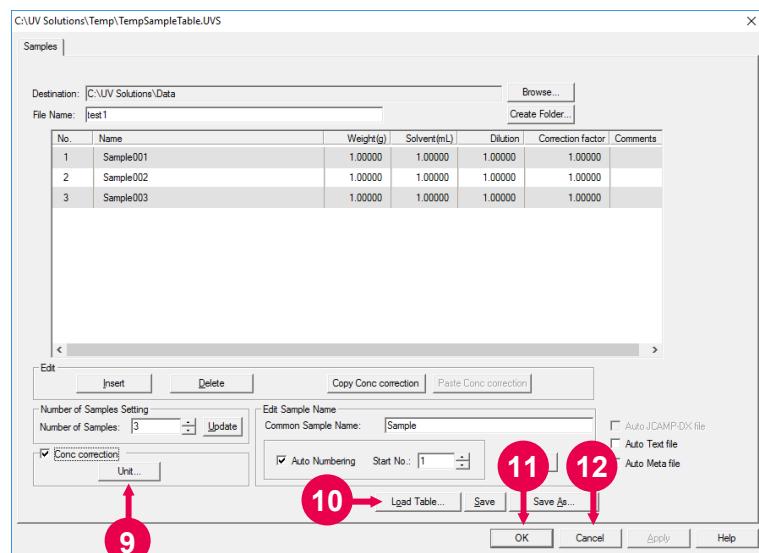


Fig. 4-41

## 4.3 Defining Sample

### (9) Unit Button

This button is used for changing each unit of weight and solvent volume.

When clicking the button, the “Unit Setting” dialog box will appear. Each unit of weight and solvent volume for concentration correction coefficient can be changed. The respective units can be entered in up to 6 half-size characters.

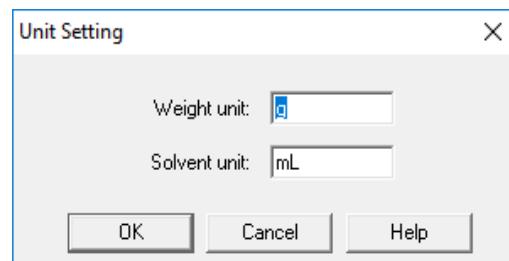


Fig. 4-42

OK : When you click the **OK** button after entry of each unit, this dialog box will close and the concentration correction coefficient table will be updated according to the newly entered unit.

Cancel : This dialog box will close without reflecting your unit entry.

### (10) Load Table Button

Used for loading an existing sample table.

When clicking this button, the Open dialog box appears.

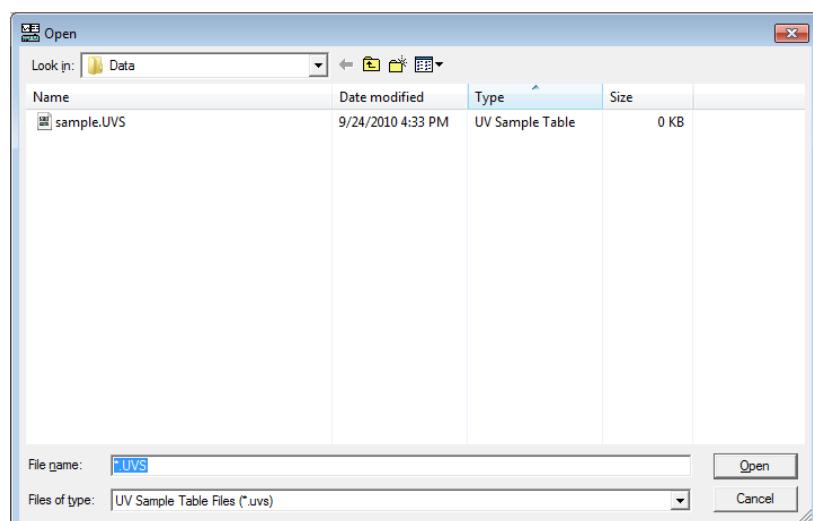


Fig. 4-43 Open Dialog

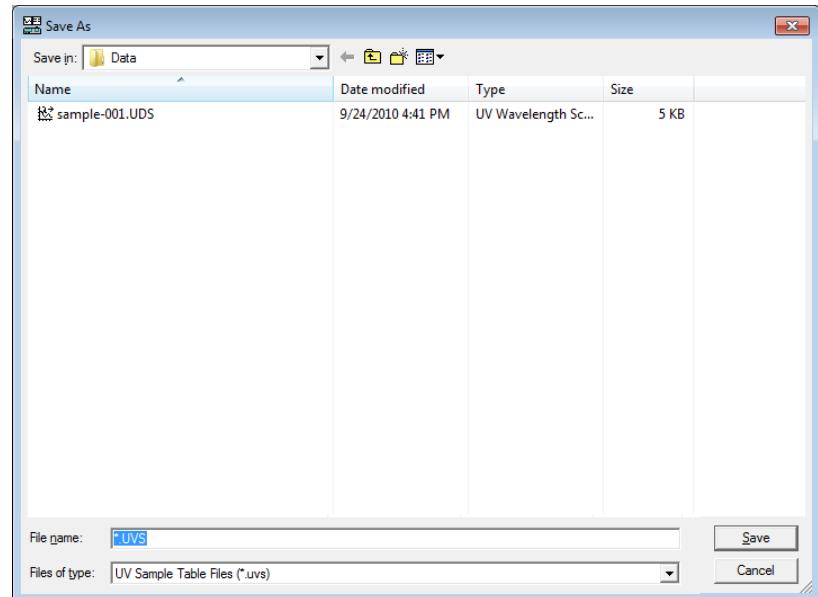
Select a sample table and click the **Open** button.  
Then, the selected sample table will be loaded.

(11) **Save** Button

Used for saving the contents of your change by overwriting.  
In case of new creation, the Save As dialog box appears.

(12) **Save As** Button

Used for saving your sample table with a name given.  
Clicking this button will display the Save As dialog box.



**Fig. 4-44 Save As Dialog**

Select a saving location and enter a file name, then click the **Save** button.

## 4.4 Auto Zero or Baseline Measurement

### 4.4 Auto Zero or Baseline Measurement

When Measurement type is Wavelength or Ratio, you should set a blank sample and execute Auto Zero. Select the Zero command from the Spectrophotometer menu or click the  button on the measurement toolbar.

In case of Peak height, Peak area or Derivative, set a blank sample and carry out user baseline measurement by selecting the Record Baseline command from the Spectrophotometer menu or clicking the  button on the measurement toolbar.

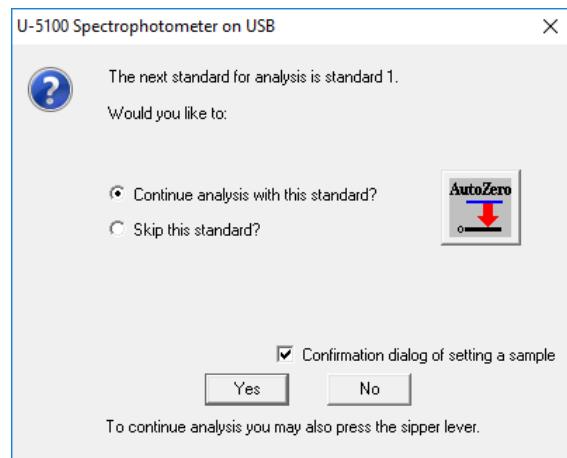
## 4.5 Measurement

### 4.5.1 Standards Measurement

[With U-1900, U-5100 (6 Cell Mode OFF), U-2900, U-2910, U-3900, U-3900H, U-4100, UH4150 and UH4150AD+]

First prepare a calibration curve, and then proceed to sample measurement.

- (1) Click the  (Edit Method) button and select the Standards tab. Make sure that standards have already been defined. (Refer to 4.2.5.) Then, click the  (Sample /Comment) button or  (Edit Sample Table) button in order to make sure that samples have also been defined. (Refer to 4.3.)
- (2) Start measurement by clicking the  (Start Series) button. When measurement starts, a window as shown in Fig. 4-45 is displayed.  
Also, auto zero can be executed by clicking the  button.



**Fig. 4-45**

#### 4.5 Measurement

- (3) Click **Yes**, and a window as shown in Fig. 4-46 will appear.

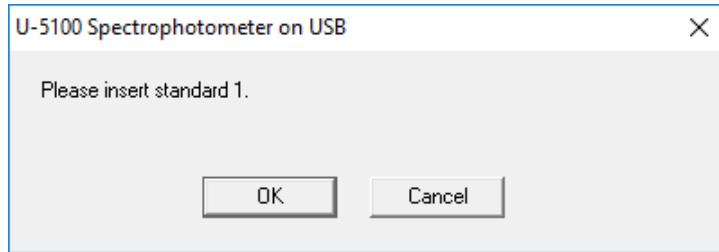


Fig. 4-46

Set the first standard sample and click **OK**.

The standard sample will be measured and the next one will become measurable. A window as shown in Fig. 4-45 will appear. So, click **Yes**.

Then, a window as shown in Fig. 4-46 is displayed. Set the next standard sample and click **OK**. Standard samples are measurable until the set number of standard samples on the Standards tab in Analysis Method have all been measured.

- (4) On completion of standard sample measurement, a window as shown in Fig. 4-47 will appear. Click the **OK** button for moving on to unknown sample measurement.

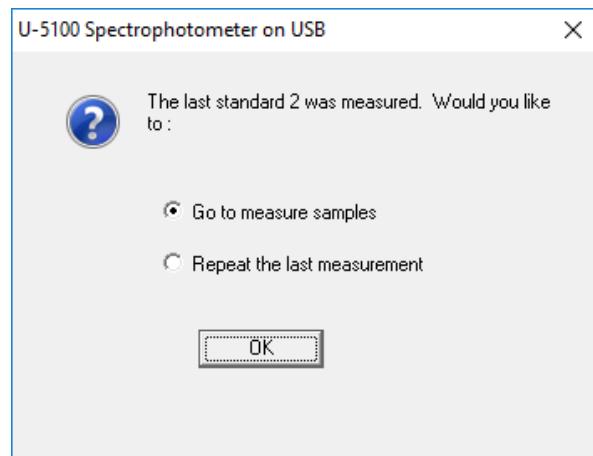
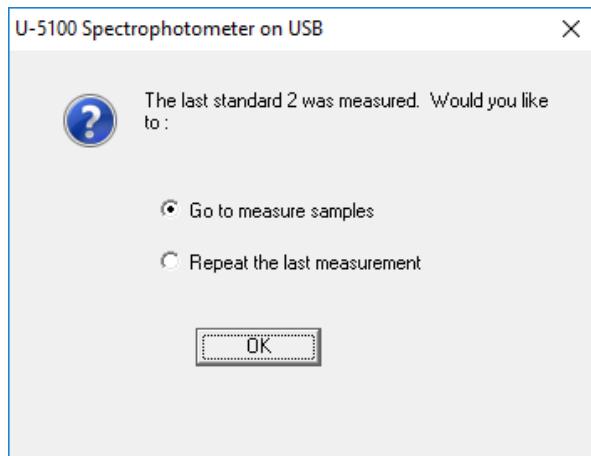


Fig. 4-47

[With U-5100 (6 Cell Mode On, 6 cell control mode On)]

- (1) Click the  (Edit Method) button and select the Standards tab. Make sure that standards have already been defined. (Refer to 4.2.5.) Then, click the  (Sample /Comment) button or  (Edit Sample Table) button in order to make sure that samples have also been defined. (Refer to 4.3.)
- (2) Set standard samples according to the “Standards” tab page in the window called by  (Edit Method). Place each standard sample in the same cell No. as on the sample table. Also, place a sample for auto zero in cell A.
- (3) When “Autozero Before Sequence Measurement” is turned off on the “Standards” tab and “Wavelength” or “Ratio” is selected for Measurement type on the “Quantitation” tab, click the Auto Zero button. When “Peak area,” “Peak height” or “Derivative” is selected, baseline correction is required. Auto zero or baseline correction will be executed at the position of cell A.
- (4) Start measurement by clicking the  (Start Series) button.
- (5) On completion of standard sample measurement, a window as shown in Fig. 4-48 will appear.



**Fig. 4-48**

## 4.5 Measurement

[With U-5100 (6 Cell Mode On, 6 cell control mode Off)]

- (1) Click the  (Edit Method) button and select the Standards tab. Make sure that standards have already been defined. (Refer to 4.2.5.)
- (2) Then, click the  (Sample /Comment) button or  (Edit Sample Table) button in order to make sure that samples have also been defined. (Refer to 4.3.)
- (3) Place standard samples at desired cell positions.
- (4) When “Autozero Before Sequence Measurement” is turned off, carry out auto zero. And when “Peak height,” “Peak area” or “Derivative” is used, baseline correction is required.
- (5) Start measurement by clicking the  (Start Series) button.
- (6) When measurement starts, a window as shown in Fig. 4-45 is displayed.
- (7) When “Autozero Before Sequence Measurement” is turned on, auto zero will automatically be carried out.
- (8) Upon start of measurement, a window as shown in Fig. 4-49 appears. When the cell position at which standard sample 1 is placed is different from the present cell position, click the Cell button for movement to the aimed-at cell position.

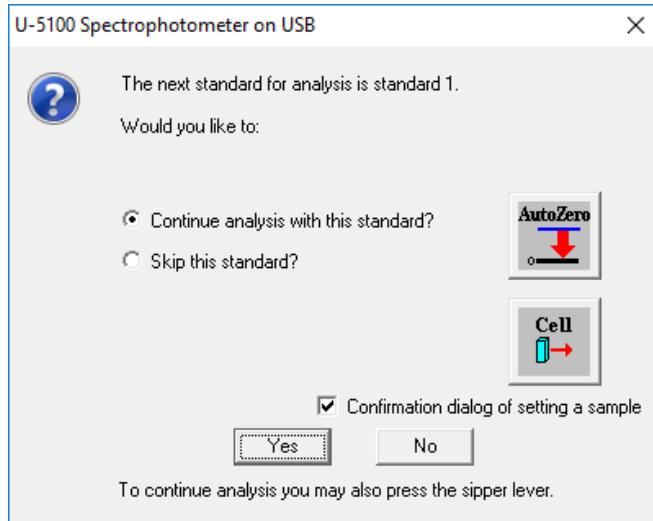


Fig. 4-49

- (9) Click the Yes button, and measurement of standard sample 1 starts. After completion of this measurement, a window as shown in Fig. 4-50 appears. Thus, carry out measurement according to the window/message boxes. Measure standard samples according to the guidance until the set number of standard samples on the Standards tab in Analysis Method have all been measured.

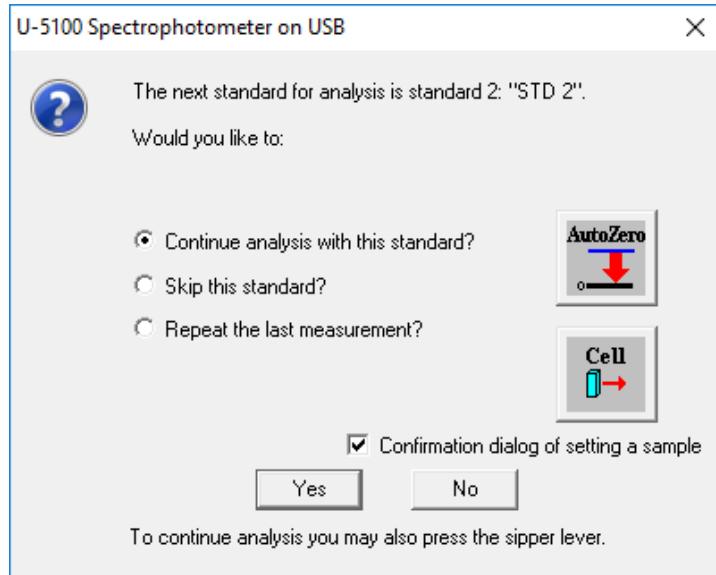


Fig. 4-50

- (10) On completion of standard sample measurement, a window as shown in Fig. 4-51 will appear. Click the **OK** button for moving on to unknown sample measurement.

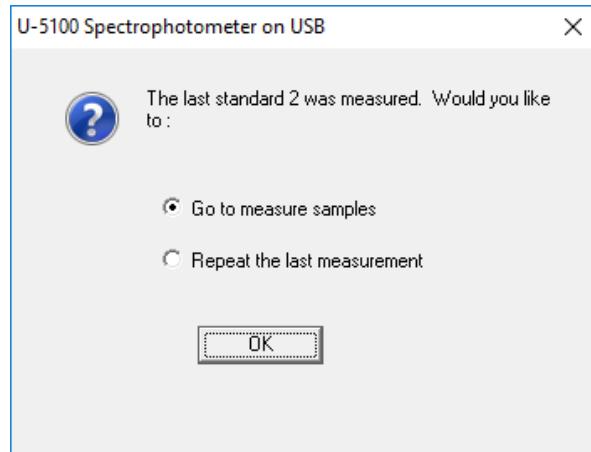


Fig. 4-51

## 4.5 Measurement

### 4.5.2 Sample Measurement

An unknown sample is to be measured here.

Operation differs depending on whether to use a sample table or not.

- (1) Without Sample Table (when “Use Sample Table” is not selected in Analysis Method)

When the 6 Cell Mode and 6 cell control mode are both turned on in the U-5100, refer to “(2) With Sample Table.”

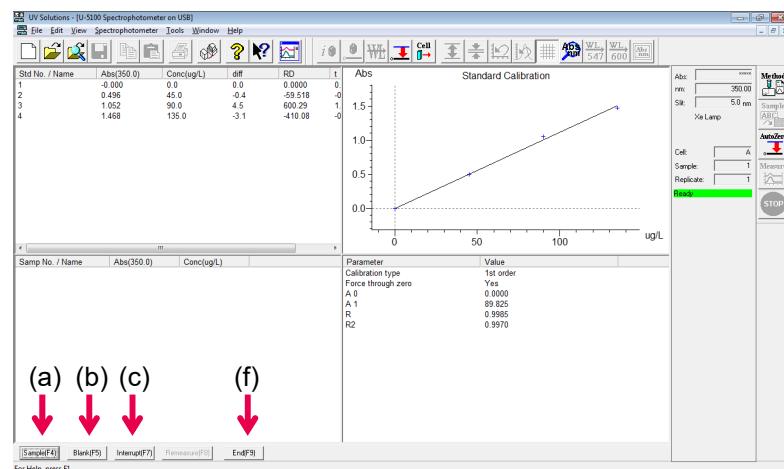
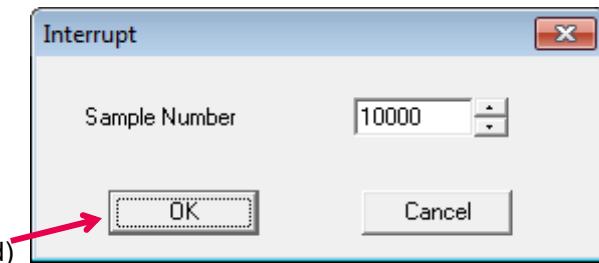


Fig. 4-52

- (a) Set a sample and click the **Sample (F4)** button.  
Measurement will be performed and the result will be indicated.
- (b) For measuring a blank sample midway, click the **Blank (F5)** button.

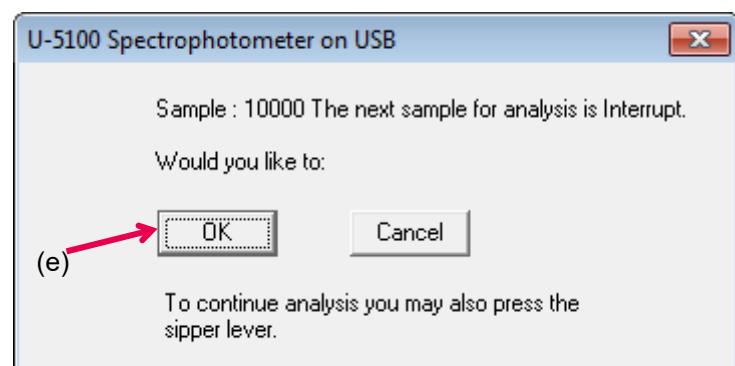
- (c) For interruption measurement, click the **Interrupt (F7)** button.

A dialog box will appear as shown in Fig. 4-53.  
Enter a Sample Number.



**Fig. 4-53**

- (d) Clicking the **OK** button will display a dialog box as shown in Fig. 4-54.



**Fig. 4-54**

- (e) When clicking the **OK** button, measurement of the interruption sample will start.

- (f) After completion of sample measurement, click the **End (F9)** button.

When Auto File is active, the measured data will automatically be saved at the selected destination with the specified name given.

If a file of the same name as specified already exists, your file will be saved in “data file name + measurement date.” (Example: data1\_20100811164856.udq)

When Auto File is inactive, the measured data must be saved by selecting the “Save As” command from the File menu.

## 4.5 Measurement

### Input and Change of Sample Name

After completion of sample measurement, a sample name can be entered on the monitor window (Fig. 4-55).

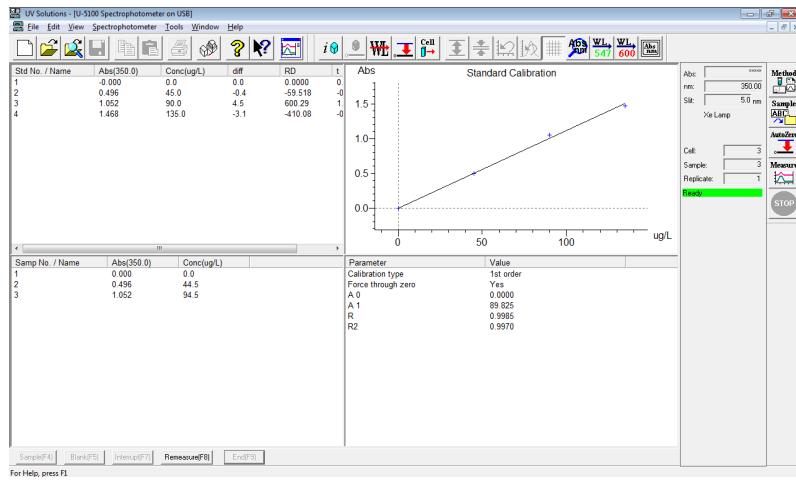


Fig. 4-55

Follow these steps:

- From the Edit menu, select the Edit Sample Name command as shown in Fig. 4-56.

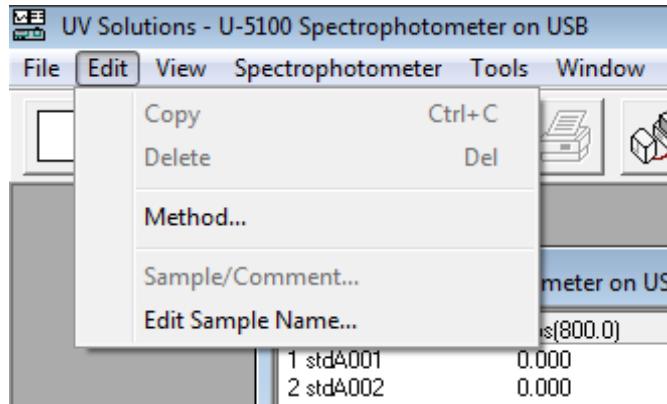


Fig. 4-56

- (b) The Edit Sample Name window appears as shown in Fig. 4-57.

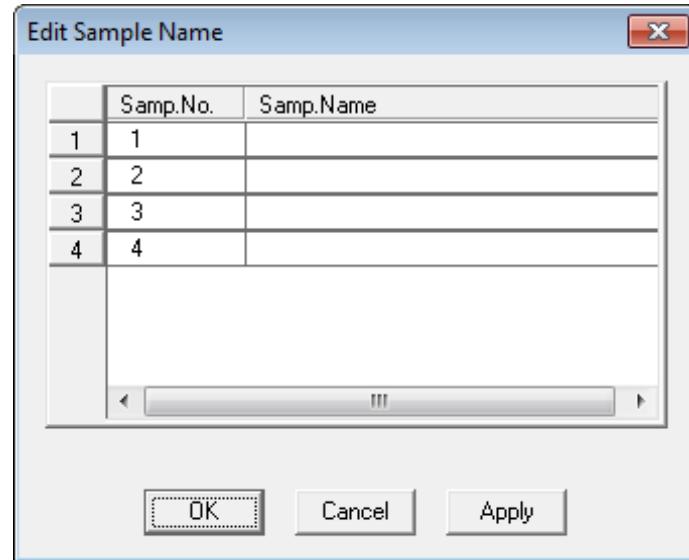


Fig. 4-57

- (c) Enter sample names as shown in Fig. 4-58 and click the **Apply** or **OK** button.

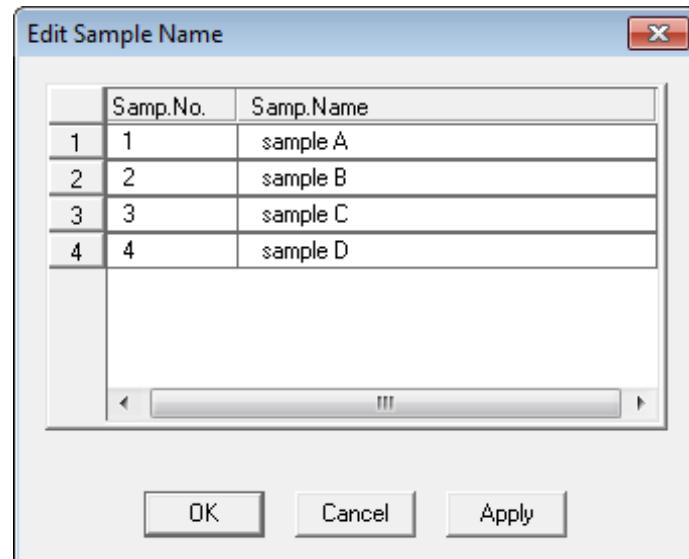


Fig. 4-58

## 4.5 Measurement

- (d) A monitor window in which the entered sample names are brought will appear as shown in Fig. 4-59.

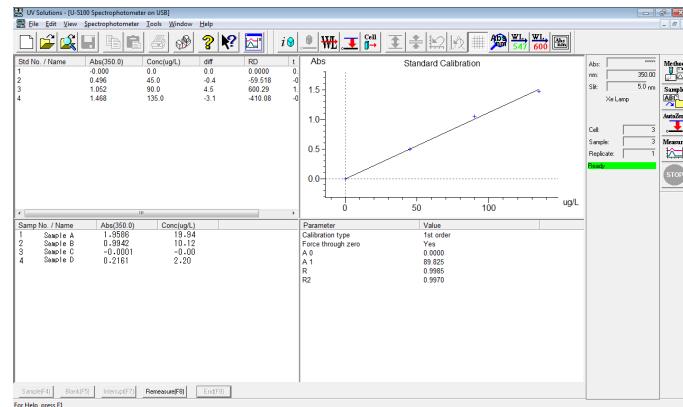


Fig. 4-59

For saving the data after sample name update, click the (Save) button. The data processing window will appear. From the File menu, select “Save As” for saving the data.

- (2) With Sample Table (when “Use Sample Table” is selected in Analysis Method)

[With U-1900, U-5100 (6 Cell Mode Off), U-2900, U-2910, U-3900, U-3900H, UH4150 and UH4150AD+]

- (a) A window/message box is displayed as shown in Fig. 4-60. Follow the reported messages. Measurement can be carried out by clicking **Yes** and **OK** in order.

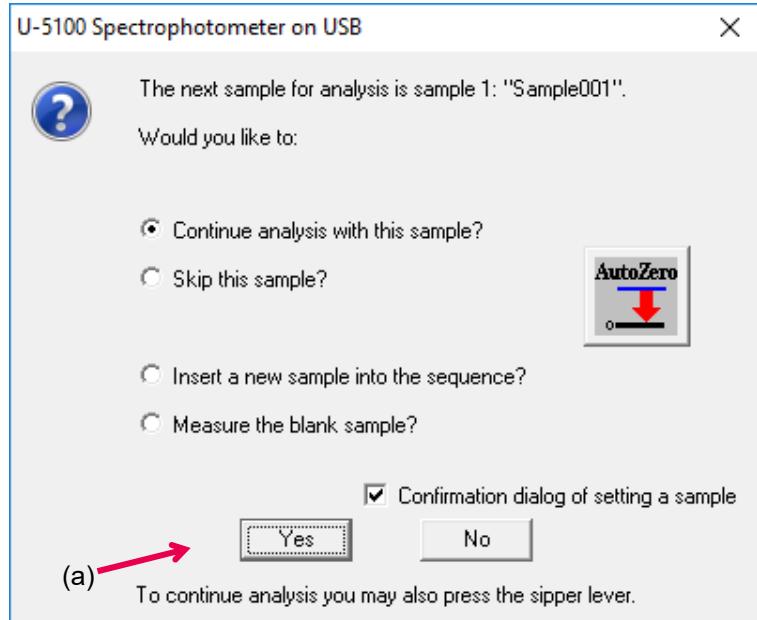


Fig. 4-60

- (b) For interruption measurement, select “Insert a new sample into the sequence?” as shown below and then click **Yes**.

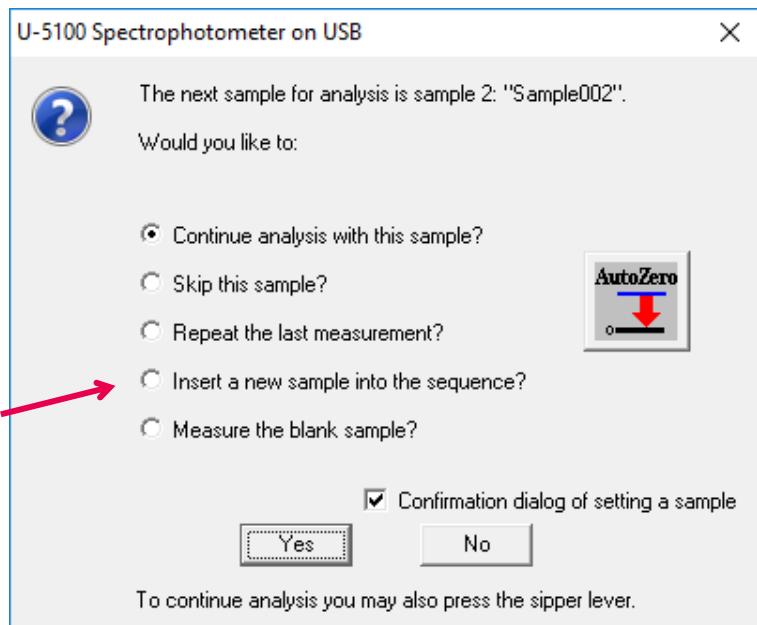


Fig. 4-61

#### 4.5 Measurement

- (c) When a window as shown in Fig. 4-62 is displayed, enter a sample name and comment, and click **OK**.

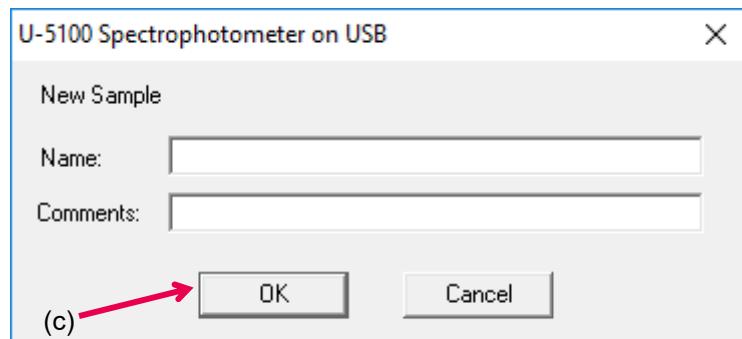


Fig. 4-62

- (d) Clicking the **OK** button starts measurement of the interruption sample.

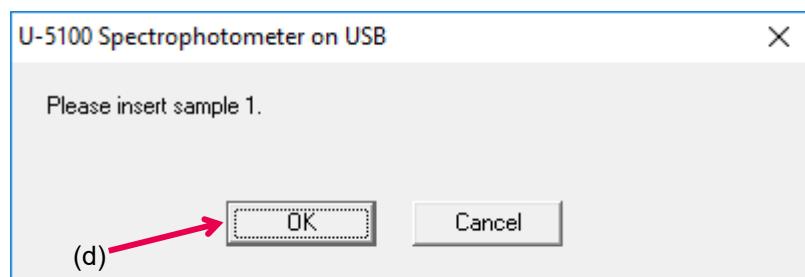
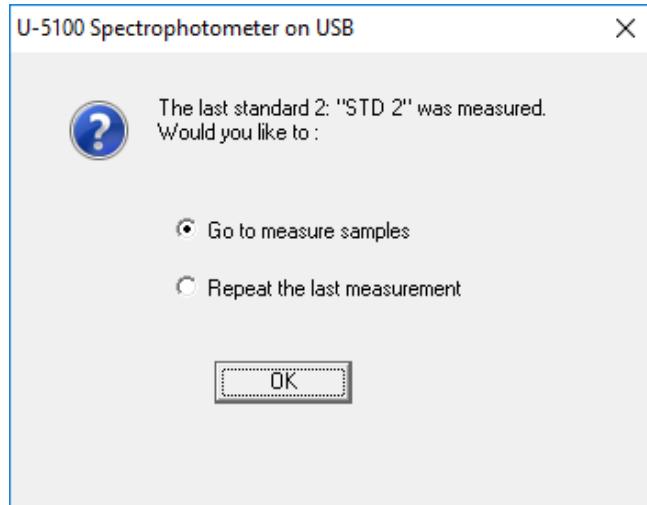


Fig. 4-63

**NOTE:** The information entered here will be added to the monitor window.

After completion of all sample measurements, the data processing window will automatically be displayed.  
(However, this is effective only when “Open data processing window after acquisition” is selected on the Monitor tab in Analysis Method.)  
When the set number of samples in the sample table have been measured, the photometric data will automatically be saved at the selected saving location with the specified file name given.

[With U-5100 (6 Cell Mode On, 6 cell control mode On)]

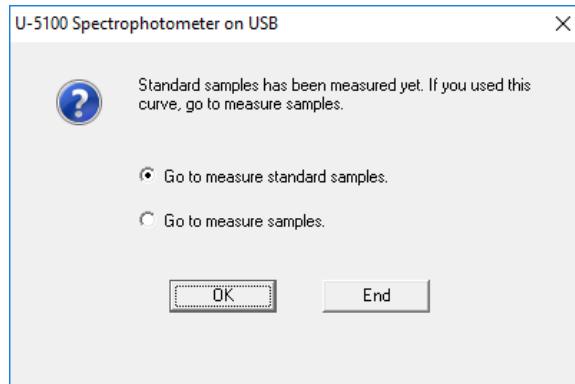


**Fig. 4-64**

- (1) When this window appears, set a sample at each cell position. After the setting, click **OK**.
- (2) After measurement of each sample, the measured data will be displayed.

[With U-5100 (6 Cell Mode On, 6 cell control mode Off)]

- (1) After standard samples have been measured, a window/message box as shown in Fig. 4-65 will appear. When “Autozero Before Sequence Measurement” is now turned on, set a sample for auto zero in cell A. Then, select “Go to measure samples” and click **OK**.



**Fig. 4-65**

#### 4.5 Measurement

- (2) When “Autozero Before Sequence Measurement” is turned on, auto zero will be executed with cell A. After completion of auto zero operation, the window/message box shown in Fig. 4-66 is displayed. Follow the reported messages. For changing the cell position, select “Cell.” And for terminating all the measurements, click the **No** button.

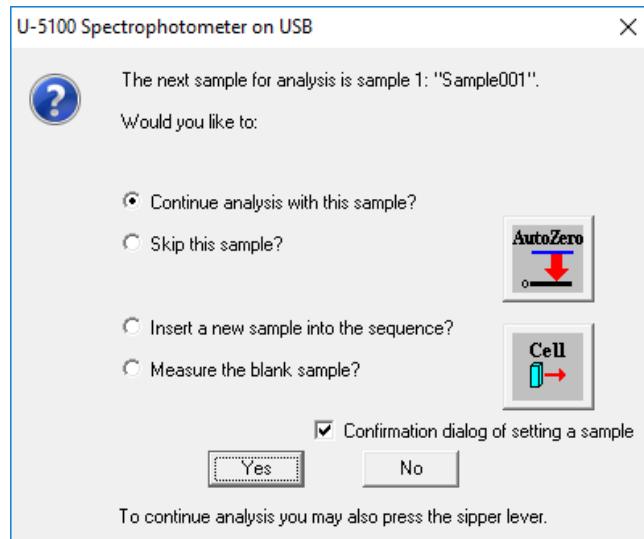


Fig. 4-66

For interruption measurement, select “Insert a new sample into the sequence?” and then click **Yes**.

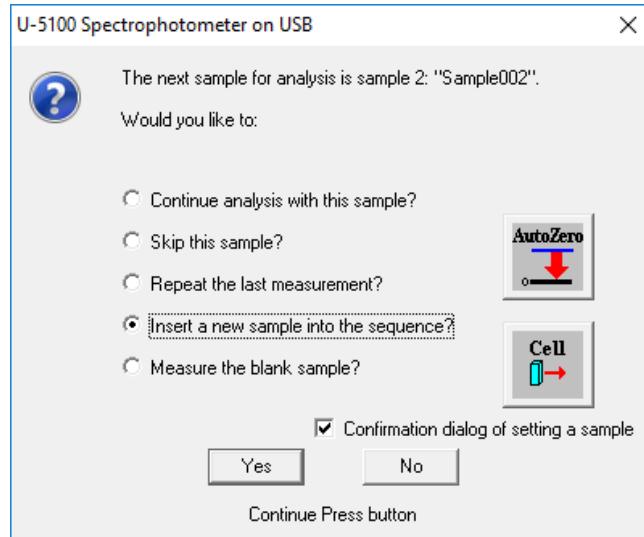


Fig. 4-67

When the window shown in Fig. 4-68 is displayed in succession, enter a sample name and comment. Then, set the interruption sample at the present cell position and click the **OK** button. After clicking, measurement starts.

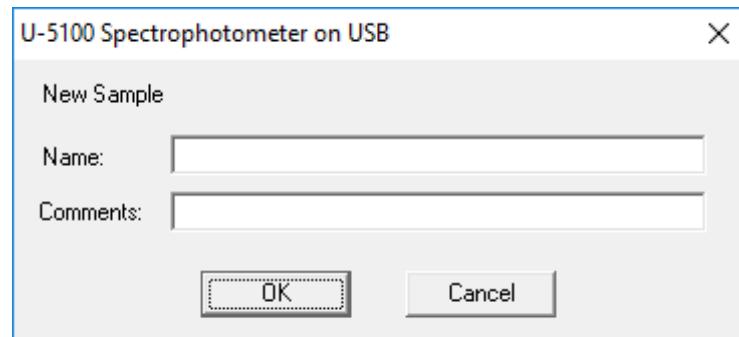


Fig. 4-68

Note: The information entered here will be added to the monitor window.

After completion of all sample measurements, the data processing window is automatically displayed.  
(However, this is effective only when "Open data processing window after acquisition" is selected on the Monitor tab in Analysis Method.)

When the set number of samples in the sample table have been measured, the photometric data will automatically be saved at the selected saving location with the specified file name given.

## 4.5 Measurement

### 4.5.3 Explanation of Measurement Result Window

Upon completion of photometry or opening of a data file, a data processing window as shown in Fig. 4-69 is displayed.

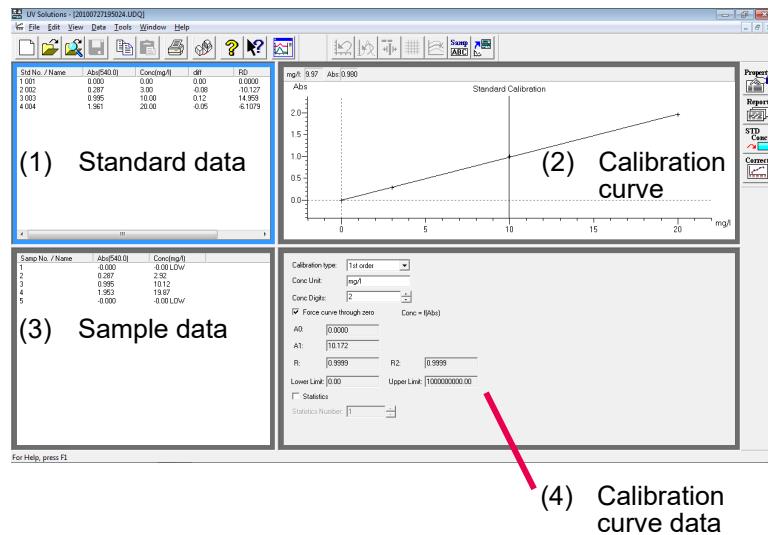


Fig. 4-69 Data Processing Window (photometry)

#### (1) Standard Data

The result of standard sample measurement for preparation of a calibration curve is indicated here.

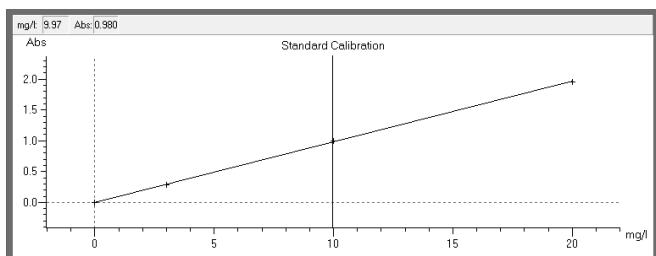
Std.No./Name	Abs(600.0)	Conc(%)	diff	RD	t
1 Std1	0.000	0	0	-16.789	-0.2592
2 Std2	0.517	10	0	0.0000	0.0000
3 Std3	1.032	20	0	0.0000	0.0000
4 Std4	1.547	30	1	101.17	1.5619
5 Std5	2.013	40	-1	-79.154	-1.2220

Fig. 4-70-1 Data of Standards

## (2) Calibration Curve

The calibration curve prepared according to the data of standards is displayed. This curve can be traced.

At the top left of this field, concentration and photometric values are read.



**Fig. 4-70-2 Calibration Curve**

## (3) Sample Data

This field lists the photometric value (Data), concentration (Conc), average value (Avg Conc), standard deviation (SD), coefficient of variation (CV) and upper/lower limit judgment result (High, Low) of each sample.

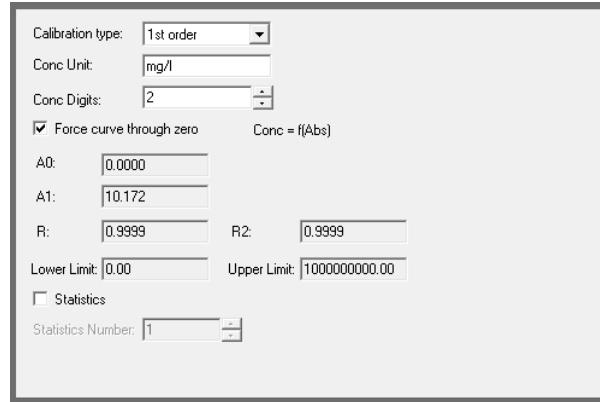
Samp No. / Name	Abs(540.0)	Conc(mg/l)
1	-0.000	-0.00 LOW
2	0.287	2.92
3	0.995	10.12
4	1.953	19.87
5	-0.000	-0.00 LOW

**Fig. 4-70-3 Result of Sample Measurement**

## 4.5 Measurement

### (4) Calibration Curve Data

Calibration order, concentration unit, concentration digits below decimal point, calibration curve factors ( $A_0$ ,  $A_1$ ), decisive factors ( $R$ ,  $R_2$ ) of calibration curve, upper/lower limits of concentration judgment, etc. are indicated here.

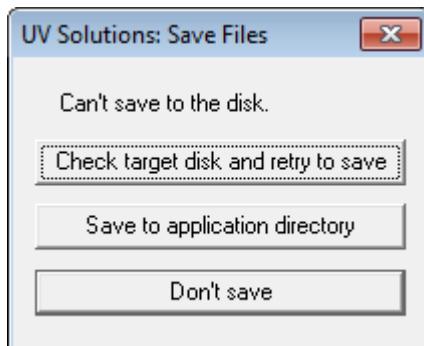


**Fig. 4-70-4 Calibration Curve Data**

The following parameters can be changed.

- Calibration order
- Conc Unit
- Conc Digits
- Force curve through zero
- Statistics
- Statistics Number

- NOTES:**
1. Under the condition given below, measurement result data is automatically saved in “¥UV Solutions¥Data.”  
(Example: C:¥UV Solutions¥Data)  
A measurement is carried out under the condition that the sample table is not used and the function “Auto File” is turned on in the absence of a file name.
  2. For the data measured under the following conditions, a guidance “Can't save to the disk” will be displayed. According to the guidance, select the subsequent measure.
    - (1) There is no sufficient free space in a destination medium for saving (such as floppy disk or magneto-optical disk).
    - (2) Writing is inhibited.



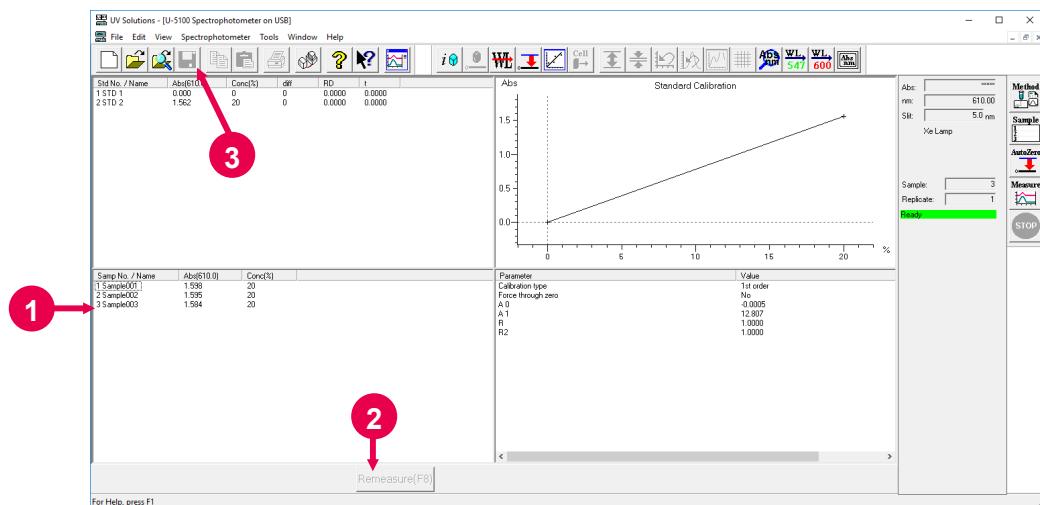
## 4.5 Measurement

### 4.5.4 Remeasurement

If remeasurement becomes necessary after a series of measurement, standard and unknown sample data can be remeasured.

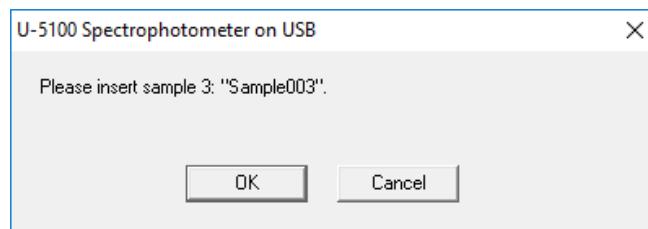
- (1) Activate the data part subjected to remeasurement by clicking it as shown in Fig. 4-71.

**NOTE:** Figure 4-71 shows the window appearing when the sample table is not used. Five buttons including [Remeasure (F8)] are displayed in this window. In the window appearing when the sample table is used, only the [Remeasure (F8)] button is displayed.



**Fig. 4-71 Measurement End Window  
(when sample table is not used)**

- (2) Click the **Remeasure (F8)** button. A window as shown in Fig. 4-72 will appear.



**Fig. 4-72**

- (3) When you click **OK**, measurement starts. When standard samples were remeasured, a calibration curve is displayed through recalculation.
- (4) For saving the data after remeasurement, click the  (Save) button. The data processing window will be displayed. From the File menu, select "Save As" and save the data.

Remeasurement is effective for standard and unknown sample data.

#### 4.5.5 Statistical Calculation

After sample measurement, the statistical calculation result of sample data is indicated when Statistics is specified (see (1) in Fig. 4-74). The result will be indicated in the "Avg Conc" column in the data processing window as shown in Fig. 4-73.

Samp No. / Name	Abs(350.0)	Conc(ug/L)	Avg Conc [SD][CV] (%)
1 sampleA	1.054	60.0	
2 sampleB	1.052	59.9	60.0 [0.1032][0.1720]
3 sampleC	1.465	83.4	
4 sampleD	1.469	83.6	83.5 [0.1649][0.1975]
5 sampleE	-0.002	-0.1 LOW	

**Fig. 4-73 (Example when Statistics Number = 2)**

$$AvgConc = \frac{\sum X_i}{N}$$

$$SD = \sqrt{\frac{\sum X_i^2 - (\sum X_i)^2 / N}{N - 1}}$$

$$CV = \frac{SD}{MEAN} \times 100$$

Where, N : Number of standards

MEAN : Mean value

SD : Standard deviation

CV : Coefficient of variation (%)

**NOTE:** When SD or CV value is nearly zero, it is indicated by [\*\*\*\*\*].

## 4.5 Measurement

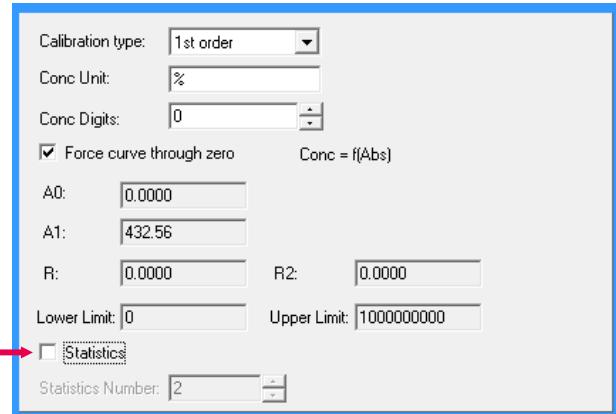


Fig. 4-74 (calibration curve data)

When turning off the check mark for Statistics, the result of statistical calculation will not be indicated. And, if you change the number of samples in Statistics Number, the result of statistical calculation will change.

For example, when 6 samples are to be measured, input of 2 for Statistics Number will effect statistic calculation in units of 2 data.

### 4.5.6 Rescaling of Calibration Curve

A calibration curve can be rescaled in the following procedure. Move the cursor onto calibration curve display and click the right mouse button. The menu shown below will appear.

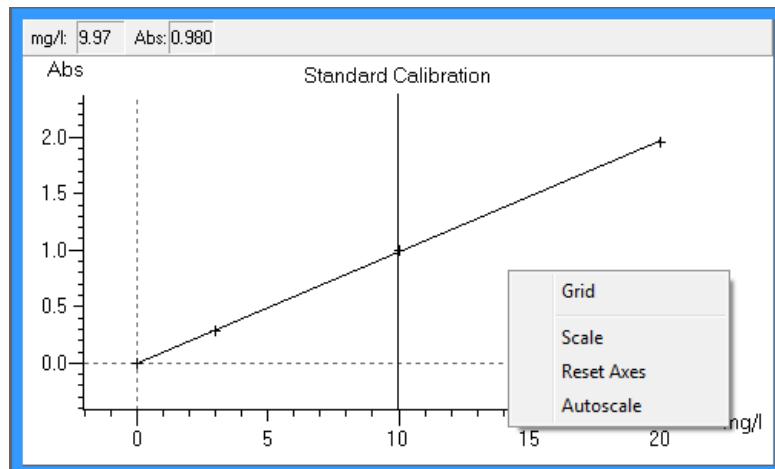
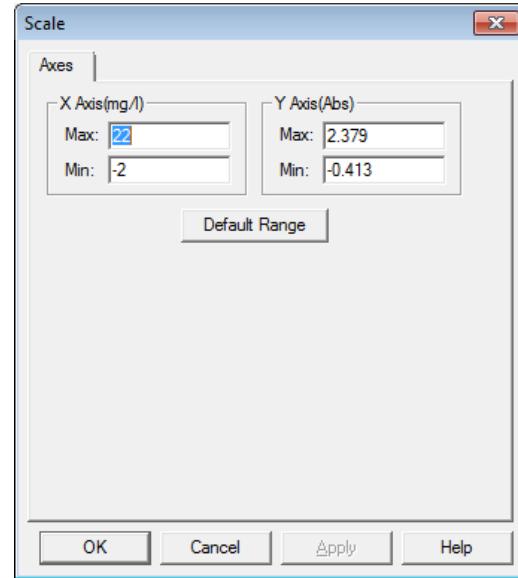


Fig. 4-75 Calibration Curve

Click the Scale command, and a dialog box for Scale will be displayed.



**Fig. 4-76**

Set the X and Y axis scales, and click the **OK** or **Apply** button. The calibration curve graph will be displayed on the new scales after change.

For restoring the original scales, move the cursor onto the calibration curve display, right-click the mouse and click the Reset Axes command. When you select the Autoscale command, the scales will be changed according to the standard sample data and the calibration curve will be redisplayed.

## 4.6 Printing Data

### 4.6 Printing Data

After measurement, data can be printed even when the automatic printing function is not used. Either of the following procedures is usable.

- (1) Click in the spectrum display, and the circumference will turn blue. In this status, click the  (Print) button on the Standard toolbar. (Or from the File menu on the menu bar, select the Print command.) In this case, the active field in the data processing window (field (2) in Fig. 4-69) will be printed. What is displayed by clicking the Print Preview command in the File menu will be printed.

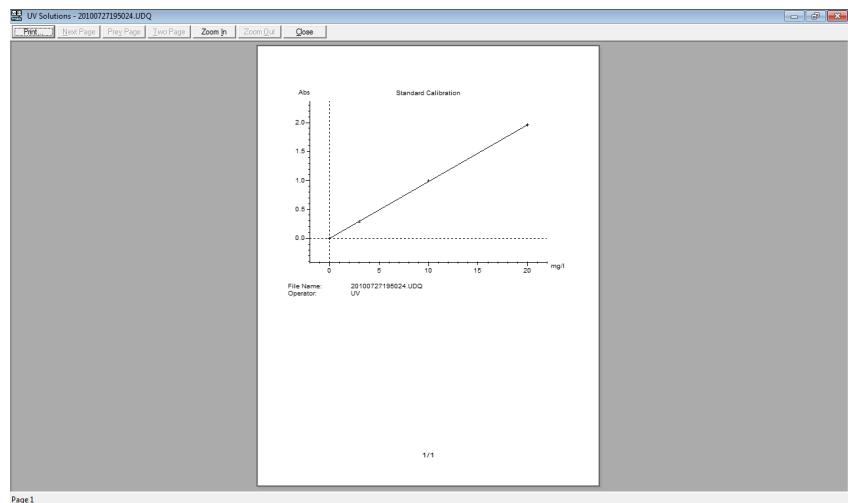


Fig. 4-77

- (2) Click the  (Report) button on the DataProcess toolbar, and the Print Preview window as shown in Fig. 4-78 will appear. (Or from the Data menu on the menu bar, select the Report command.) For printout on a printer, click the **Print** button. In this case, measurement conditions will also be printed.

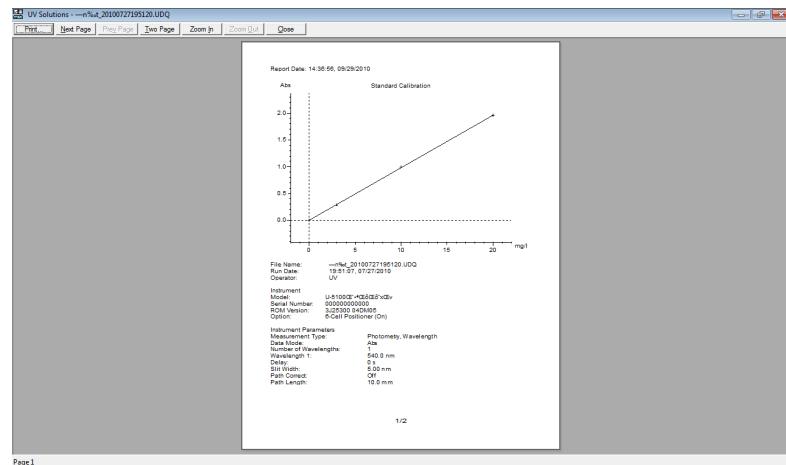


Fig. 4-78

Print items can be selected on the Report tab of the Photometry Properties window displayed by selecting the Properties command in the Edit menu.

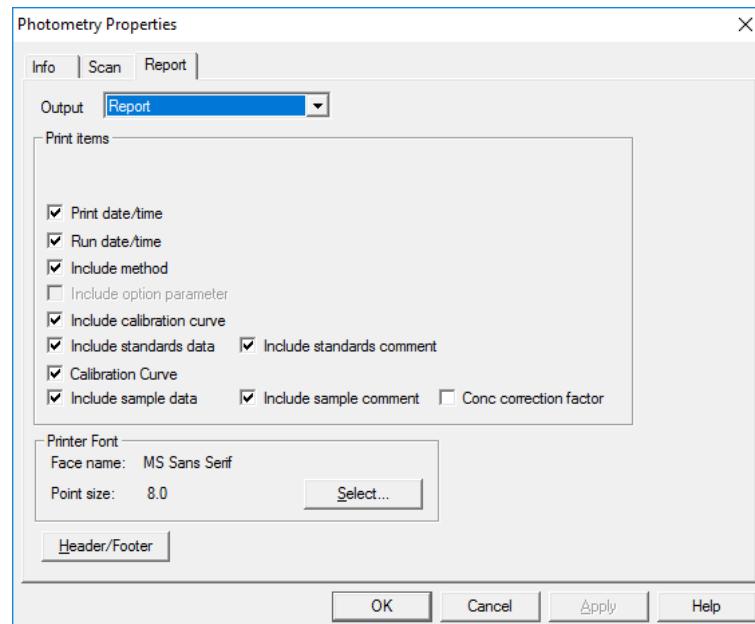


Fig. 4-79

**NOTE:** When concentration values become larger due to the concentration correcting function, data plotting may be too wide in the horizontal direction to be printed. In such a case, take a corrective measure such as use of landscape mode or change of font before report printout.

## 4.7 Changing Concentration of Standard Sample

### 4.7 Changing Concentration of Standard Sample

The concentration of each standard sample is changeable.

This function is usable after measurement. On the toolbar in the data processing window, click the  (Standards Conc) button, and a window as shown in Fig. 4-80 will be displayed. So, enter a desired value in a Conc column cell. (Or from the Data menu on the menu bar, select the “Edit standards conc” command.) After entry, click the **OK** or **Apply** button, and the calibration curve will be recalculated and displayed.

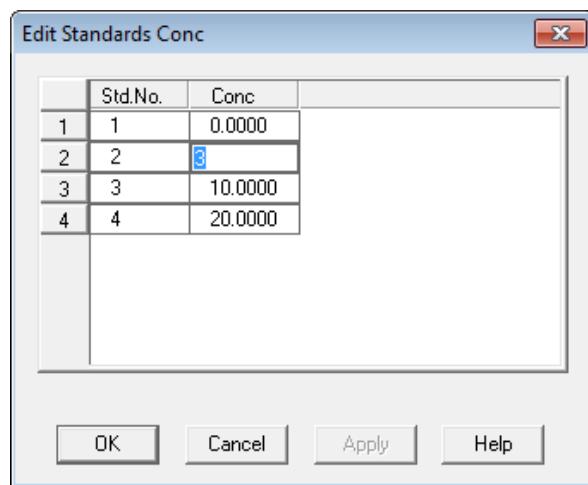


Fig. 4-80

## 4.8 Measurement Using Saved Calibration Curve

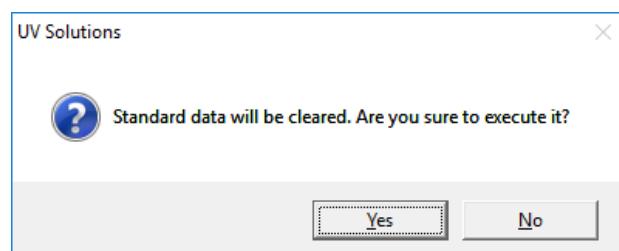
Call the calibration curve in the following procedure.

- (1) Set the Measurement mode to “Photometry.”
- (2) Select the Load curve command from the File menu or select  icon in the instrument toolbar.

A dialog box containing the message shown below will appear.

This message dialog box does not appear immediately after turning on power supply or under operation in other than the Photometry mode.

Click the **YES** button.



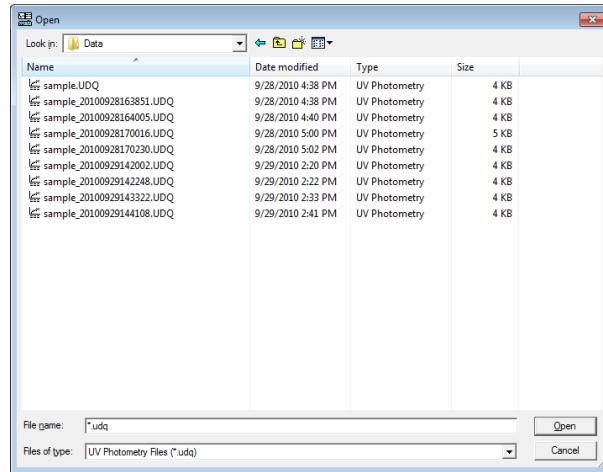
**Fig. 4-81**

- (3) A window as shown in Fig. 4-82 is now displayed. Select the file of the calibration curve to be used. In this case, when the data in the selected file has been measured by use of a sample table, samples are to be measured using a sample table. And when the data has been measured without using a sample table, samples are to be measured without using a sample table. With the U-5100, measurement will be carried out under the same 6 Cell Mode and 6 cell control mode as those in the measurement for the selected file data.

**NOTE:** For measurement with the 6-cell turret in the U-5100, be sure to use the calibration curve data measured with “6 Cell Mode” activated on the General tab page in the Analysis Method window.

## 4.8 Measurement Using Saved Calibration Curve

After file selection, click the **Open** button.

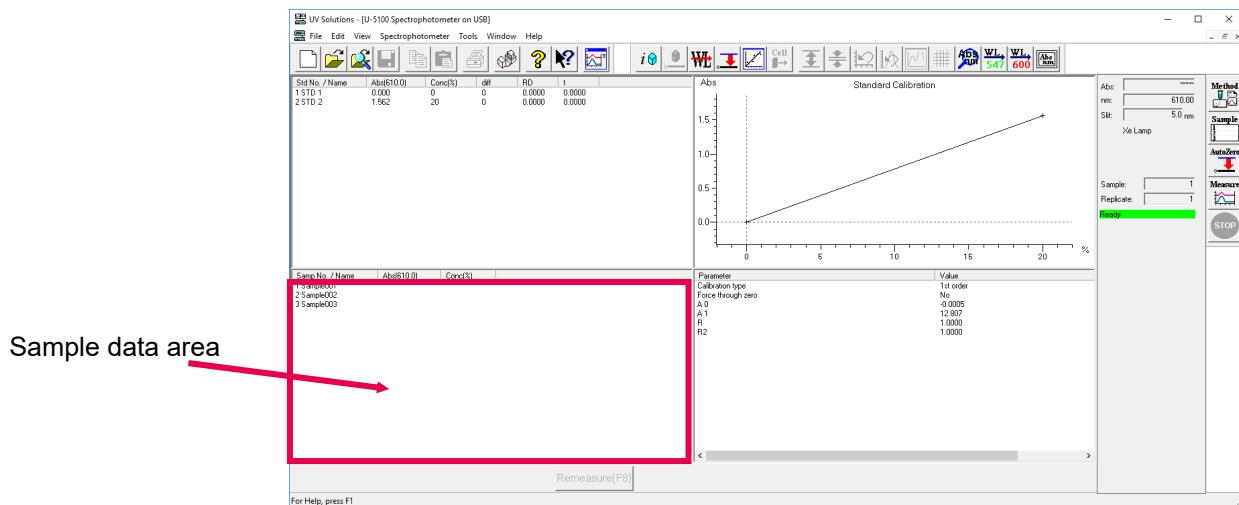


**Fig. 4-82**

### (4)-a For Data Measured with Sample Table

A window as shown in Fig. 4-83 will appear. In the sample data area, the sample names in the sample table to be edited are listed.

When sample table editing is required, click the  (Edit Sample Table) button and edit the table. After editing, click the **OK** button.



**Fig. 4-83**

## (4)-b For Data Measured without Sample Table

A window as shown in Fig. 4-84 will appear.  
The sample data area is now blank.

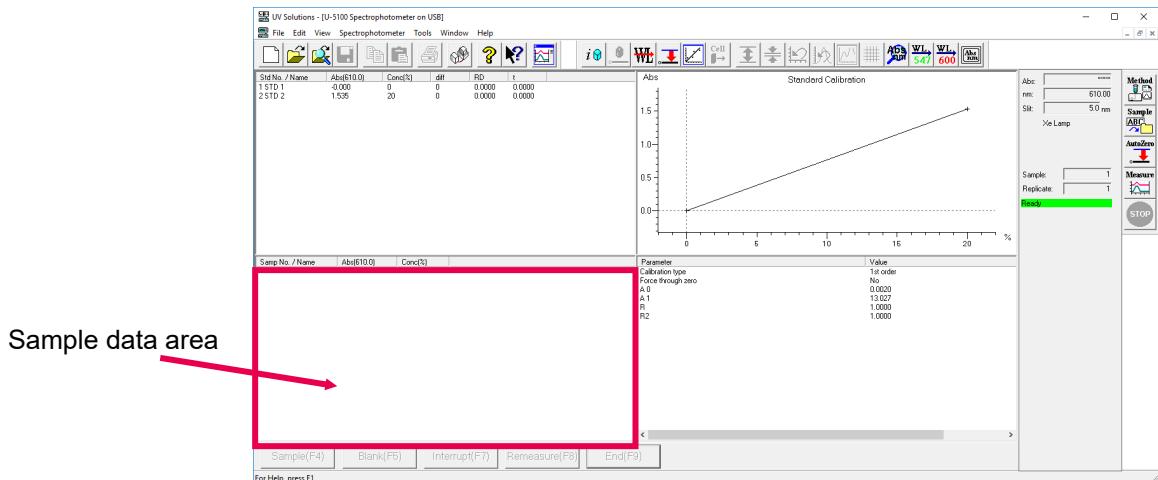


Fig. 4-84

Click the (Sample /Comment) button, and a window as shown in Fig. 4-85 will be displayed.  
In this window, enter a sample name and comment.  
Click the **OK** button.

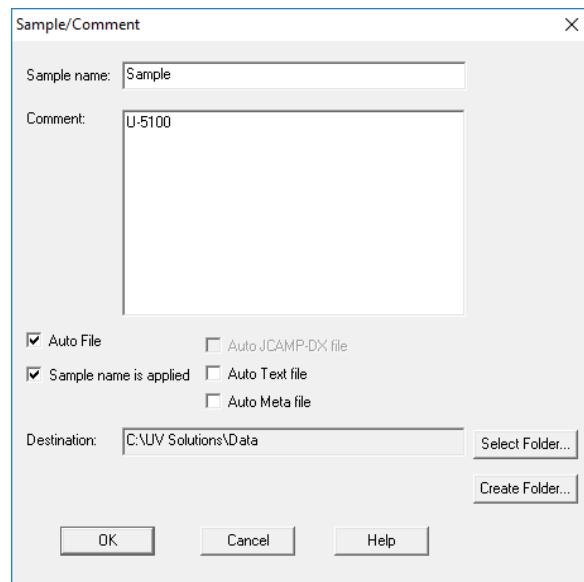


Fig. 4-85

#### 4.8 Measurement Using Saved Calibration Curve

- (5) Set a sample to be measured. Click the  (Start Series) button. (Or from the Spectrophotometer menu, select the Measure command.)
- (6) A message box as shown below is now displayed. Click the **OK** button.  
However, when measurement is being carried out in the U-5100 using the calibration curve data measured with 6 Cell Mode and 6 cell control mode both activated, set the same samples as those in the edited sample table into the 6-cell turret before clicking the **OK** button.

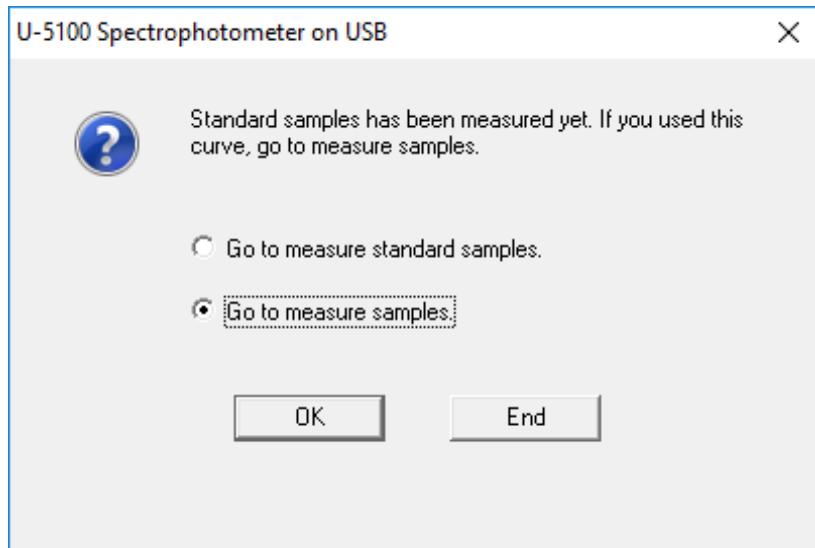


Fig. 4-86

##### (7)-a For Data Measured with Sample Table

Measure samples in the order of input on the sample table according to the guidance. For halfway termination of measurement, click the  (Stop Command) button.

##### (7)-b For Data Measured without Sample Table

A window as shown in Fig. 4-87 is displayed and the **Sample (F4)** button is now active. Click this button. Measurement starts.

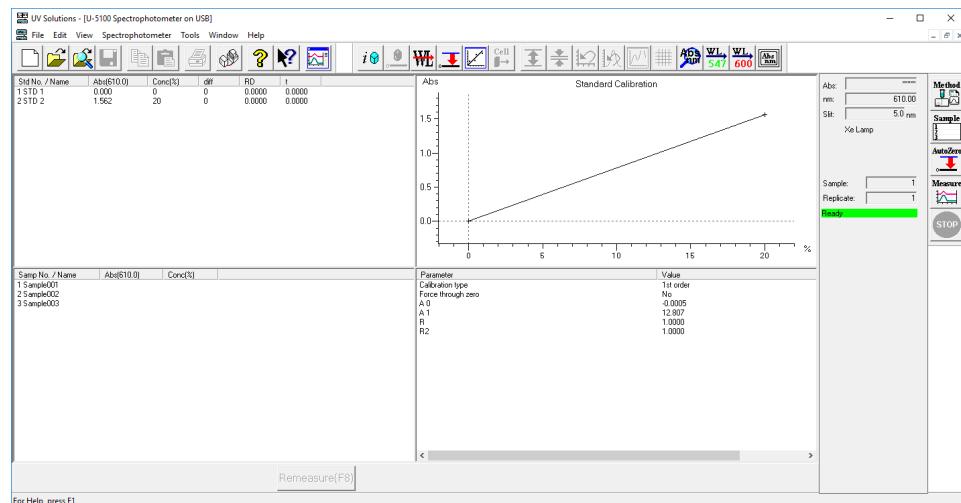


Fig. 4-87

(8) After completion of measurement, click the **End (F9)** button.

## 5. DATA PROCESSING

This section explains the operation procedures for data processing after measurement.

### 5.1 Loading Data

Saved data can be loaded in the following procedure.

- (1) Click the  button on the Standard toolbar (or select the Open command from the File menu). A dialog box as shown in Fig. 5-1 will appear.

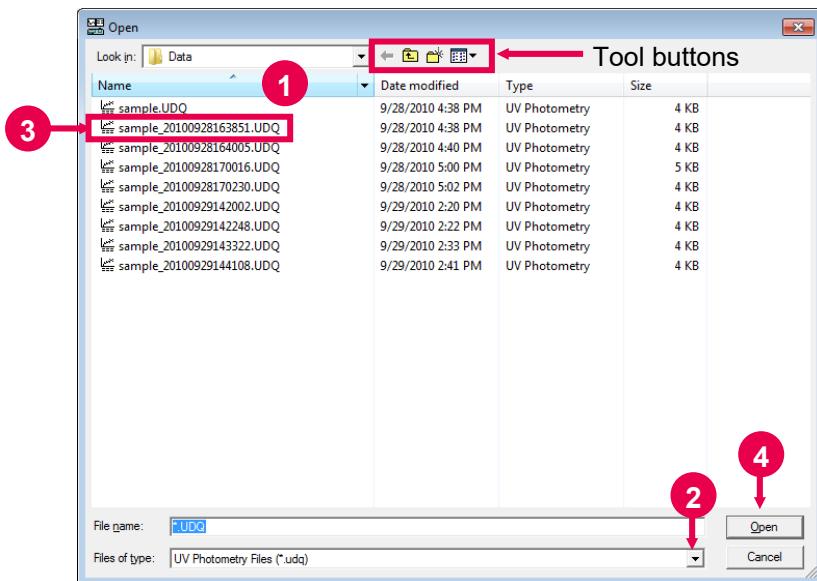


Fig. 5-1

- (2) The dialog box shown in Fig. 5-1 contains four tool buttons. Table 5-1 lists the tool buttons and their functions.

Table 5-1 Tool Buttons in Open Dialog Box

Tool Button	Function	Tool Button	Function
	Moves to the previously displayed folder.		Creates a new folder.
	Displays a hierarchical folder at the next higher level.		Lists the following display menu items: Thumbnails, Tiles, Icons, List and Details.

- (3) In the "Look in" field, specify a folder containing the file to be loaded.  
For example, specify UV Solutions ⇒ [Data] in Local Disk (C:) (refer to (1) in Fig. 5-1).

## 5.1 Loading Data

- (4) In the “Files of type” field, select a file type.  
The following file types are selectable.

- UV Wavelength Scan Files (\*.uds)
- UV Time Scan Files (\*.udt)
- UV Photometry Files (\*.udq)
- UV Method Files (\*.uvm)
- UV Sample Table Files (\*.uvs)
- UV Report Files (\*.uvr)
- UV Processed Data Files (\*.udp)
- All Files (\*.\*)

Upon clicking  , the files of the selected type will be listed (refer to (2) in Fig. 5-1).

- (5) Select a file. The selected file is highlighted in blue (refer to (3) in Fig. 5-1).  
The following two methods are available for selecting multiple files.

Method 1: Click the first file, and then select the subsequent ones with the  key while holding down the Shift key.

Method 2: Click each file while holding down the Ctrl key.

- (6) After completion of file selection, click the **Open** button (refer to (4) in Fig. 5-1). The selected file will open as shown in Fig. 5-2.

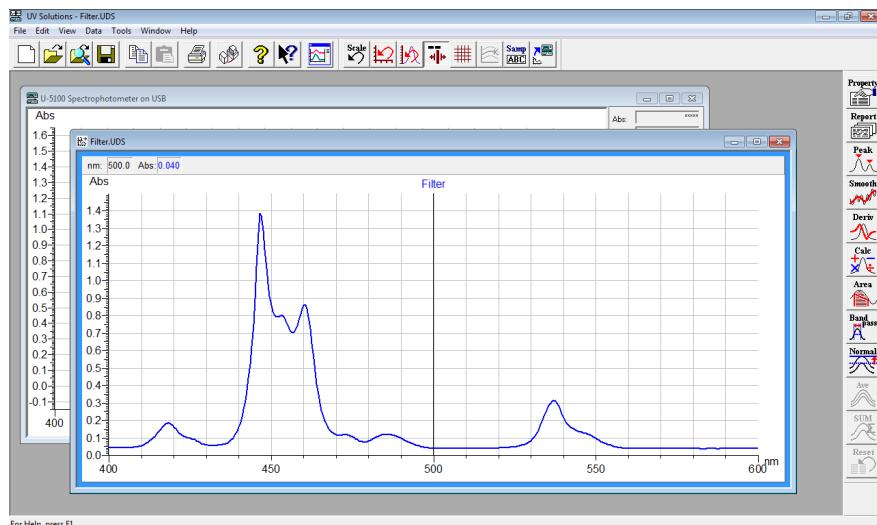


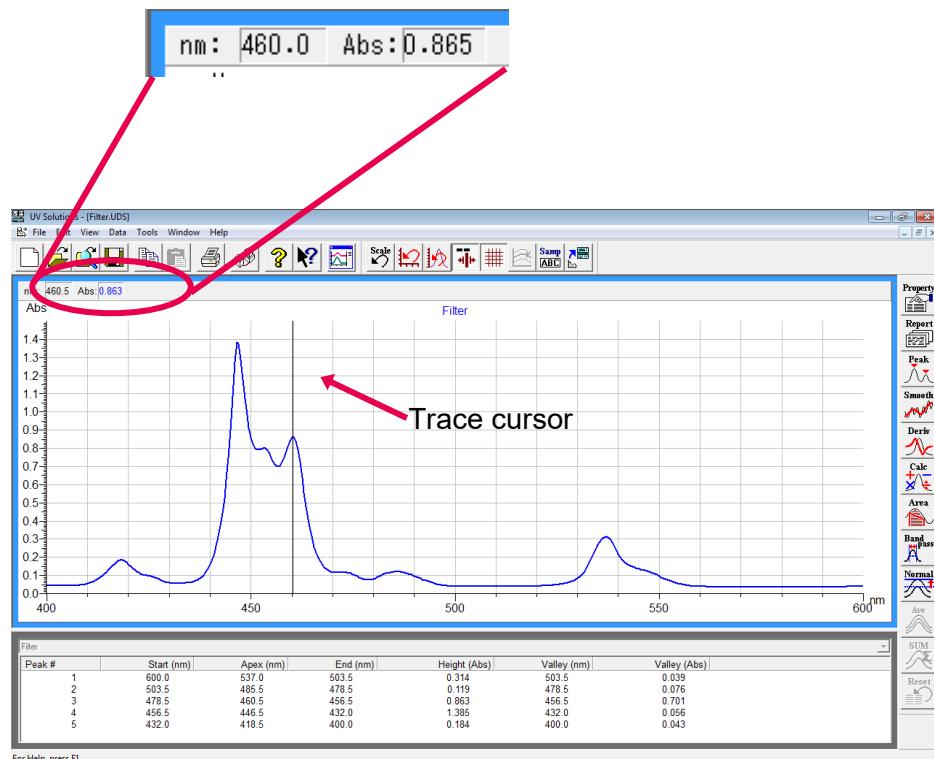
Fig. 5-2

## 5.2 Tracing a Spectrum

This function is usable when you want to know the photometric value at a certain wavelength on the measured spectrum.

For spectrum tracing, it is required to bring the trace cursor onto the displayed spectrum in the following two ways.

- (1) Click the  button on the Spectrum toolbar. A trace cursor will appear on the spectrum. The wavelength and photometric value at the cursor position are indicated at the upper left in Fig. 5-3.



**Fig. 5-3**

## 5.2 Tracing a Spectrum

- (2) Bring the mouse pointer onto the displayed spectrum and right-click the mouse. A menu box as shown in Fig. 5-4 will appear. Select “Trace” from the menu box.

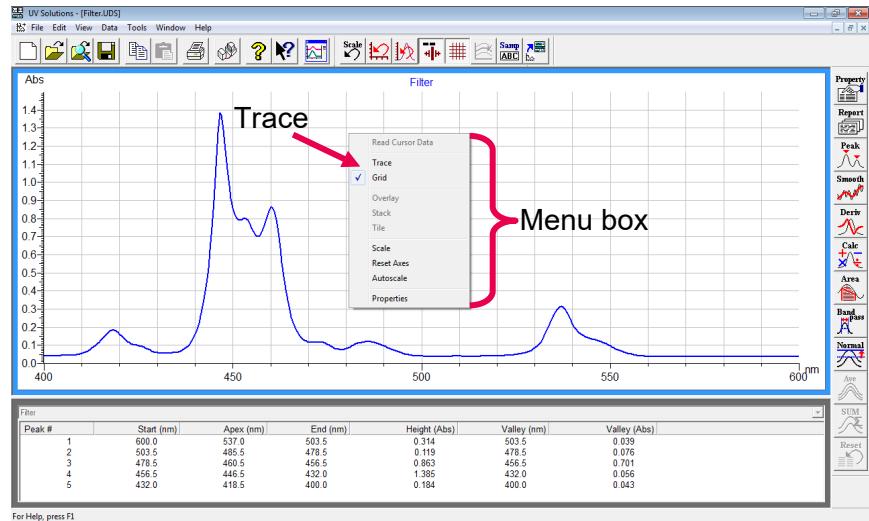


Fig. 5-4

- (3) The trace cursor can be moved in the following two ways.

1) Moving by Mouse

Bring the mouse pointer to the trace cursor position and move the cursor to a position for readout with the mouse while holding down its left button.

2) Moving by Arrow Keys on Keyboard

By clicking the  $\leftarrow$  or  $\rightarrow$  key, the trace cursor moves in the corresponding direction.

## 5.3 Changing Scale

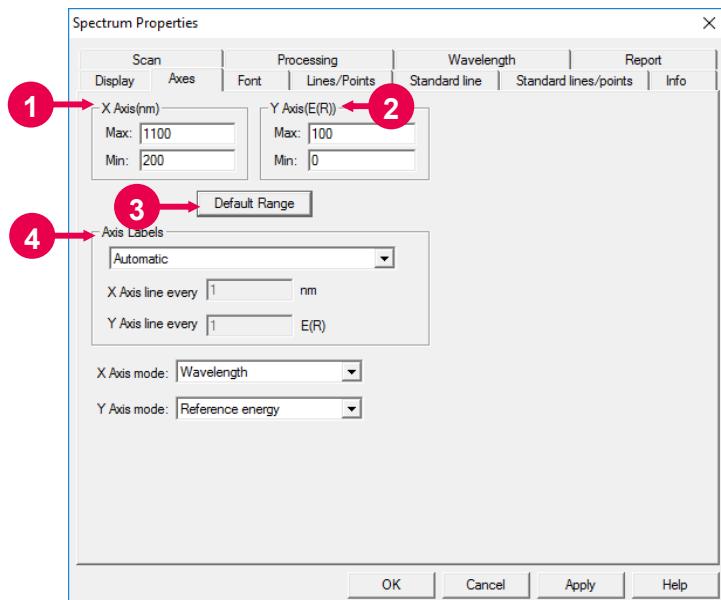
You can change the X and Y-axis scales of data.

For scale change, the following three methods are available.

### 5.3.1 Change by Using Axes Tab

Click the  button on the Process toolbar. The Spectrum Properties window will open.

Click the Axes tab. A tab page as shown in Fig. 5-5 will appear.



**Fig. 5-5 Axes Tab**

Enter numerical values in the Maximum and Minimum input boxes for the X and Y axes. The default values are those saved most recently.

This tab page contains the following setting items.

#### (1) X Axis

Enter minimum and maximum values for the X axis.

#### (2) Y Axis

Enter minimum and maximum values for the Y axis.

## 5.3 Changing Scale

### (3) Default Range

This button resets the X and Y axes to the default values.

### (4) Axis Labels

Make your selection for the X and Y axis labels from the following three: Automatic, Label high, low and median values and Use fixed increment.

For returning to the original scale, click the  button.

#### 5.3.2 Change by Right-clicking Mouse

Right-click the mouse on the spectrum window. A menu box as shown in Fig. 5-6 will appear. Select “Scale” from the menu box.

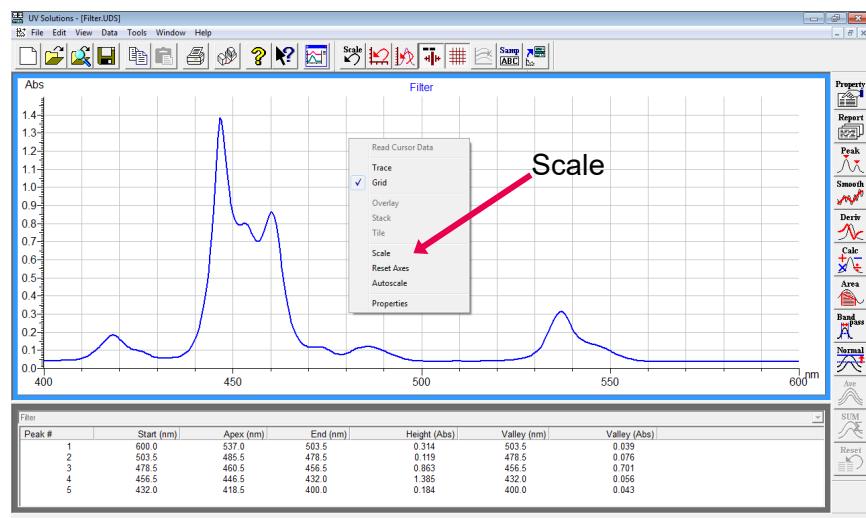


Fig. 5-6

A window as shown in Fig. 5-7 will appear. The window contains the same setting items as in 5.3.1.

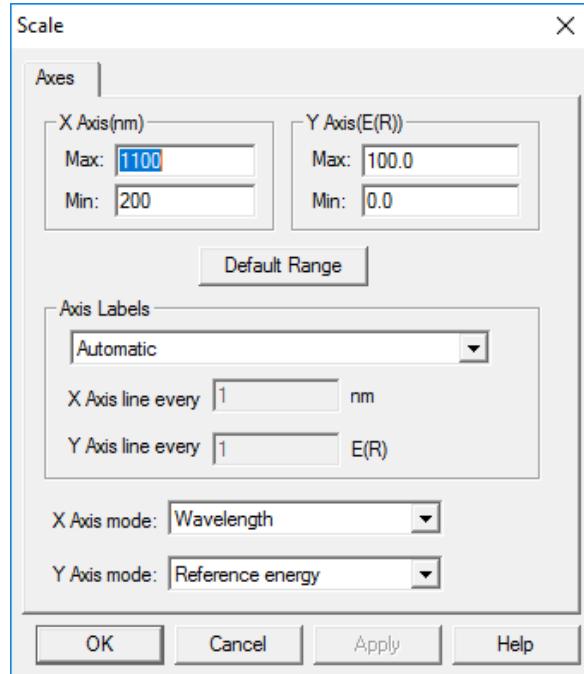


Fig. 5-7

### 5.3.3 Change by Using Left Mouse Button

The scale can be expanded with the left button of the mouse.

- (1) Bring the trace cursor onto the spectrum window (refer to Fig. 5-3).
- (2) Specify an area to be expanded. Draw a rectangle while holding down the left mouse button, and then release the button. The area will be expanded.

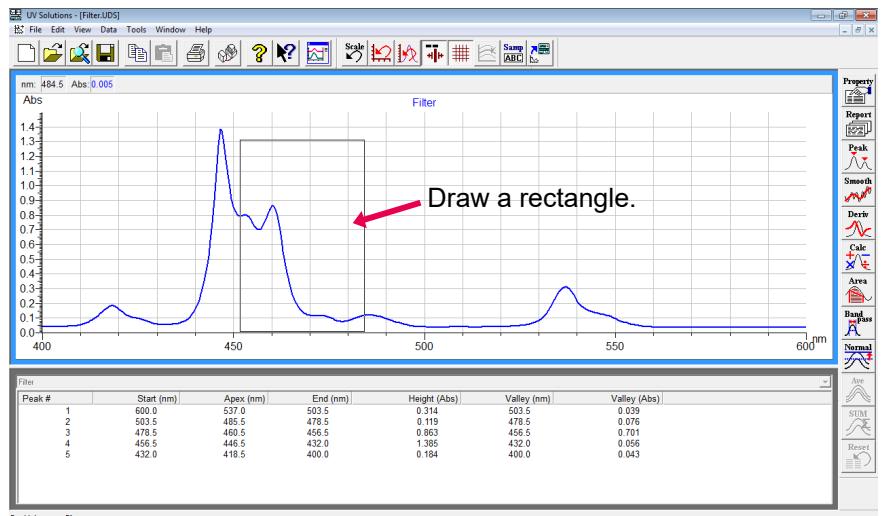


Fig. 5-8

### 5.3 Changing Scale

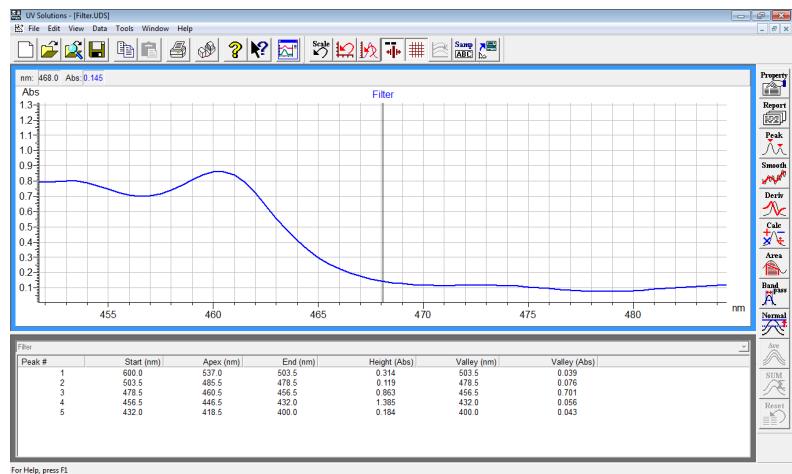
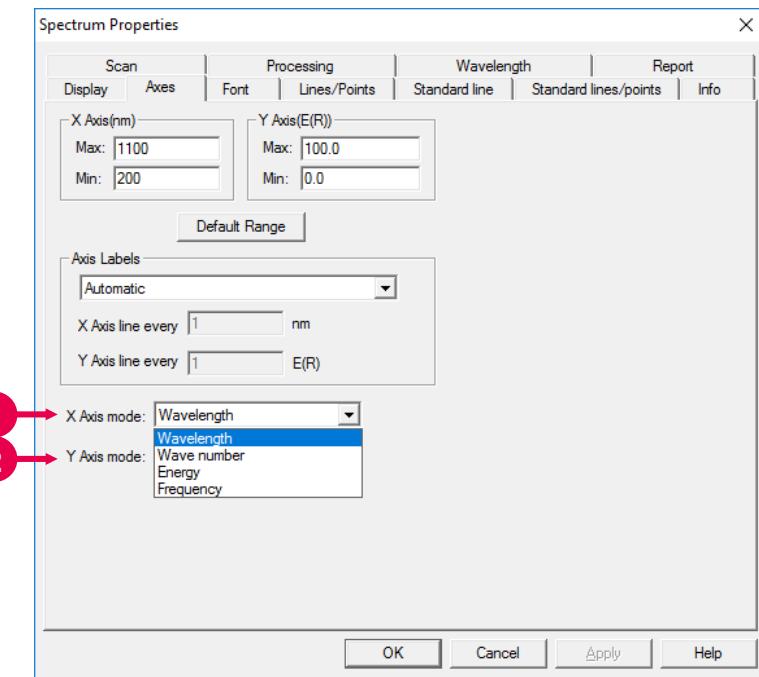


Fig. 5-9

For returning to the original scale, click the button.

## 5.4 Changing Graph Axes

The X and Y axes of a graph can be changed on the spectrum. Click the  button on the Data Process toolbar and select the Axes tab.



**Fig. 5-10 Axes Tab**

### (1) X Axis mode

The X axis can be indicated in any unit given below.

- **Wavelength**  
Indicated in wavelength (nm).
- **Wave number**  
Indicated in wavenumber ( $\text{Kcm}^{-1}$ ,  $\text{K} = 1000$ ).  
 $x \cdot \lambda = 10000$  ( $x$ :  $\text{Kcm}^{-1}$ ,  $\lambda$ : nm)
- **Energy**  
Indicated in energy (eV).  
 $y \cdot \lambda = 1239.8$  ( $y$ : eV,  $\lambda$ : nm)
- **Frequency**  
Indicated in frequency (THz).  
 $z \cdot \lambda = 299792$  ( $z$ : THz,  $\lambda$ : nm)

## 5.4 Changing Graph Axes

### (2) Y Axis mode

The Y axis can be indicated in any unit given below.

- Transmittance  
Indicated in transmittance (%T).
- Absorbance  
Indicated in absorbance (Abs).
- Sample energy  
Indicated in energy value (eV) on the sample side.
- Reference energy  
Indicated in energy value (eV) on the reference side.
- %R Transmittance  
Indicated in reflectance (%R).
- Molar absorbance  
Indicated in molar absorption coefficient.  
 $\epsilon = \text{Abs}/c \cdot d$   
c : Concentration [mol/L]  
d : Optical path length [cm] (usual cell length 1 cm)  
Abs : Absorbance (measured value)  
Values c and d should be entered in the concentration and cell length input boxes on the Scan tab page of the Spectrum Properties window.
- Log molar absorbance  
Indicated in logarithm of molar absorption coefficient  $\epsilon$ .
- F(R)  
Diffuse reflection function (Kubelka-Munk's formula).  
Effective for measuring diffuse reflection spectra by Kubelka-Munk's formula.  
$$F(R) = \frac{(1 - R(\lambda))^2}{2R(\lambda)}$$

R( $\lambda$ ): Reflectance (measured data) of sample  
 $0 \leq R \leq 100\%$
- log F(R)  
Logarithm of diffuse reflection function.

- NOTES:**
1. For conversion into molar absorbance and log molar absorbance, data must be an Abs value. For conversion into F(R) and log F(R), data must be a %R value.
  2. With "%R Transmittance", "F(R)" or "log F(R)" selected, the cell length is not displayed (printed).
  3. With "Absorbance" selected, you can set cell length correction On/Off and cell length. And cell length correction On/Off and cell length are displayed (printed).
  4. With "Molar absorbance" or "Log molar absorbance" selected, cell length correction is carried out all the time. And cell length correction On and cell length are displayed (printed).
  5. With "%R Transmittance", "Sample energy" or "Reference energy" selected, the cell length at measurement is displayed (printed). You cannot set cell length correction.

## 5.5 Changing Spectral Line

### 5.5 Changing Spectral Line

You can change the line pattern and color of a spectrum.

Click the  (Properties) button on the Data Processing toolbar and select the Lines/Points tab in the Spectrum Properties window. A tab page as shown in Fig. 5-11 will appear.

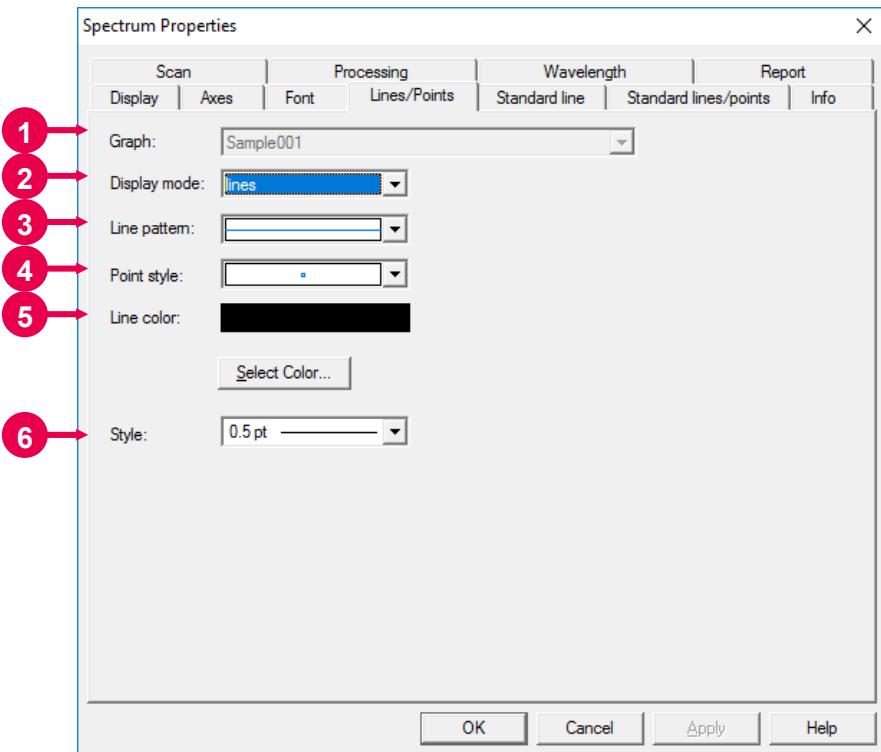


Fig. 5-11 Lines/Points Tab

The above tab page contains the following setting items.

(1) Graph

Select a spectrum for which you want to set a line pattern.

(2) Display mode

Data can be displayed in the following modes.

- lines
- points
- lines & points

## (3) Line pattern

Specify a line pattern such as dotted line or solid line.

## (4) Point style

Select a point style to be used for printing or displaying a graph.

## (5) Line color

Upon clicking the **Select Color** button, the Color window will appear. This window allows you to change the color of spectral line and point.

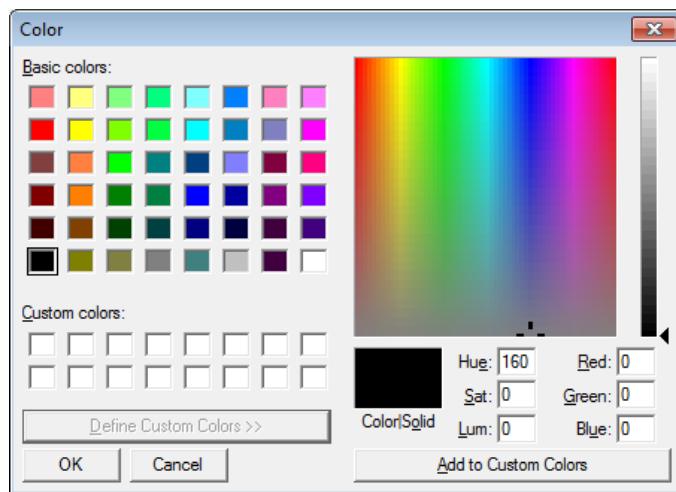
There are 48 basic colors prepared. By clicking the **Define Custom Colors** button, a smaller window is added on the right side of the Color window as shown in Fig. 5-12.

You can now add 16 colors.

These colors are usable for the spectral lines and points.

For defining a color, you can enter values for Hue, Sat (saturation), Lum (luminance), Red, Green and Blue.

Upon completion of the definition, click the **Add to Custom Colors** button. Selection is allowed among the defined colors.



**Fig. 5-12**

## (6) Style

Specify a line thickness.

### 5.6 Detecting Peak of Spectrum

The peak and valley of a spectrum can be detected automatically.

Click the  button on the Data Process toolbar (or select the Find Peaks command from the Data menu). A dialog box as shown in Fig. 5-13 will appear. Set an integration method, threshold and sensitivity.

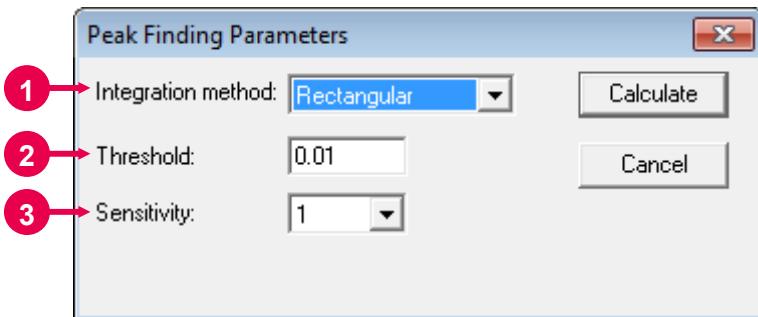


Fig. 5-13

#### (1) Integration method

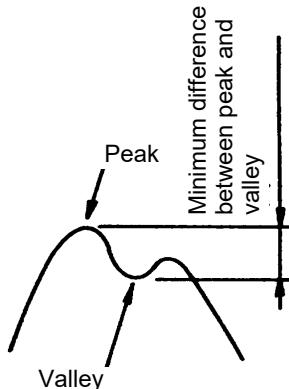
The following three methods are available and the peak wavelength remains the same no matter which method you select. However, the result of area calculation indicated in the peak table will vary with the selected method.

- Rectangular
- Trapezoid
- Romberg

For details of each method, refer to Appendix D.

## (2) Threshold

Set a detection limit of peak and valley (a difference between the peak and valley) on the photometric value axis. Peaks and valleys below the set value will not be detected.

**Fig. 5-14**

Input range: Varies with data mode.

Data Mode	Input Range
Abs	0.0001 to 1.0000
%T, %R, E(R), E(S), F(R), log F(R)	0.01 to 100.00
$\epsilon$	0.0001 to 1000000000.0000
log $\epsilon$	0.01 to 1.00

## (3) Sensitivity

Select the number of data points in the X-axis direction. For detection of sharp peaks, select sensitivity 1, and for broad peaks, select sensitivity 8.

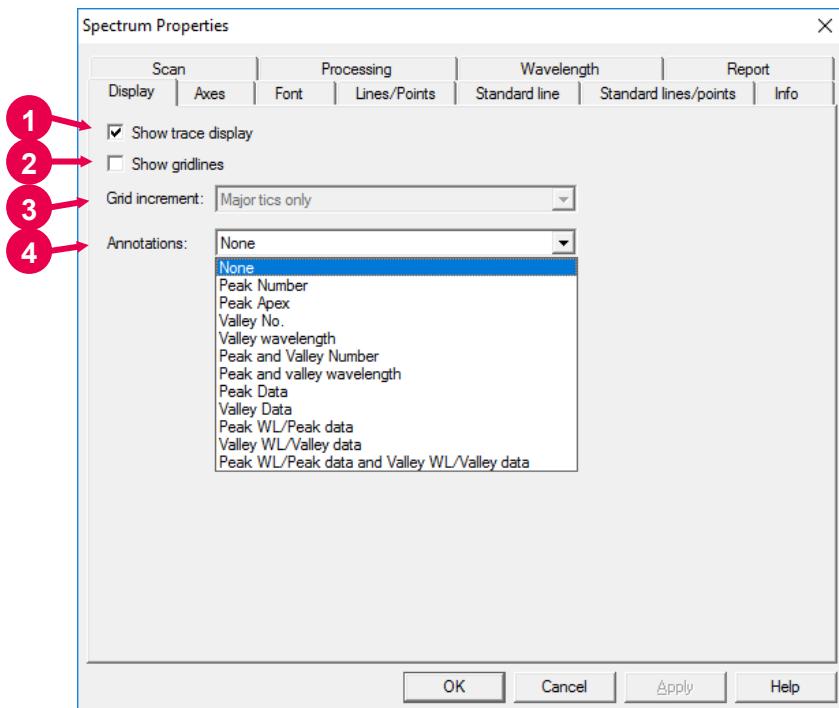
- 1
- 2
- 4
- 8

**NOTE:** Peak detection is based on the Abs mode. In the %T or %R mode, therefore, the valley level of a spectrum on display corresponds to the peak value in the peak table in the Abs mode.

## 5.7 Indicating Peak Information on Spectrum

### 5.7 Indicating Peak Information on Spectrum

Click the  button on the Data Process toolbar (or select the Properties command from the Edit menu) and select the Display tab.



**Fig. 5-15 Display Tab**

#### (1) Show trace display

By putting a check mark here, the trace cursor is displayed to enable tracing when the data processing window is opened.

#### (2) Show gridlines

By putting a check mark here, the monitor window and data processing window can be displayed with gridlines.

#### (3) Grid increment

Specify a gridline width. This parameter becomes valid when a check mark is put at "Show gridlines".

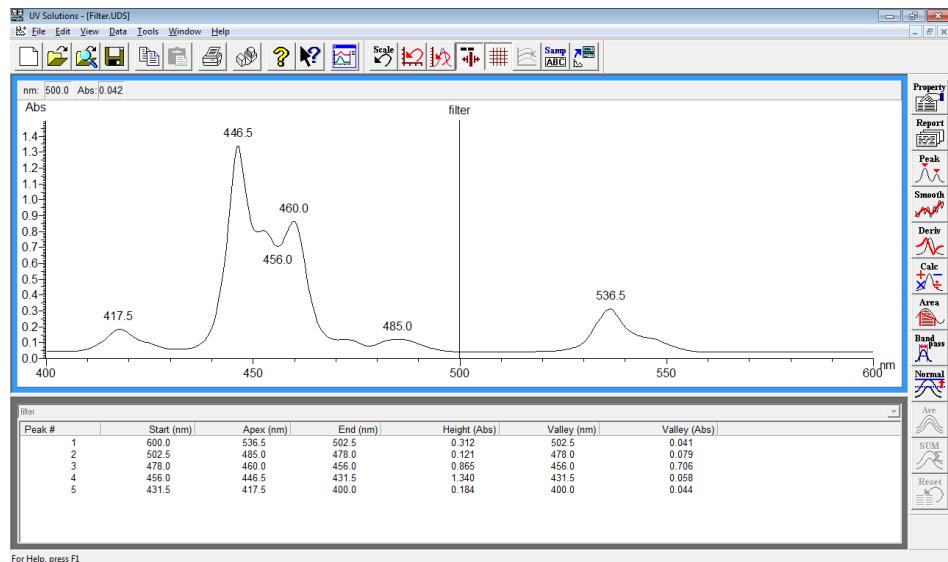
## (4) Annotations

Peak data can be indicated on a spectrum. Select items to be displayed on a spectrum and click the **OK** or **Apply** button.

- None  
Only a spectrum is displayed (with no peak information).
- Peak Number  
Peak number is indicated on a spectrum.
- Peak Apex  
Peak wavelength is indicated on a spectrum.
- Valley No.  
Valley number is indicated on a spectrum.
- Valley wavelength  
Valley wavelength is indicated on a spectrum.
- Peak and Valley Number  
Peak number and valley number are indicated on a spectrum.
- Peak and valley wavelength  
Peak wavelength and valley wavelength are indicated on a spectrum.
- Peak Data  
Peak data is indicated on a spectrum.
- Valley Data  
Valley data is indicated on a spectrum.
- Peak WL/Peak data  
Peak wavelength and peak data are indicated on a spectrum.
- Valley WL/Valley data  
Valley wavelength and valley data are indicated on a spectrum.

## 5.7 Indicating Peak Information on Spectrum

- Peak WL/Peak data and Valley WL/Valley data  
Peak wavelength, peak data, valley wavelength and valley data are indicated on a spectrum.



**Fig. 5-16 Example of Indication of Peak Wavelength**

## 5.8 Smoothing a Spectrum

Click the  button on the Data Process toolbar (or select the Smooth command from the Data menu). A dialog box as shown in Fig. 5-17 will open.

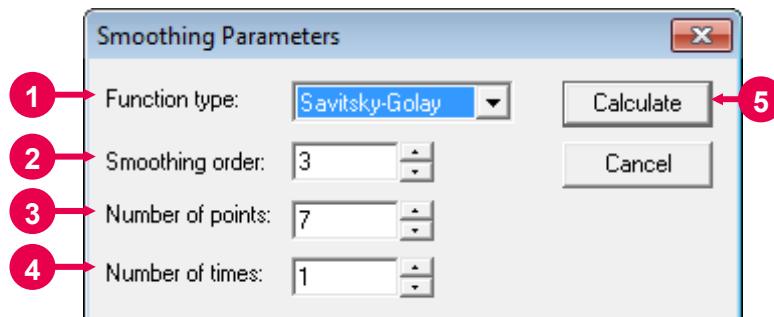


Fig. 5-17

Set the following parameters in the above dialog box.

### (1) Function type

Select a smoothing method from the following three.  
For details, refer to Appendix D.3.

- Savitsky-Golay
- Mean
- Median
- Gaussian

### (2) Smoothing order

Set a smoothing order.  
Input range: 2 to 4

### (3) Number of points

Set the number of data points to be used for calculation.  
Input range: 5 to 101  
Initial value: 7

### (4) Number of times

Set the number of smoothing operations.  
Input range: 1 to 100

## 5.8 Smoothing a Spectrum

### (5) Calculate

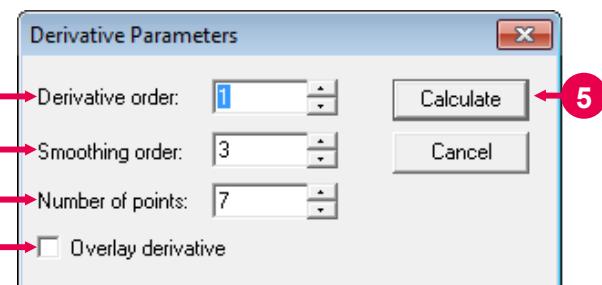
This button executes smoothing.

For returning to the original status (before calculation), click the

 (Reset Data) button.

## 5.9 Differentiating a Spectrum

Click the  button on the Data Process toolbar (or select the Derivative command from the Data menu). A dialog box as shown in Fig. 5-18 will open.



**Fig. 5-18**

### (1) Derivative order

Set the order of differentiation.

Input range: 1 to 4

### (2) Smoothing order

Set the order of smoothing.

Input range: 2 to 4

### (3) Number of points

Set the number of data points to be used for calculation.

Input range: 5 to 101

Initial value: 15

### (4) Overlay derivative

Spectra before and after differentiation are overlaid for display. In this case, the values on the Y axis do not stand for those after differentiation.

### (5) Calculate

This button executes differentiation.

For returning to the original status (before calculation), click the  (Reset Data) button.

## 5.10 Overlaying Spectra

### 5.10 Overlaying Spectra

This function is usable for comparison of two or more spectra and other purposes.

The following four methods are available.

#### 5.10.1 Insertion from Window

This method is available when two or more spectrum windows are already displayed.

- (1) Select the Overlay command from the Data menu.
- (2) A dialog box as shown in Fig. 5-19 will appear.  
The dialog box indicates a sample name for the presently displayed spectrum.

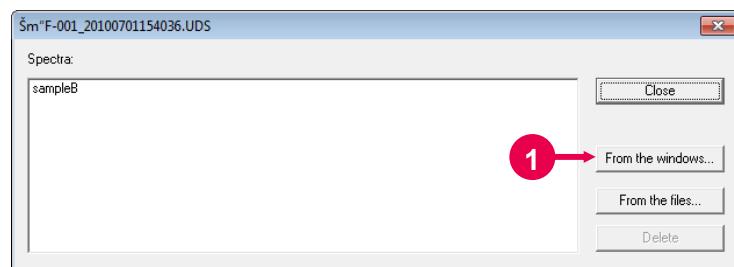


Fig. 5-19

- (3) Click the **From the windows** button. A dialog box as shown in Fig. 5-20 will appear (refer to (1) in Fig. 5-19). A list of the sample names for the presently displayed data is indicated in the left box, and a list of the overlaid sample names in the right box.

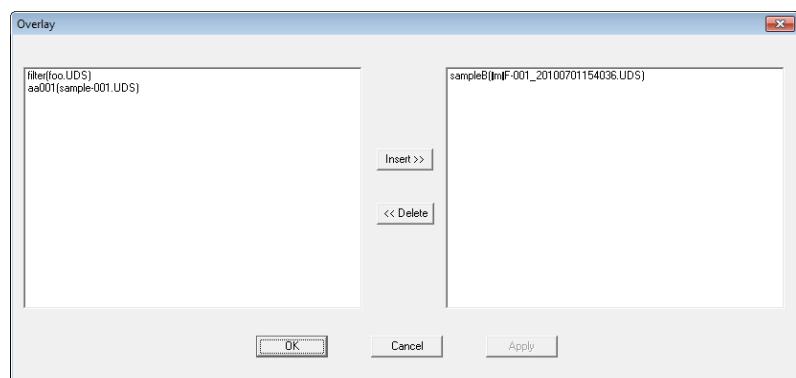
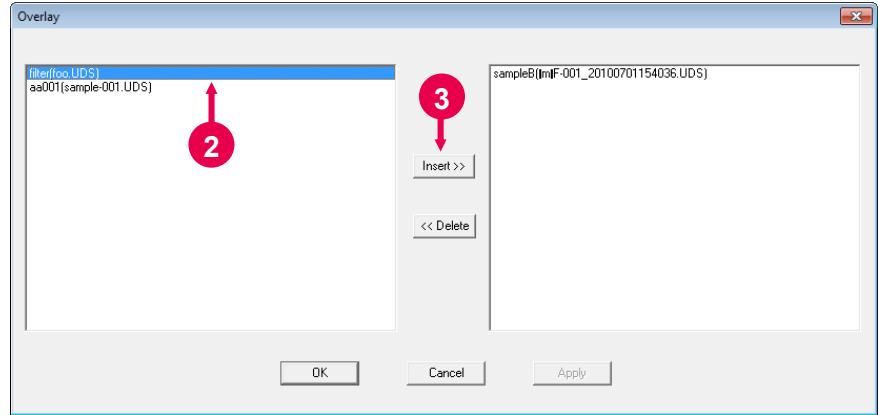


Fig. 5-20

(4) Select a sample name from the left box. The selected sample name will be highlighted in blue (refer to (2) in Fig. 5-21).

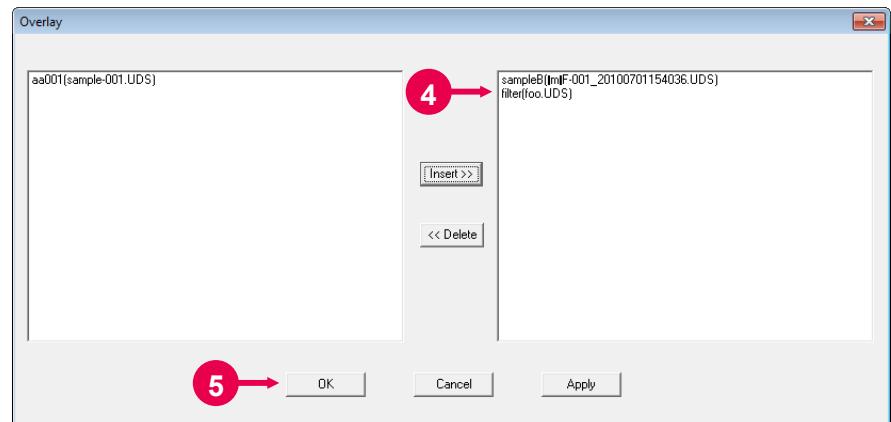
(5) Click the **Insert >>** button (refer to (3) in Fig. 5-21).



**Fig. 5-21**

(6) The selected sample name will be added as shown in Fig. 5-22 (refer to (4) in Fig. 5-22).

(7) Click the **OK** button (refer to (5) in Fig. 5-22).



**Fig. 5-22**

## 5.10 Overlaying Spectra

- (8) Two spectra will be overlaid on the data processing window. At the same time, a dialog box as shown in Fig. 5-23 will appear. Click the **Close** button (refer to (6) in Fig. 5-23).

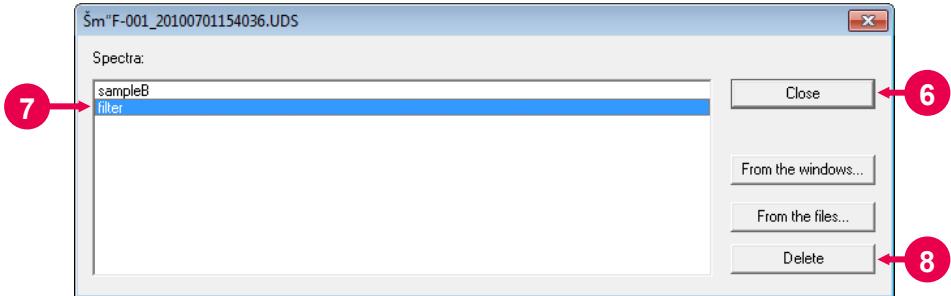


Fig. 5-23

- (9) To delete a spectrum, click the corresponding sample name in the above Spectra list (refer to (7) in Fig. 5-23). When the clicked sample name is highlighted in blue, the **Delete** button becomes active. Click the **Delete** button (refer to (8) in Fig. 5-23).

### 5.10.2 Insertion from File

This method overlays spectra by reading them from the already saved data files.

- (1) Select the Overlay command from the Data menu.
- (2) A dialog box as shown in Fig. 5-24 will appear.

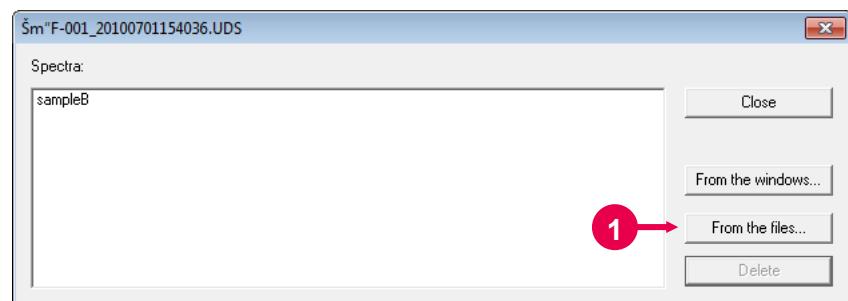
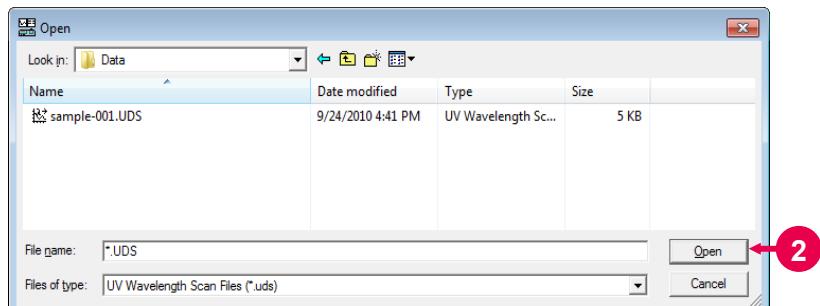


Fig. 5-24

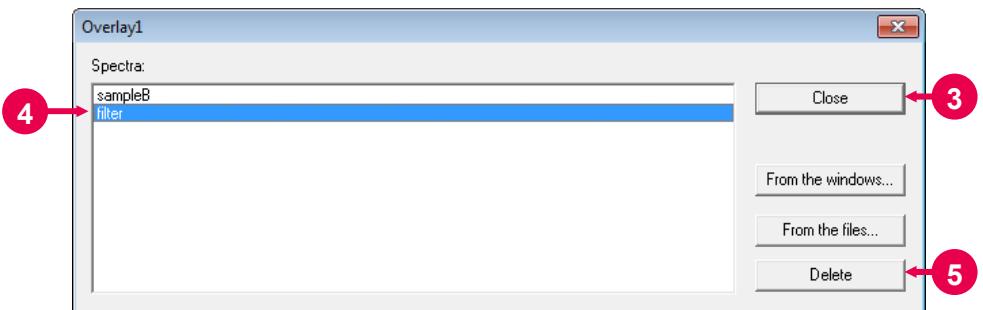
(3) Click the **From the files** button (refer to (1) in Fig. 5-24). A dialog box as shown in Fig. 5-25 will open.

(4) Select a file name for overlaid display and click the **Open** button (refer to (2) in Fig. 5-25).



**Fig. 5-25**

(5) Two spectra will be overlaid on the data processing window. At the same time, a dialog box as shown in Fig. 5-26 will appear. Click the **Close** button (refer to (3) in Fig. 5-26).



**Fig. 5-26**

(6) To delete a spectrum, click the corresponding sample name in the Spectra list (refer to (4) in Fig. 5-26). When the clicked sample name is highlighted in blue, the **Delete** button becomes active. Click the **Delete** button (refer to (5) in Fig. 5-26).

## 5.10 Overlaying Spectra

### 5.10.3 Direct Drag-and-Drop Operation

This method is available when two kinds of spectrum windows (already processed windows) are displayed on the screen as shown in Fig. 5-27.

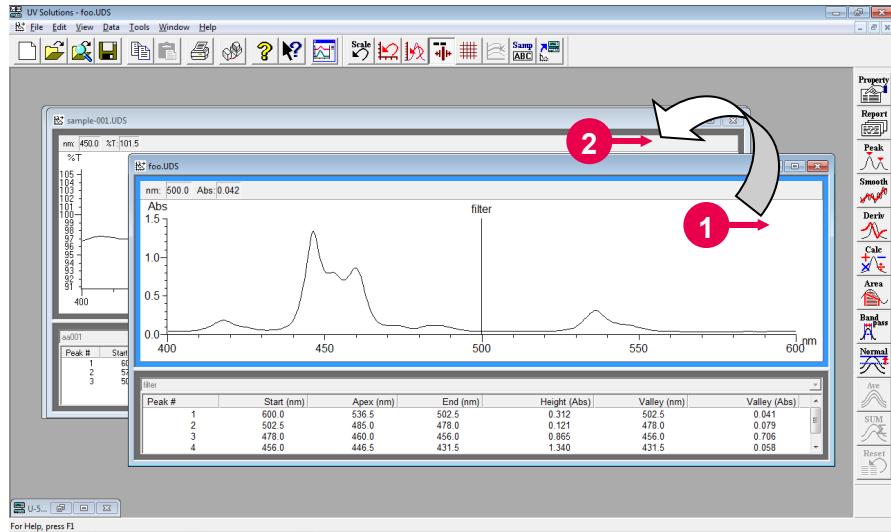


Fig. 5-27

- (1) Drag the navy blue frame for a spectrum in the following procedure (refer to (1) in Fig. 5-27).  
Move the arrow mouse pointer to the navy blue frame.  
Click the left button of the mouse. The mouse pointer will change to
- (2) With the left mouse button held down, bring the mouse pointer onto a spectrum to be overlaid (refer to (2) in Fig. 5-27). When the mouse pointer changes as shown in Fig. 5-28, drop the mouse (release the left mouse button).

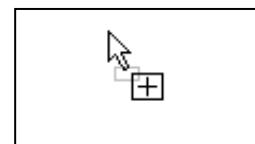


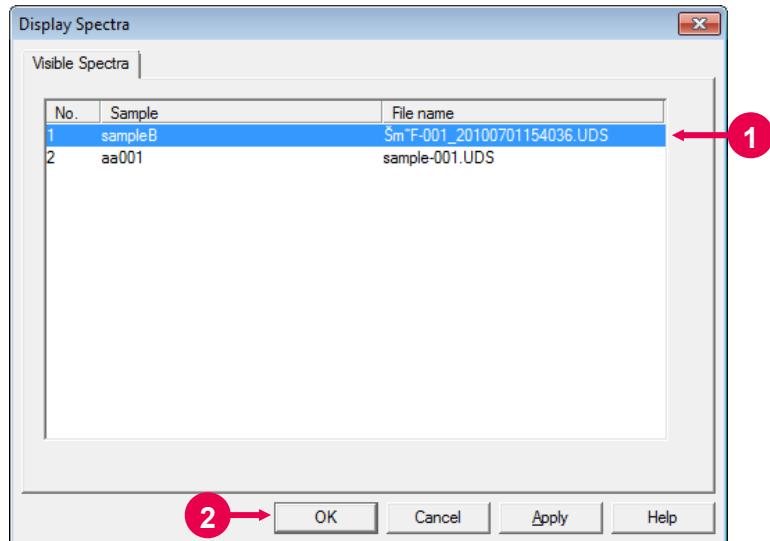
Fig. 5-28

Open files as in 5.10.3, click a spectrum to be overlaid and press [Ctrl] + [C] on the keyboard or select the Copy command from the Edit menu. Click the spectrum on which overlaying is desired and paste the first spectrum by [Ctrl] + [V] to complete overlaying.

#### 5.10.4 Selection of Spectra from Overlay Window

This method allows you to display only the spectra selected from overlaid ones.

- (1) Click the  (Visible Spectra) button on the Spectrum toolbar. A dialog box as shown in Fig. 5-29 will appear.
- (2) Select a desired sample name from the Visible Spectra list. The selected sample name will be highlighted in blue (refer to (1) in Fig. 5-29).  
(Multiple spectra are selectable by clicking the left button of the mouse on the sample name while holding down the Shift key.)
- (3) Click the **OK** button (refer to (2) in Fig. 5-29).
- (4) Only the selected spectra will be displayed on the spectrum window. In this example, spectrum No. 1 will be displayed. Printing is made according to the settings on the Report tab page of the Spectrum Properties window.



**Fig. 5-29**

## 5.11 Arithmetic Operation between Spectra

### 5.11 Arithmetic Operation between Spectra

Open data files for arithmetic operation between spectra.

Then, click the  (Arithmetic) button on the Data Process toolbar (or select the Arithmetic command from the Data menu).

The Spectral Arithmetic window will open as shown in Fig. 5-30.

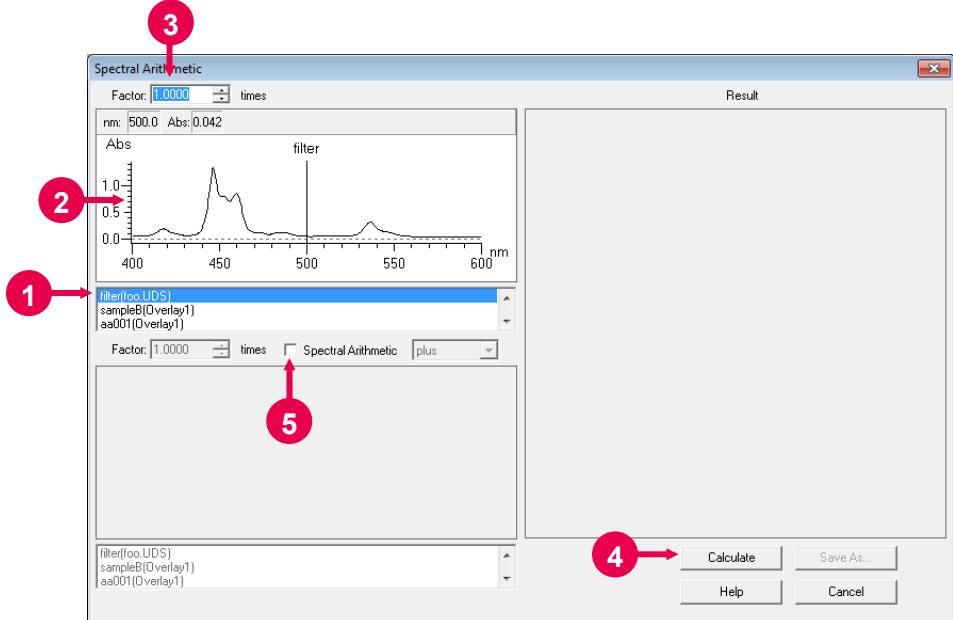


Fig. 5-30

- (1) Sample name indication area. The sample names for the files opened in the window (file names in parentheses) are listed. From this list, select a file for arithmetic operation (refer to (1) in Fig. 5-30).
- (2) The spectrum selected in step (1) is displayed (refer to (2) in Fig. 5-30).
- (3) Set a factor for the spectrum selected in step (1) (refer to (3) in Fig. 5-30).  
Input range: 0.0001 to 100.0000
- (4) For multiplying the spectrum by the factor, click the **Calculate** button (refer to (4) in Fig. 5-30).
- (5) For arithmetic operation between two spectra, put a check mark at "Spectral Arithmetic" (refer to (5) in Fig. 5-30).

- (6) Another sample name indication area for arithmetic operation between spectra. The sample names for the files opened in the window (file names in parentheses) are listed. From this list, select another file for arithmetic operation (refer to (6) in Fig. 5-31).
- (7) The spectrum selected in step (6) is displayed (refer to (7) in Fig. 5-31).

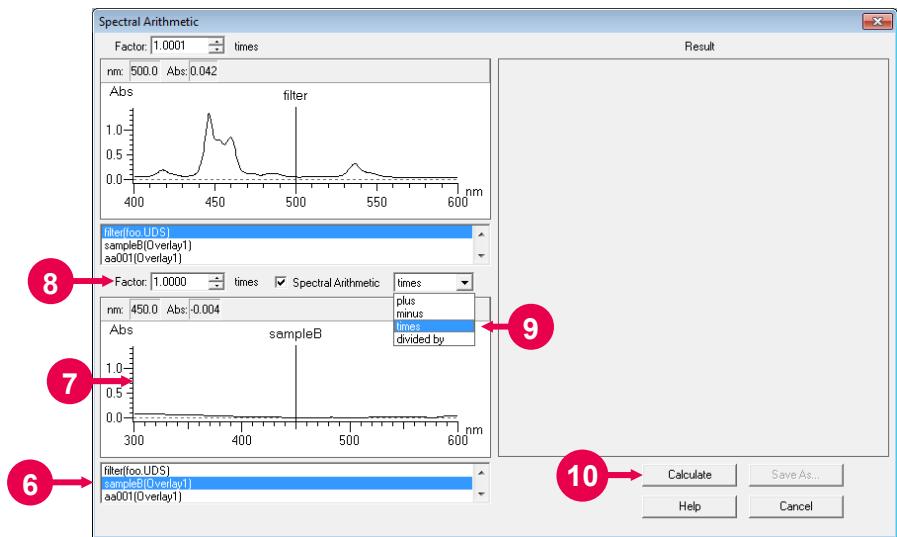


Fig. 5-31

- (8) Set a factor for the spectrum selected in step (6) (refer to (8) in Fig. 5-31).  
Input range: 0.0001 to 100.0000
- (9) Select a mathematical operator for the two spectra (refer to (9) in Fig. 5-31).  
plus: Addition, minus: Subtraction, times: Multiplication, divided by: Division
- (10) After setting of a mathematical operator, click the **Calculate** button (refer to (10) in Fig. 5-31).

## 5.11 Arithmetic Operation between Spectra

- (11) The result of arithmetic operation is displayed as shown in Fig. 5-32 (refer to (11) in Fig. 5-32).

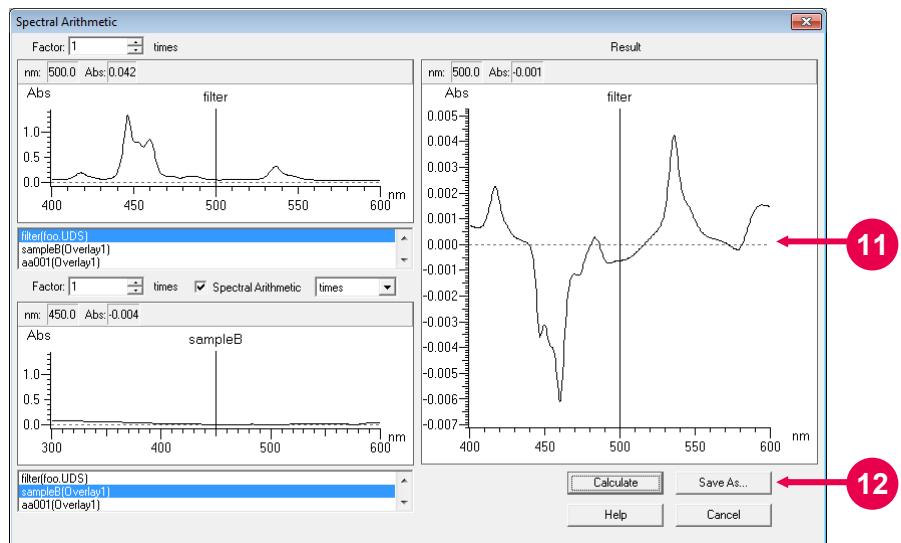


Fig. 5-32

- (12) Click the **Save As** button to save the result of calculation as a file (refer to (12) in Fig. 5-32).

## 5.12 Calculating Peak Area

For a spectrum displayed at present, you can obtain the peak area value by integration in the specified range.

Click the  button on the Data Process toolbar (or select the Calculation Area command from the Data menu). A window as shown in Fig. 5-33 will appear.

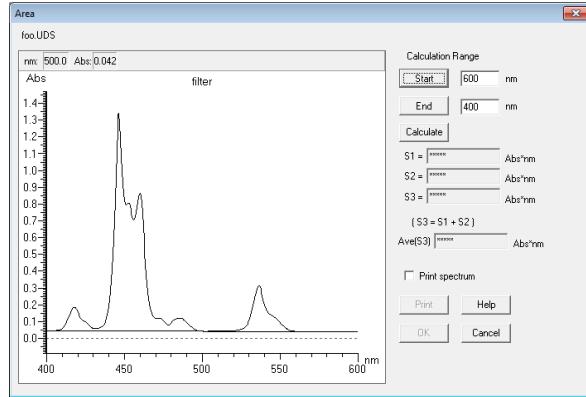


Fig. 5-33

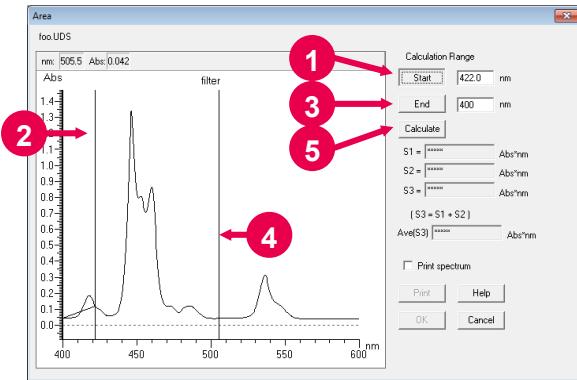
### 5.12.1 Setting of Calculation Range

The range for area calculation is settable in the following two ways.

#### (1) Setting by Moving Cursor

- 1) Click the **Start** button (refer to (1) in Fig. 5-34). Move the trace cursor to a desired start wavelength on the spectrum (refer to (2) in Fig. 5-34), and then click the right button of the mouse.
- 2) Click the **End** button (refer to (3) in Fig. 5-34). Move the trace cursor to a desired end wavelength on the spectrum (refer to (4) in Fig. 5-34), and then click the right button of the mouse.
- 3) Click the **Calculate** button (refer to (5) in Fig. 5-34). The result of calculation will be displayed.

## 5.12 Calculating Peak Area

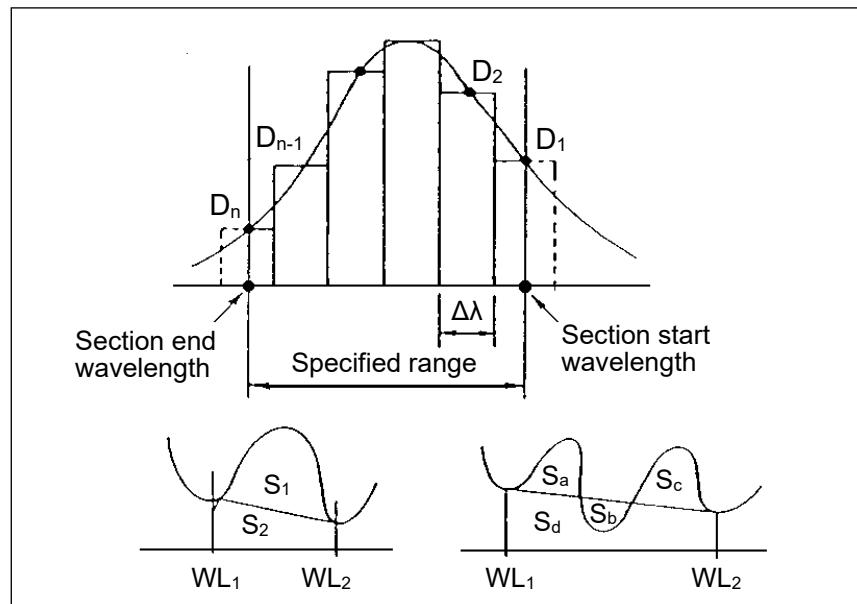


**Fig. 5-34**

(2) Setting by Entering Numerical Value

- 1) Enter a desired start wavelength in the Start input box from the keyboard.
- 2) Enter a desired end wavelength in the End input box from the keyboard.
- 3) Click the **Calculate** button. The result of calculation will be displayed.

(3) The principle of calculation is shown below.



**Fig. 5-35 Principle of Calculation**

The peak area is calculated using the spectral elements ( $D_1$  to  $D_n$ ) as follows.

$$\begin{aligned} S_3 &= S_1 + S_2 = S_a + S_c + S_d \\ &= \{D_2 + D_3 + \dots + D_{n-2} + D_{n-1} + (D_1 + D_n)/2\} * \Delta\lambda \\ S_2 &= S_b + S_d \\ &= [(D_1 + D_n) * \{\Delta\lambda * (n - 1)\}] / 2 \\ &= [(D_1 + D_n) * \{\text{section start wavelength (WL}_2\} - \\ &\quad \text{section end wavelength (WL}_1)\}] / 2 \\ S_1 &= S_3 - S_2 \end{aligned}$$

$D_1$ : Spectral data at section start wavelength

$D_n$ : Spectral data at section end wavelength

$\Delta\lambda$ : Sampling interval

For the time scan mode, change as follows.

Start wavelength (WL<sub>2</sub>) → End time (T<sub>2</sub>)

End wavelength (WL<sub>1</sub>) → Start time (T<sub>1</sub>)

### 5.12.2 Printing of Calculation Result

The result of area calculation can be printed out.

- (1) For printing both the spectrum and calculation result, put a check mark at "Print spectrum" (refer to (1) in Fig. 5-36). To avoid spectrum printing, remove the check mark.
- (2) Click the **Print** button to start printing (refer to (2) in Fig. 5-36). Upon execution of printing, the Area window will close. The same window can be called up by clicking the  (Area) button on the Data Process toolbar.

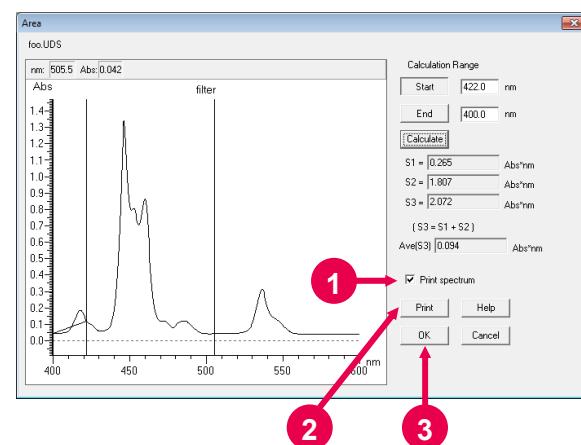
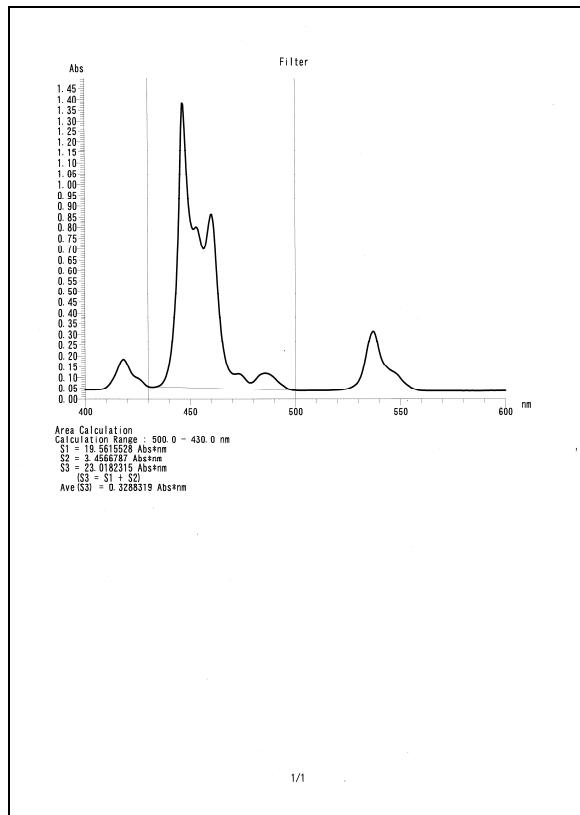


Fig. 5-36

## 5.12 Calculating Peak Area



**Fig. 5-37 Example of Printout  
(with “Print spectrum” selected)**

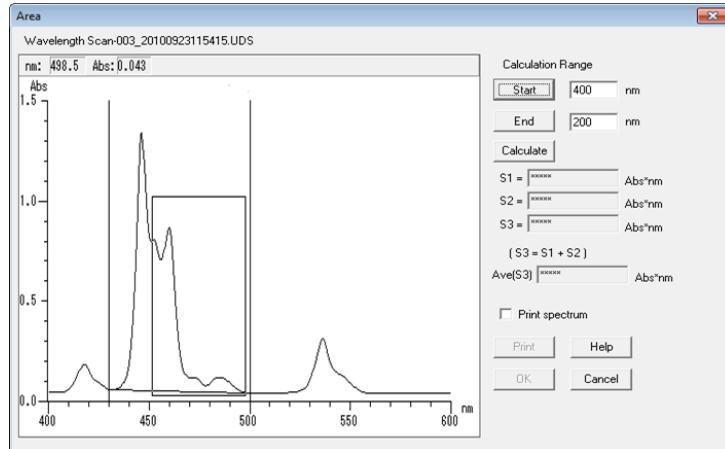
- (3) After calculation, click the **OK** button (refer to (3) in Fig. 5-36). The Area window will close with the result saved.
- (4) The calculation result is reset by clicking the  (Reset Data) button on the Data Process toolbar with the data processing window displayed. Upon calling up the Area window again, therefore, “\*\*\*\*\*” will be indicated in each result box.

**NOTE:** Upon execution of file saving after area calculation, the result is also saved in a file. So a numerical value is indicated in each result box when the Area window is called up. These values cannot be erased by clicking the reset button, because they are saved in the computer.

### 5.12.3 Expansion of Scale

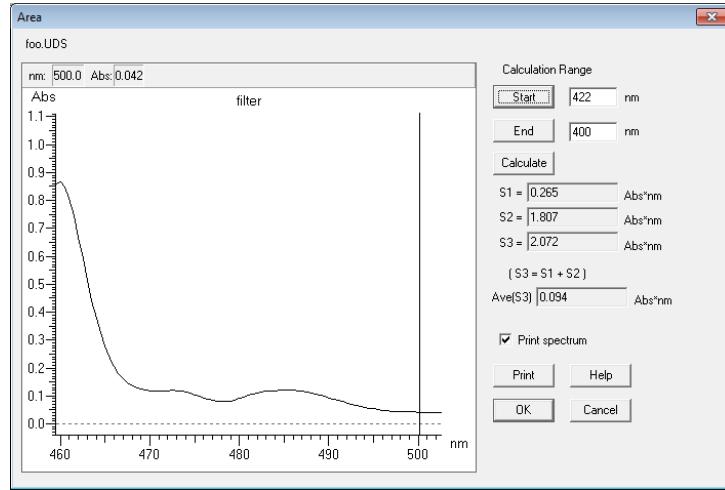
For expanding the scale in the Area window, use the left button of the mouse.

- (1) To specify the area to be expanded, draw a rectangle on the spectrum by moving the mouse with its left button held down as shown in Fig. 5-38.



**Fig. 5-38**

- (2) Then release the left button. The specified area will be expanded as shown in Fig. 5-39.



**Fig. 5-39**

- (3) For returning to the original scale, double-click the left button on the spectrum.

## 5.13 Transferring Data to Microsoft Excel

### 5.13 Transferring Data to Microsoft Excel

Measured data can be transferred to a worksheet of Microsoft Excel in the following procedure.

- (1) Click the  (Properties) button and select the Report tab. A tab page as shown in Fig. 5-40 will appear. Select “Use Microsoft Excel” for Output. Also select data to be transferred (peak table, data listing, etc. in wavelength scan mode). Then click the **OK** button.

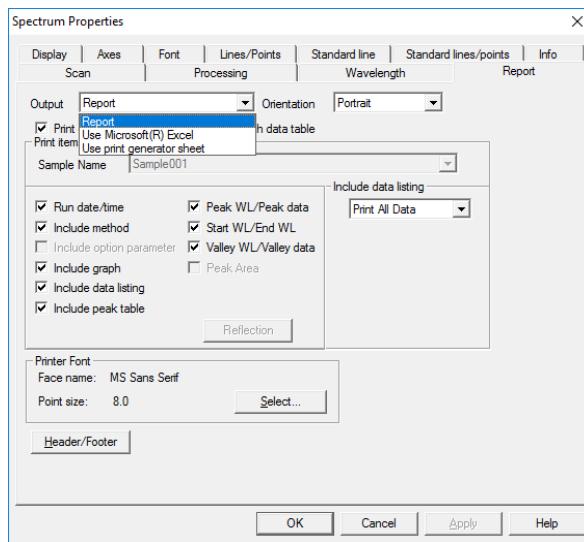


Fig. 5-40

- (2) Click the  (Report) button. Microsoft Excel will automatically start to read data if it is installed on the PC. The subsequent procedure concerns the Microsoft Excel operation.

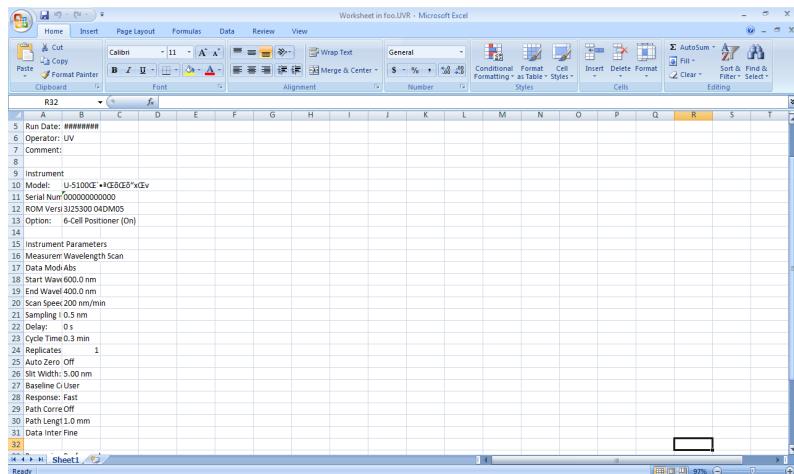
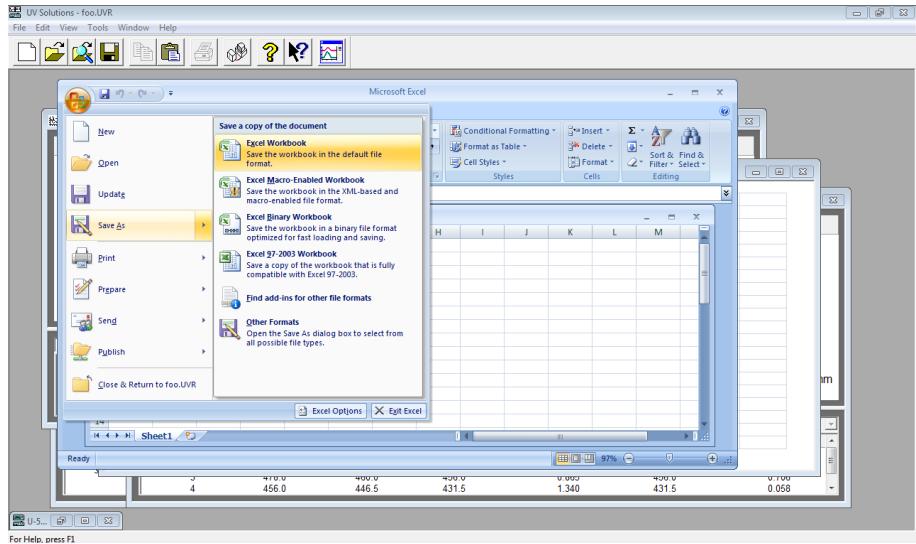


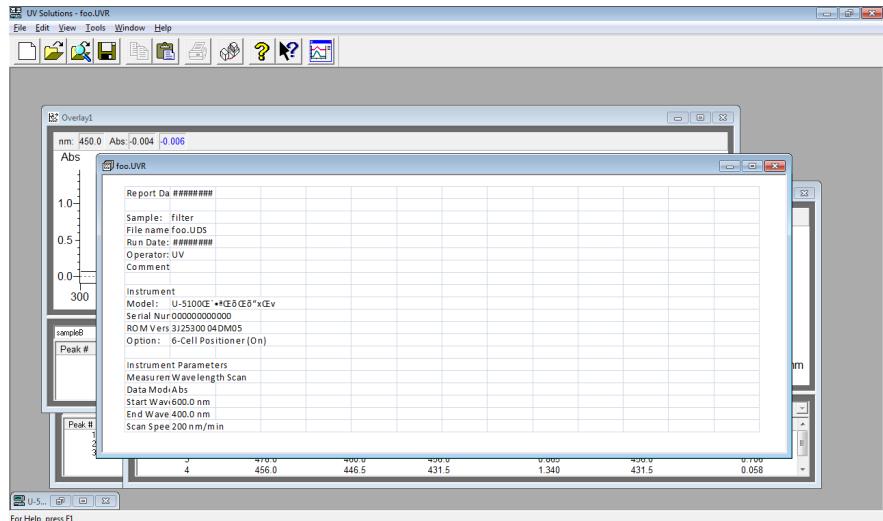
Fig. 5-41

- (3) Select [Office button]-[Save Copy As]-[Excel Book] or [Office button]-[Save Copy As]-[Excel 97-2003 Book], and then enter a file name. Data can now be saved with extension code “.xlsx” or “.xls” of Microsoft Excel.



**Fig. 5-42**

- (4) Upon closing Microsoft Excel, a window as shown in Fig. 5-43 appears. Now close this window. The original data processing window will reappear.



**Fig. 5-43**

## 5.14 Pasting Spectrum to Microsoft Word

### 5.14 Pasting Spectrum to Microsoft Word

A spectrum can be pasted to a Microsoft Word text as it is by taking the following procedure.

- (1) Click the spectrum in the data processing window of UV Solutions 4.1 program to make it active. The thick frame will change to blue.
- (2) Select the Copy command from the Edit menu.
- (3) Open a Microsoft Word text and right-click the position for pasting. Then select the Paste command from the Edit menu. The spectrum will be pasted to the Microsoft Word text.

The peak table and kinetics data can also be pasted to a Microsoft Word text in the same way as above. In this case, they are pasted as a text.

Upon right-clicking the spectrum pasted to a Microsoft Word text after double-clicking it with the UV Solutions 4.1 program closed, a window as shown in Fig. 5-44 will appear to enable scale change and gridline indication.

Upon double-clicking the spectrum pasted to a Microsoft Word text with the UV Solutions 4.1 program opened, system control will shift to a window of UV Solutions program 4.1 to enable scale change and gridline indication on the UV Solutions program.

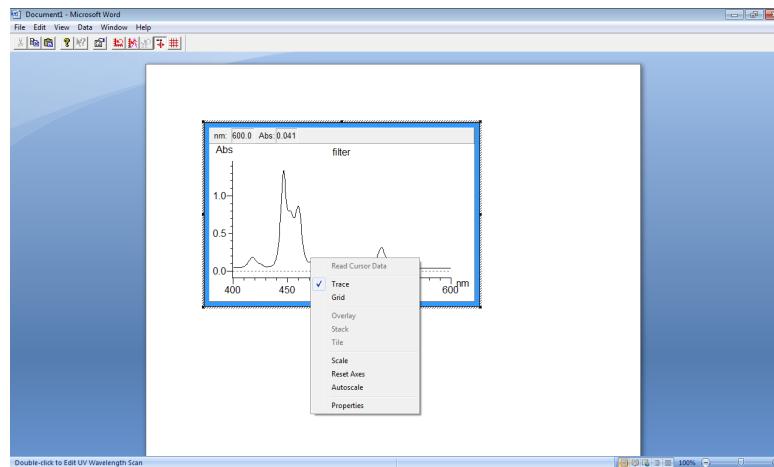


Fig. 5-44 Spectrum Pasted to Microsoft Word

**NOTE:** Editing in Microsoft Word is effective on a PC in which Microsoft Word and UV Solutions program are both installed.

## 5.15 Pasting Spectrum to Microsoft Excel

A spectrum can be pasted to Microsoft Excel as it is by taking the following procedure.

- (1) Click the spectrum in the data processing window to make it active. The thick frame will change to blue.
- (2) Select the Copy command from the Edit menu.
- (3) Open Microsoft Excel and select “Paste Special” from its Edit menu. A dialog box as shown in Fig. 5-45 will appear. Make sure that “UV Wavelength Scan Object” is indicated in the As field.

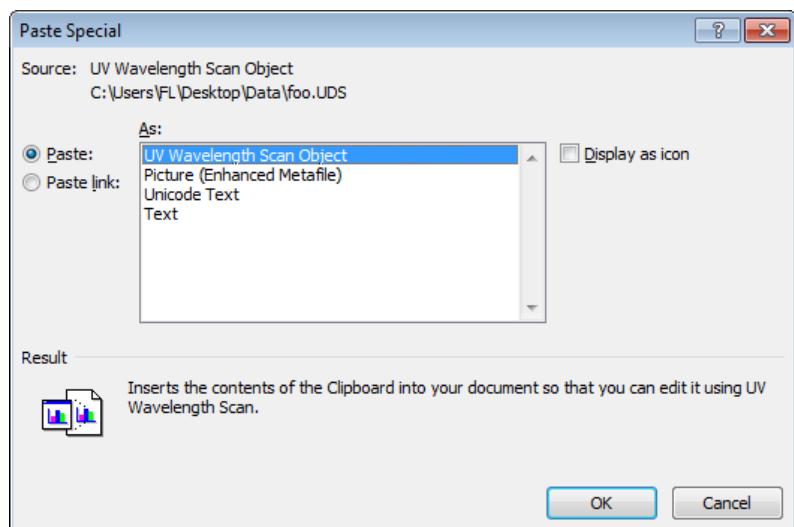


Fig. 5-45

- (4) Click the **OK** button. The spectrum will be pasted to Microsoft Excel.

The peak table and kinetics data can also be pasted to Microsoft Excel in the same way as above. In this case, they are pasted as data for each cell.

## 5.16 Converting Data into ASCII Text File

### 5.16 Converting Data into ASCII Text File

A file conversion function is provided for data processing with spreadsheet software. Conversion can be made into the following three data files.

- JCAMP-DX Files (\*.dx)
- ASCII Text Files (\*.txt)
- Graph Meta Files (\*.wmf)

**NOTES:**

1. The date/time, analysis method and data list (raw data) will be converted into a JCAMP-DX file.
2. The items selected on the Report tab page of the Spectrum Properties window are converted into an ASCII text file.

- (1) Load a data file for text conversion and open the data processing window (refer to 5.1).
- (2) Click the Save As command in the File menu.
- (3) A dialog box as shown in Fig. 5-46 will open. Select “ASCII Type1 files (\*.txt)” in the “Save as type” field.

For converting a file containing overlaid spectra into an ASCII text file, select “ASCII Type1 files (\*.txt)” or “ASCII Type2 files (\*.txt)”. (For details, refer to 5.17.)

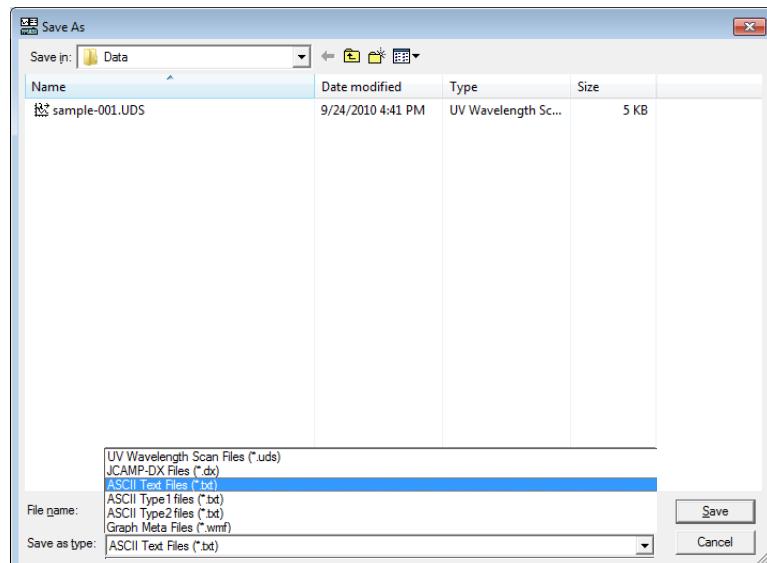
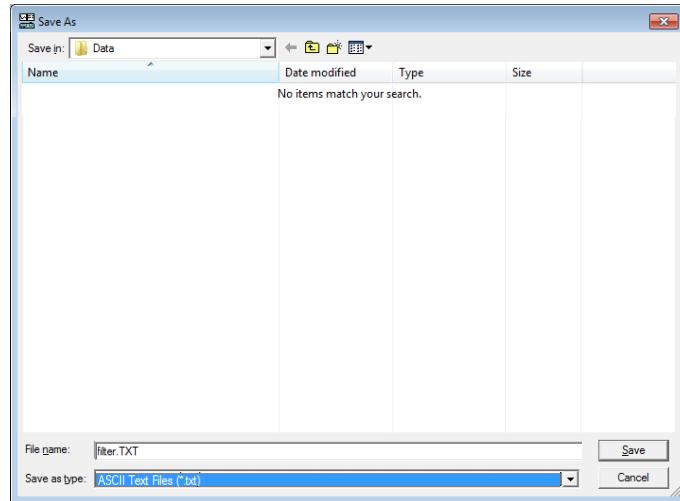


Fig. 5-46

- (4) Specify a folder for saving, enter a file name and click the **Save** button.



**Fig. 5-47**

File conversion is effective for a data file in any measurement mode. The selected data is separated by tab.

## 5.17 Converting Overlaid Spectra into ASCII File

### 5.17 Converting Overlaid Spectra into ASCII File

A file conversion function is provided for processing of overlaid spectral data with spreadsheet software. Conversion can be made to the following two ASCII formats.

- ASCII Type1 files (\*.txt)
- ASCII Type2 files (\*.txt)

**NOTE:** The items selected on the Report tab page of the Spectrum Properties window are converted into an ASCII type 1 file or ASCII type 2 file. Note that the instrument conditions are not output when the ASCII type 2 file is selected.

- (1) Load a data file for text conversion and open the data processing window (refer to 5.1).
- (2) Click the Save As command in the File menu.
- (3) A dialog box as shown in Fig. 5-48 will open. Select either file below in the “Save as type” field.
  - ASCII Type1 files (\*.txt)
  - ASCII Type2 files (\*.txt)

For a single spectrum, select “ASCII Type1 files (\*.txt)”.

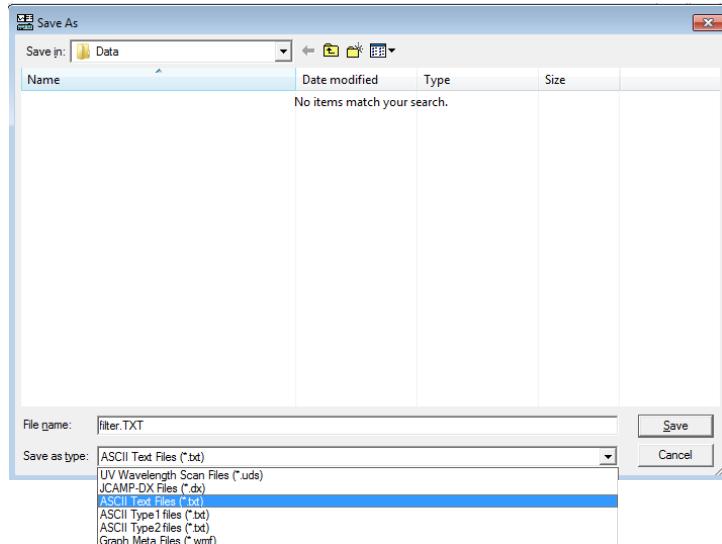


Fig. 5-48

### <Output Format of ASCII Type 1 File>

For a file containing overlaid spectra, a set of item name and data will be laid out in two columns and saved as text data.

Upon opening a saved text data file in Microsoft Excel, the data will be arranged in each cell in the following format.

1st spectral data		2nd spectral data		3rd spectral data	
Item name	Data	Item name	Data	Item name	Data

Figure 5-49 shows an example of opening the text data file saved as an ASCII type 1 file in Microsoft Excel.

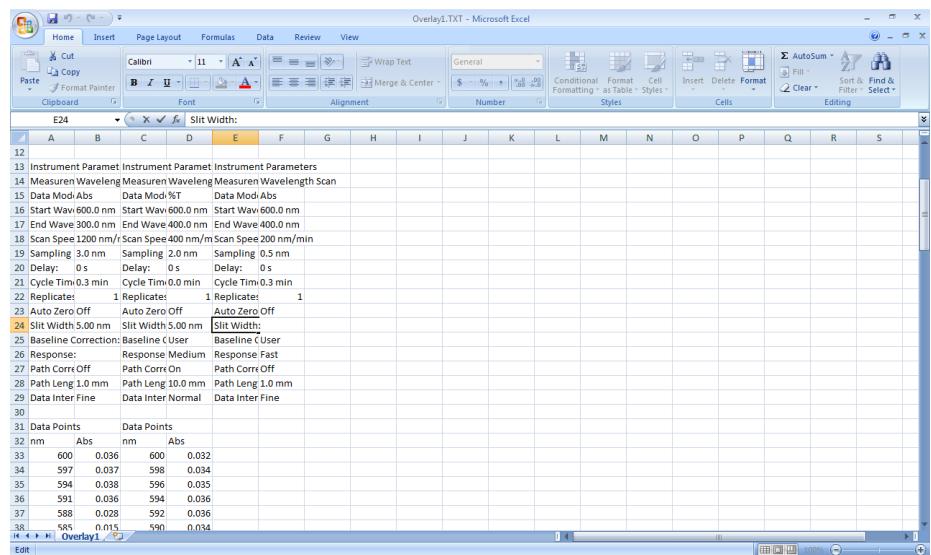


Fig. 5-49

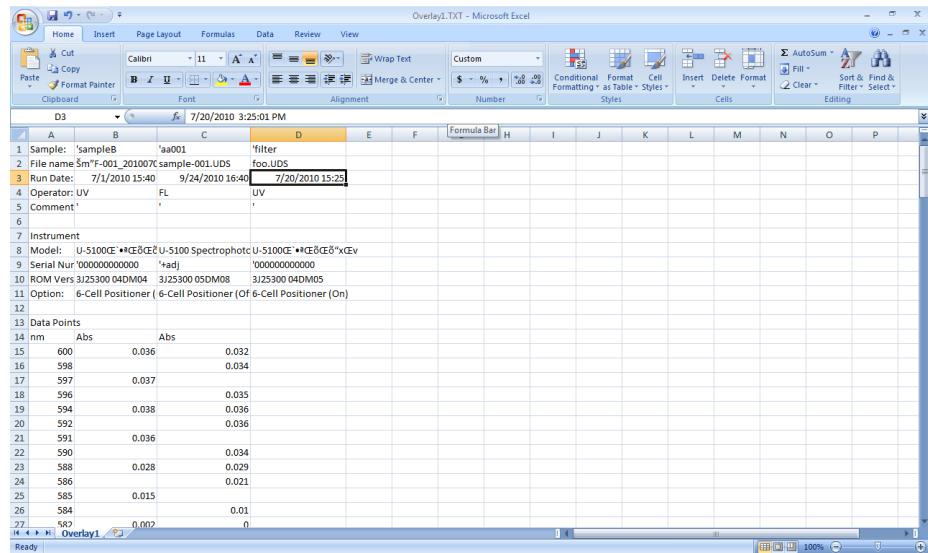
## 5.17 Converting Overlaid Spectra into ASCII File

<Output Format of ASCII Type 2 File>

For a file containing overlaid spectra, the item name will be laid out in the leftmost column and spectral data in each column and saved as text data. Upon opening a saved text data file in Microsoft Excel, the data will be arranged in each cell in the following format.

Item name	1st spectral data	2nd spectral data	3rd spectral data
-----------	-------------------	-------------------	-------------------

Figure 5-50 shows an example of opening the text data file saved as an ASCII type 2 file in Microsoft Excel.

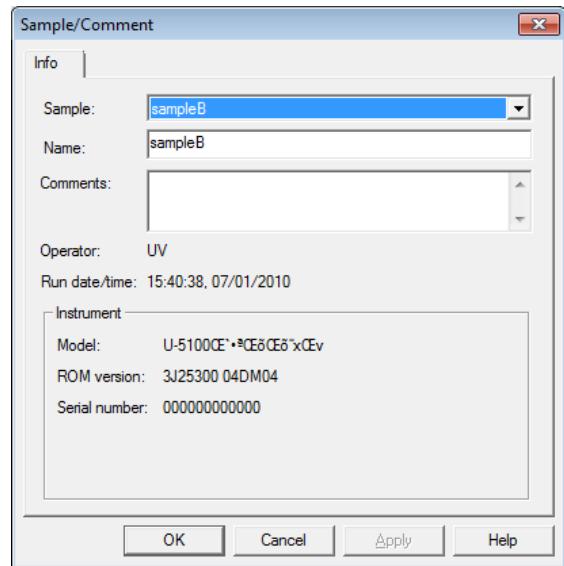


**Fig. 5-50**

## 5.18 Renaming a Sample

After measurement, you can change the sample name of saved data. Call up the Info tab page and rename your sample in the following procedure.

- (1) Open a data file for renaming (refer to 5.1).
- (2) Click the  (Edit Sample/Comment) button on the Spectrum toolbar. A dialog box for input of a sample name/comment will appear. The dialog box includes the Info tab.
- (3) Or click the  (Properties) button on the Data Process toolbar. The Spectrum Properties window will open. Click the Info tab. A tab page as shown in Fig. 5-51 will appear.  
(You can also open the Spectrum Properties window by selecting the Properties command from the Edit menu.)



**Fig. 5-51**

- (4) Enter a new sample name in the Name field and click the **OK** button.
- (5) To save data under the new sample name, click the  (Save) button on the Standard toolbar for overwriting, and select the Save As command from the File menu for saving under a new file name.

## 5.19 Printing Wavelength and Photometric Value on Display

### 5.19 Printing Wavelength and Photometric Value on Display

This program provides a function for reading data such as presently displayed wavelength and photometric value, traced value on the data processing window, etc. The data can also be printed.

#### 5.19.1 Reading and Printing of Presently Displayed Wavelength and Photometric Value

Take the following procedure with the monitor window displayed.

- (1) Select the Read Data command from the Tools menu (refer to (1) in Fig. 5-52).

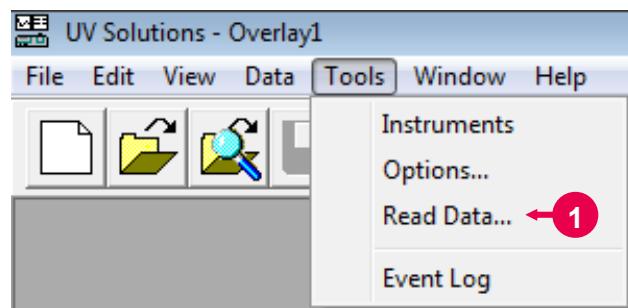


Fig. 5-52

- (2) The Read Data box will appear as shown in Fig. 5-53. Drag the title area (blue) at the top of the box to the lower right (refer to (2) in Fig. 5-53).

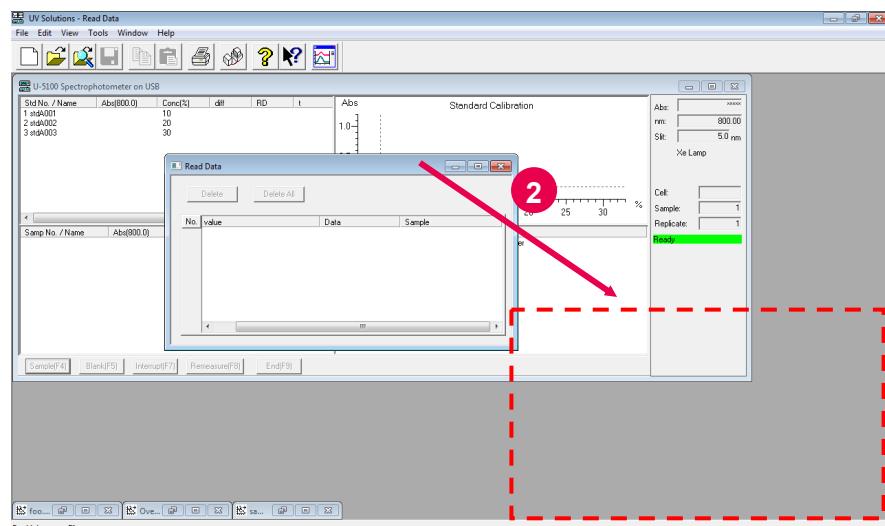
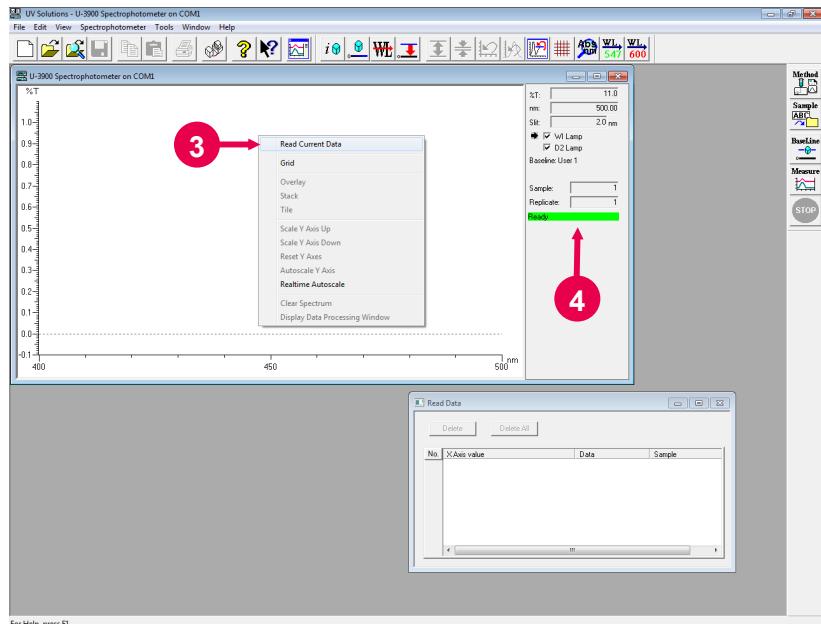


Fig. 5-53

- (3) Bring the mouse pointer onto the measurement window and click the right button of the mouse. A menu box will appear. Select “Read Current Data” from the menu box (refer to (3) in Fig. 5-54). The photometric value and data value will be read into the Read Data box.

Upon start of data reading, Parameters → Scanning → Ready are displayed sequentially in the message display area (refer to (4) in Fig. 5-54).



**Fig. 5-54**

- (4) The integration time for data reading is usually set at 2.0 seconds. To change the time, select the Options command from the Tools menu. In the Options window, select the Integration Time tab (refer to (5) in Fig. 5-55). A tab page as shown in Fig. 5-55 will appear to enable setting change.

**NOTE:** With the U-5100, the function of changing the integration time for data reading is ineffective.

## 5.19 Printing Wavelength and Photometric Value on Display

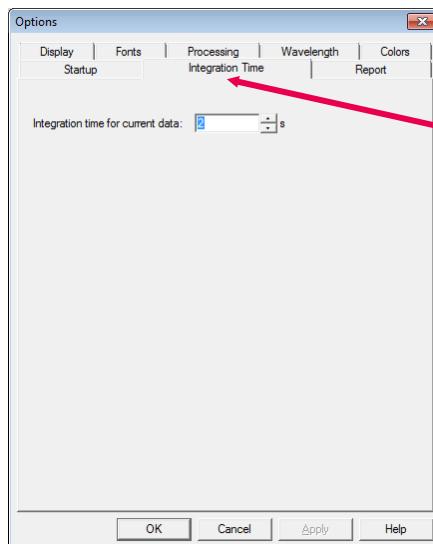


Fig. 5-55

- (5) In data reading, sample name information is also indicated. Sample names can be input. For input, click the Sample column (refer to (6) in Fig. 5-56).

The screenshot shows the 'Read Data' dialog box with a table of data. The columns are labeled 'No.', 'X Axis value', 'Data', and 'Sample'. There are four rows of data. Row 4 is highlighted with a blue selection bar. A red circle labeled '6' points to the 'aa001' entry in the 'Sample' column of row 4. A red circle labeled '7' points to the 'Delete All' button. A red circle labeled '8' points to the 'Delete' button.

No.	X Axis value	Data	Sample
1	534.0nm	97.2%T	aa001
2	514.0nm	101.3%T	aa001
3	446.0nm	101.1%T	aa001
4	445.0nm	101.1%T	aa001

Fig. 5-56

- (6) Read data can be deleted. To delete a data value from the table, click the relevant No. (refer to (7) in Fig. 5-56). Then click the **Delete** button (refer to (8) in Fig. 5-56). A dialog box as shown in Fig. 5-57 will appear. Click the **Yes** button (refer to (9) in Fig. 5-57), and the data value will be deleted.

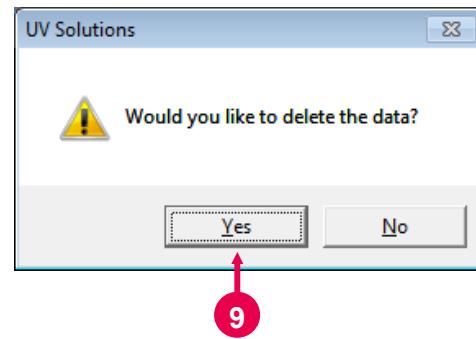


Fig. 5-57

- (7) To delete all data values, click the **Delete all** button.
- (8) For printing the relevant data, click the  (Print) button on the Standard toolbar (or select the Print command from the File menu).

## 5.19 Printing Wavelength and Photometric Value on Display

### 5.19.2 Reading and Printing of Wavelength and Photometric Value from Data Processing Window

The wavelength value and data value can be read and printed from the data processing window.

- (1) Open a data file (refer to 5.1).

**NOTE:** Avoid maximizing the opened data file. With this function, two windows are displayed at the same time. If one window is maximized, the other cannot be displayed.

- (2) Select the Read Data command from the Tools menu.
- (3) The Read Data box will appear as shown in Fig. 5-58. Drag the title area (blue) at the top of the box to the lower right (refer to (1) in Fig. 5-58.)

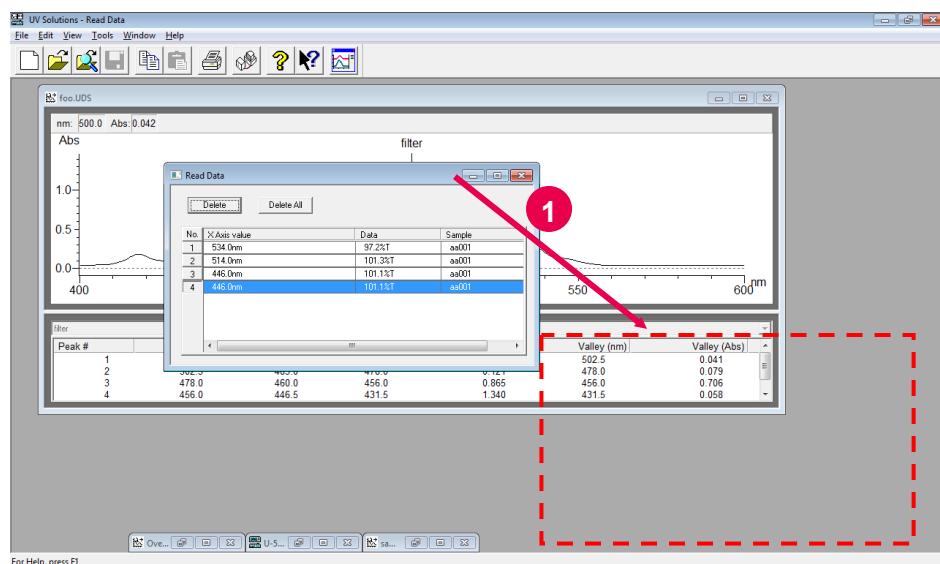


Fig. 5-58

(4) Click the spectrum display window (refer to (2) in Fig. 5-59).

(5) Click the  (Trace) button on the Spectrum toolbar (refer to (3) in Fig. 5-59.) A trace cursor will appear on the spectrum (refer to (4) in Fig. 5-59.)

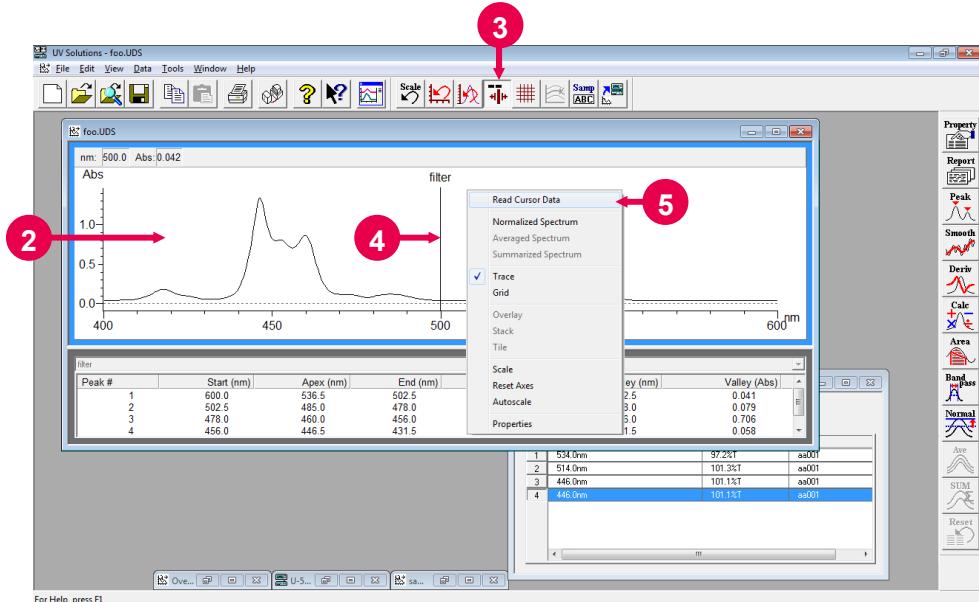


Fig. 5-59

(6) Move the trace cursor to a desired position on the spectrum and click the right button of the mouse. A menu box will appear. Select "Read Cursor Data" from the menu box (refer to (5) in Fig. 5-59). The wavelength and photometric value will be read into the Read Data box.

(7) Upon selection of "Read Cursor Data", display becomes as shown in Fig. 5-60.

(8) In data reading from the data processing window, sample name information is also indicated. Sample names can be edited. For input, click the Sample column (refer to (6) in Fig. 5-60).

The screenshot shows the 'Read Data' dialog box. It contains a table with columns: No., X Axis value, Data, and Sample. The table rows are:

No.	X Axis value	Data	Sample
1	534.0nm	97.2%T	aa001
2	514.0nm	101.3%T	aa001
3	446.0nm	101.1%T	aa001
4	500.0nm	0.042Abs	filter
5	446.0nm	101.1%T	aa001

Callouts point to the 'Delete' button (8), the 'Sample' column header (7), and the selected row (6).

Fig. 5-60

## 5.19 Printing Wavelength and Photometric Value on Display

- (9) The read data can be deleted. To delete a data value from the table, click the relevant No. (refer to (7) in Fig. 5-60). Then click the **Delete** button (refer to (8) in Fig. 5-60). A dialog box as shown in Fig. 5-61 will appear. Click the **Yes** button (refer to (9) in Fig. 5-61), and the data value will be deleted.

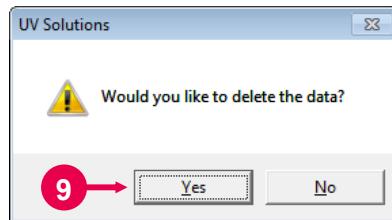


Fig. 5-61

- (10) To delete all data values, click the **Delete All** button.

- (11) For printing the relevant data, click the (Print) button on the Standard toolbar (or select the Print command from the File menu).

## 5.20 Referring to Spectrum Measured in Photometry Mode

When “Peak area”, “Peak height” or “Derivative” is specified for Measurement type in the photometry mode, wavelength scan is carried out and according to the result, a calibration curve is prepared. The spectrum measured in this case can be displayed and printed.

- (1) Open a data file (UV Photometry Files (\*.udq)) (refer to 5.1). A window as shown in Fig. 5-62 will open.

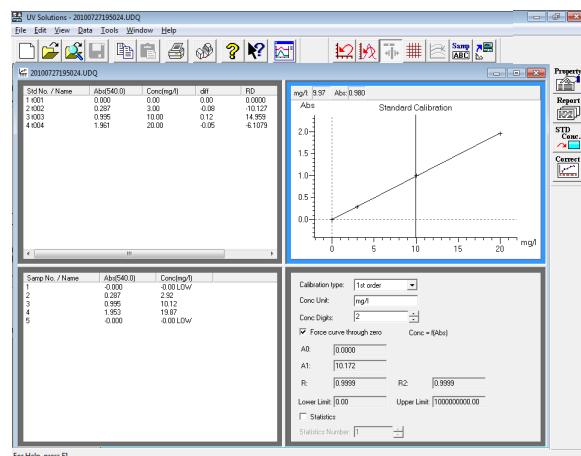


Fig. 5-62

- (2) Right-click the numerical part of the Samp. No./Name column in the sample measurement result indication area (refer to (1) in Fig. 5-63). The **Load Spectrum from Quant Data** button will appear (refer to (2) in Fig. 5-63). The same operation is possible in the area for standards.

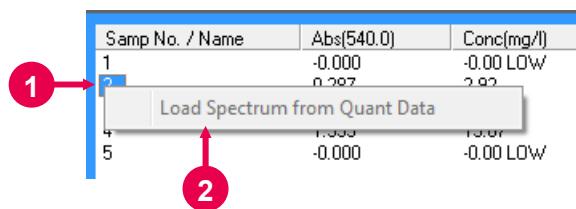


Fig. 5-63

## 5.20 Referring to Spectrum Measured in Photometry Mode

- (3) Click the **Load Spectrum from Quant Data** button.  
A spectrum window as shown in Fig. 5-64 will appear.  
(Or click the numerical part and select the Load Spectrum from Quant Data command from the Data menu.)

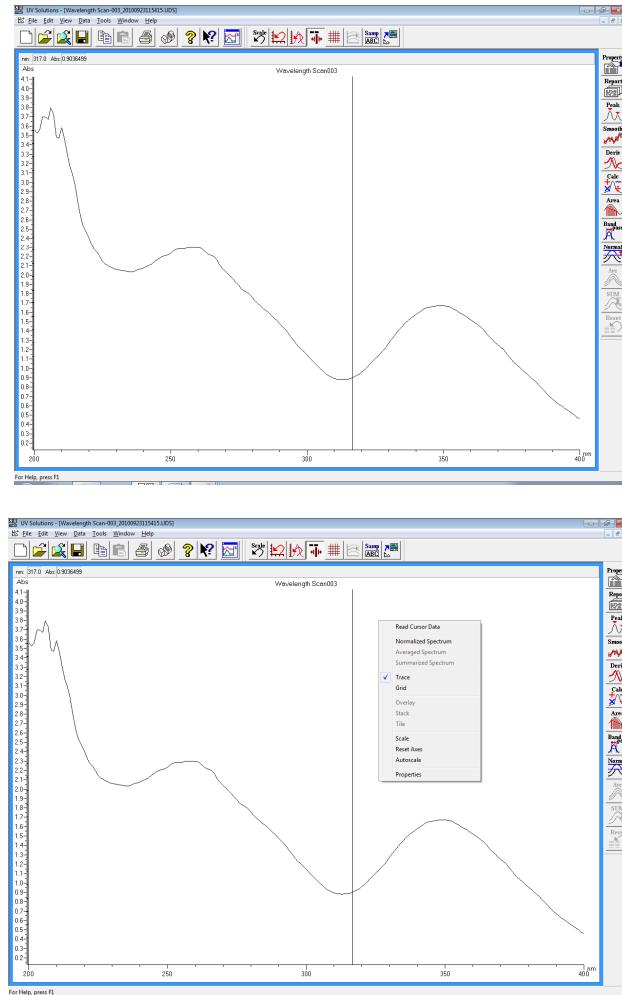


Fig. 5-64

- (4) Upon right-clicking on the displayed spectrum, a menu box will appear. You can also carry out spectrum tracing and scale change.
- (5) The spectrum can be printed by clicking the button (Print) (or by selecting the Print command from the File menu).

## 5.21 Editing Concentration Correction Coefficients for Data in Photometry Mode

You can change the concentration correction coefficients for the data measured by using a sample table in the photometry mode.

**NOTE:** When the data measured without using a sample table in the photometry mode is loaded, the  (Conc correction factor) button is not made active.

- (1) Open a data file (UV Photometry Files (\*.udq)) (refer to 5.1). A window as shown in Fig. 5-65 will open.

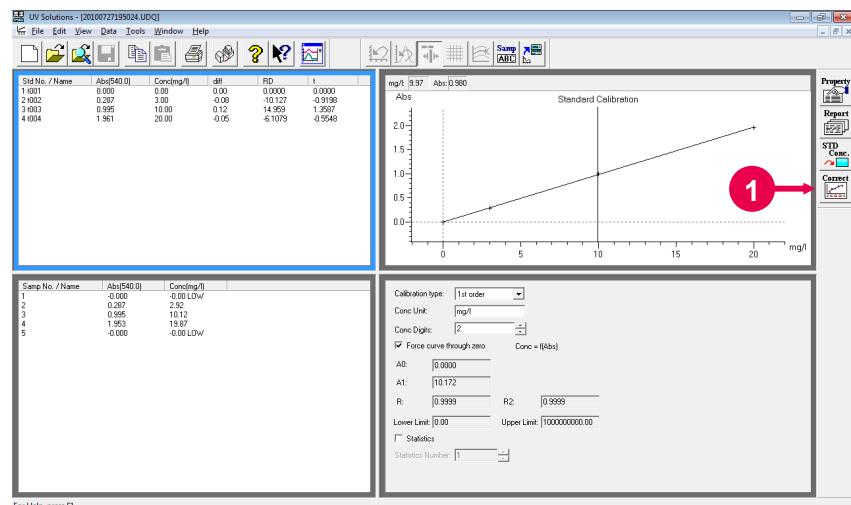
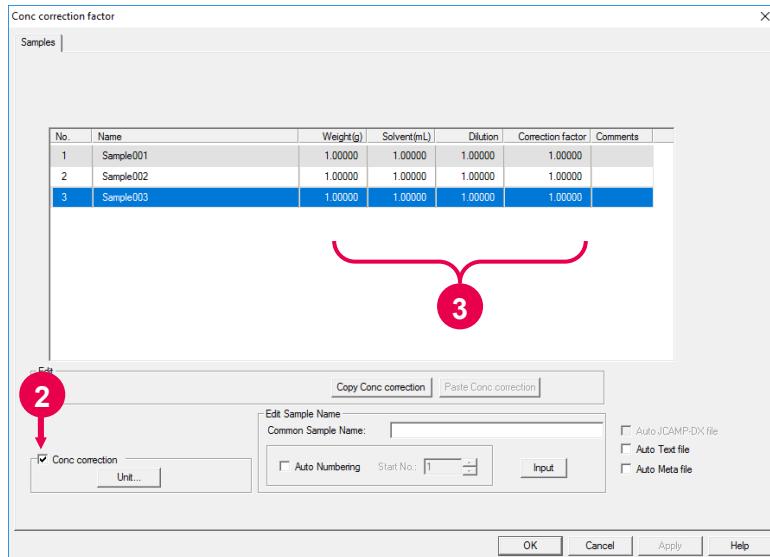


Fig. 5-65

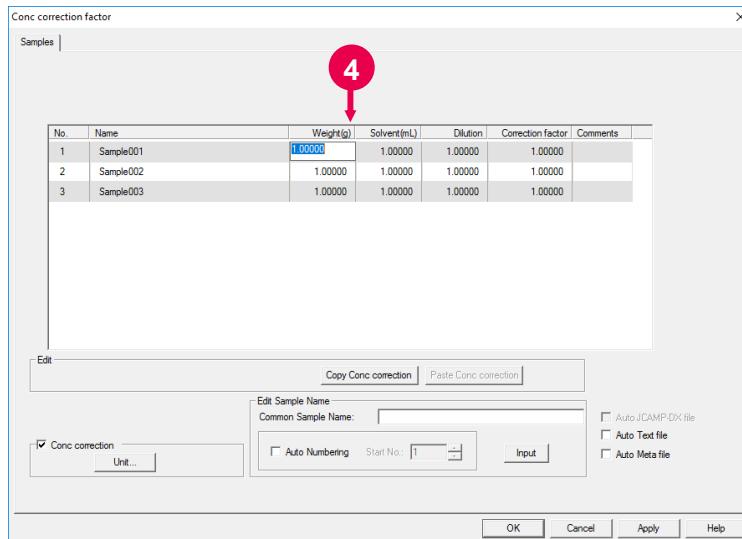
## 5.21 Editing Concentration Correction Coefficients for Data in Photometry Mode

- (2) Click the  (Conc correction factor) button (refer to (1) in Fig. 5-65.) A concentration correction coefficient table will appear. Put a check mark at “Conc correction” if not (refer to (2) in Fig. 5-66). Weight, Solvent, Dilution and Correction factor are indicated (refer to (3) in Fig. 5-66).



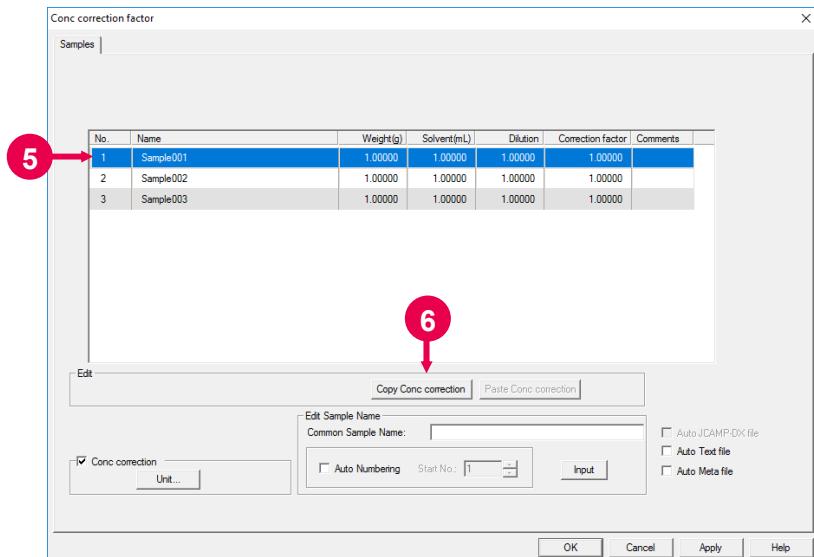
**Fig. 5-66**

- (3) Click a column for change and enter a numerical value. Input range is 0.000001 to 999999 (up to 6 significant digits) (refer to (4) in Fig. 5-67).



**Fig. 5-67**

- (4) After change of the concentration correction coefficients for one line, you can copy the line to another one. After change for the line of Weight: 5, Solvent: 5 and Dilution: 50 in Fig. 5-68, click the copy-source line No. to make the line active (refer to (5) in Fig. 5-68).



**Fig. 5-68**

Click the **Copy Conc correction** button (refer to (6) in Fig. 5-68.) The **Paste Conc correction** button will become active.

- (5) Select a leading line for collective input of the concentration correction coefficients by clicking the corresponding No. in the concentration correction coefficient table.  
While holding down the Ctrl key, click the Nos. for sample name setting to select multiple lines (refer to (7) in Fig. 5-69).

## 5.21 Editing Concentration Correction Coefficients for Data in Photometry Mode

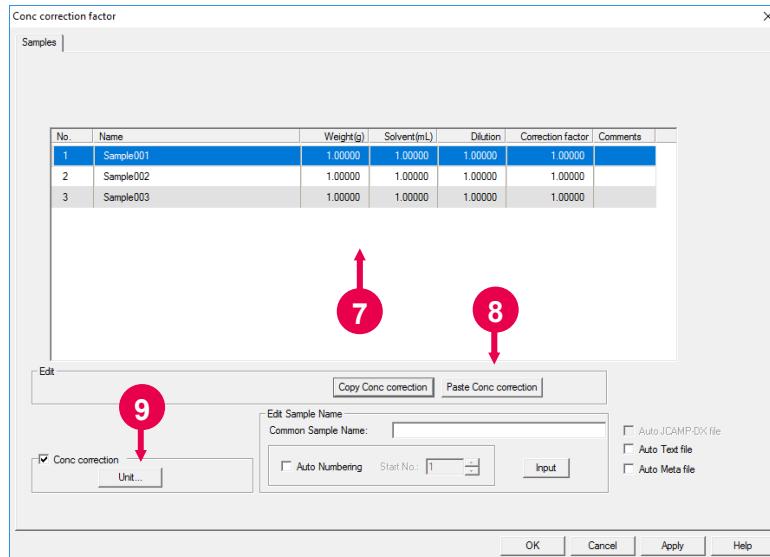


Fig. 5-69

- (6) Click the **Paste Conc correction** button (refer to (8) in Fig. 5-69). The copy-source concentration correction coefficients are copied to the active lines (refer to (7) in Fig. 5-69). Note that the sample name or comment is not copied.
- (7) You can change the respective units of weight and solvent volume. Click the **Unit** button (refer to (9) in Fig. 5-69), and the Unit Setting dialog box will appear. Up to 6 characters can be entered for each unit.

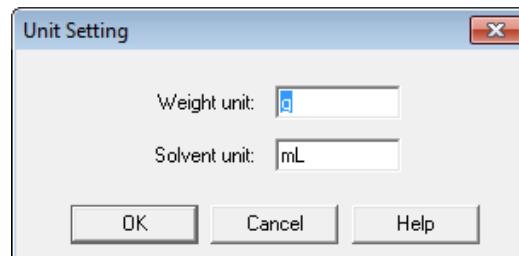


Fig. 5-70

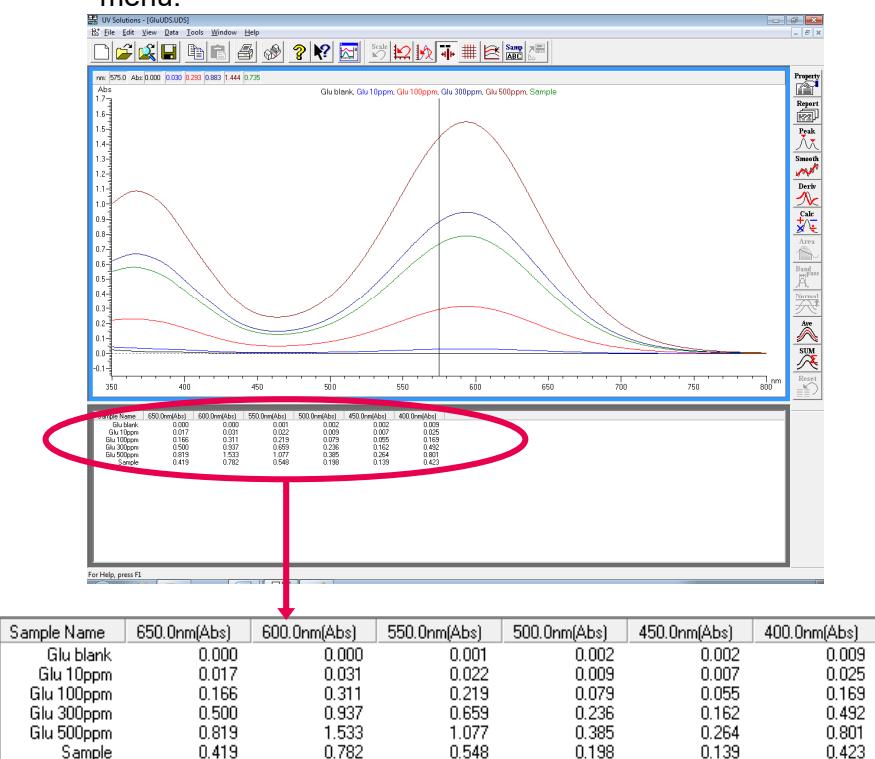
- OK** : Closes the Unit Setting dialog box and brings the new units into the concentration correction coefficient table.  
**Cancel** : Closes the Unit Setting dialog box without reflecting the new units.

## 5.22 Displaying Data at Specified Wavelength on Spectra

This function is usable when you want to compare data at the specified wavelength on two or more spectra.

### 5.22.1 Display of Data at Specified Wavelength

- (1) Display wavelength scan spectra to be compared. For the operating procedure, refer to 5.10.
- (2) Select the Wavelength Data Table command from the View menu.



**Fig. 5-71**

The specified wavelength data table is indicated according to the wavelengths set on the Wavelength tab page of the Options window.

The Options window is called up by selecting the Options command from the Tools menu.

The specified wavelength data table can be output onto a report when a check mark is put at "Wavelength data table" on the Report tab page.

The specified wavelengths can be changed in the following two ways.

## 5.22 Displaying Data at Specified Wavelength on Spectra

### 5.22.2 Change of Specified Wavelength (Options window)

- (1) Select the Options command from the Tools menu and click the Wavelength tab. A dialog box as shown in Fig. 5-72 will appear to indicate the presently specified wavelengths.

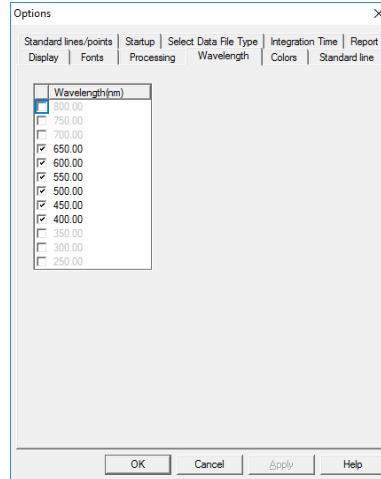


Fig. 5-72

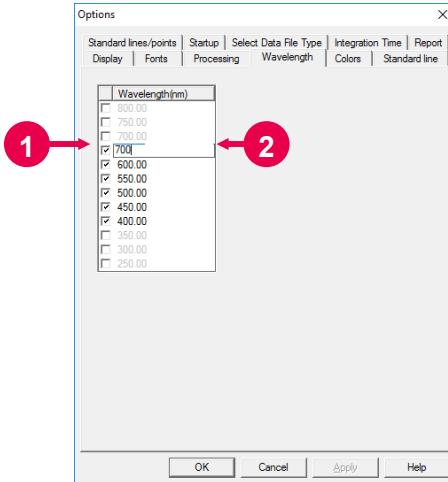
- (2) For changing the wavelength, take the following procedure.
  - 1) Shift the mouse pointer to the wavelength to be changed and click the mouse.
  - 2) Enter a wavelength.
  - 3) For other wavelengths to be changed, repeat steps 1) and 2).

For adding a wavelength, take the following procedure.

- 1) Put a check mark at any wavelength that is not selected (refer to (1) in Fig. 5-73). Up to 12 wavelengths are settable.
- 2) Move the mouse pointer to the wavelength and click the mouse.

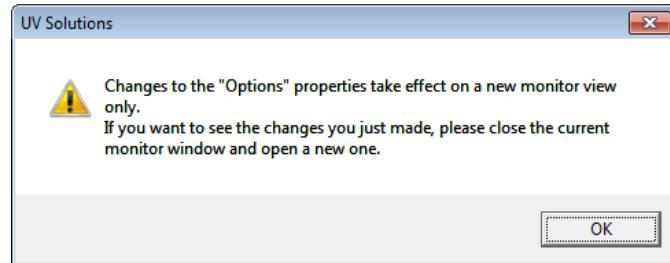
- 3) Enter a wavelength (refer to (2) in Fig. 5-73).

To cancel a specified wavelength, remove the check mark from its check box.



**Fig. 5-73**

- (3) After change, click the **OK** button. The Options window will close and the following message will appear.



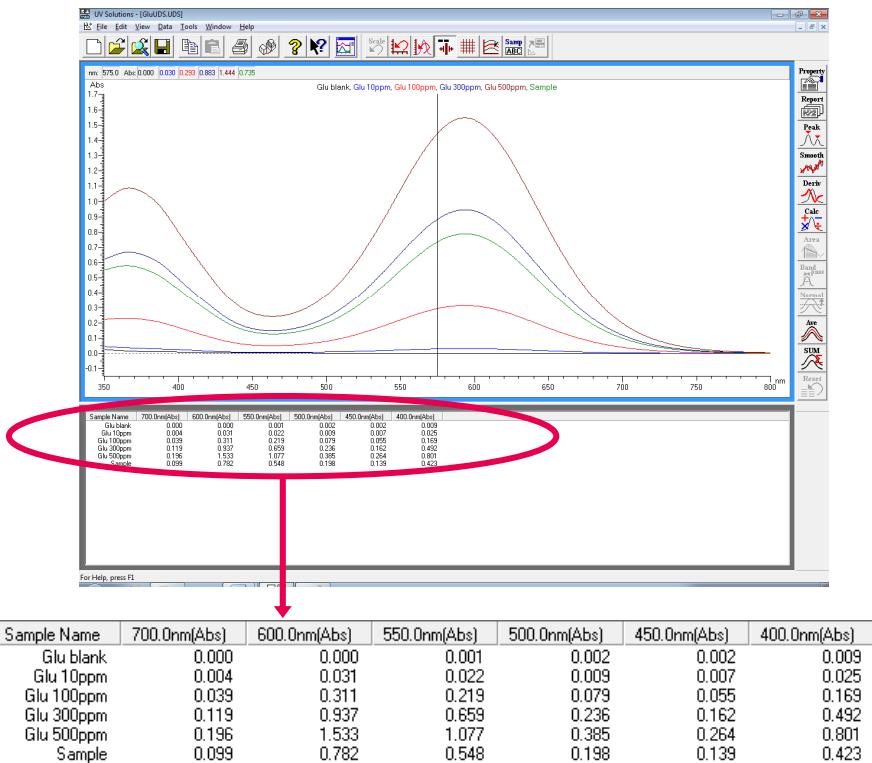
**Fig. 5-74**

Click the **OK** button. The change on the Wavelength tab page becomes valid at the time of data file loading. So the instrument need not be restarted.

- (4) Close the presently displayed data processing windows. Overlaid data can be loaded if saved in a new name.

## 5.22 Displaying Data at Specified Wavelength on Spectra

- (5) Redisplay wavelength scan spectra to be compared in the overlay mode. Or load the file saved under a new name in the overlay mode. Select the Wavelength Data Table command from the View menu. A specified wavelength data table is displayed according to the new wavelengths specified on the Wavelength tab page of the Options window.



**Fig. 5-75**

### 5.22.3 Change of Specified Wavelength (Spectrum Properties window)

- (1) On the data processing window shown in Fig. 5-71, click the  (Properties) button on the Data Process toolbar. The Spectrum Properties window will appear. In this window, click the Wavelength tab. A tab page as shown in Fig. 5-76 will appear to indicate the presently specified wavelengths.

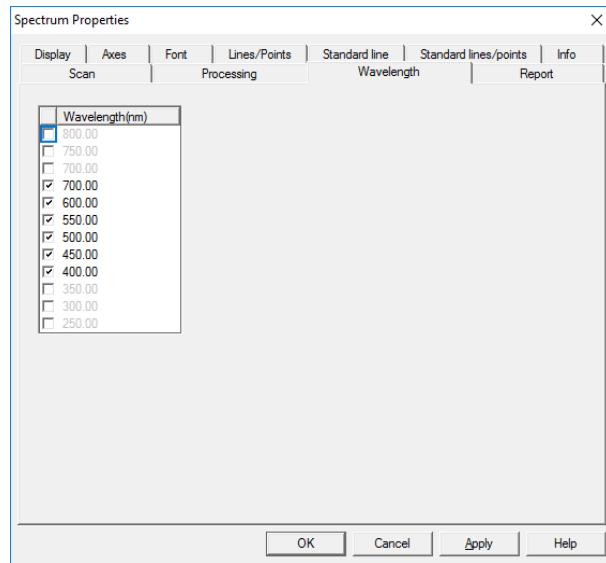


Fig. 5-76

- (2) For changing the wavelength, take the following procedure.
- 1) Shift the mouse pointer to the wavelength to be changed and click the mouse.
  - 2) Enter a wavelength.
  - 3) For other wavelengths to be changed, repeat steps 1) and 2).

For adding a wavelength, take the following procedure.

- 1) Put a check mark at any wavelength that is not selected. Up to 12 wavelengths are settable (refer to (1) in Fig. 5-77).
- 2) Move the mouse pointer to the wavelength and click the mouse.

## 5.22 Displaying Data at Specified Wavelength on Spectra

- 3) Enter a wavelength (refer to (2) in Fig. 5-77).

To delete a wavelength, remove the check mark from its check box.

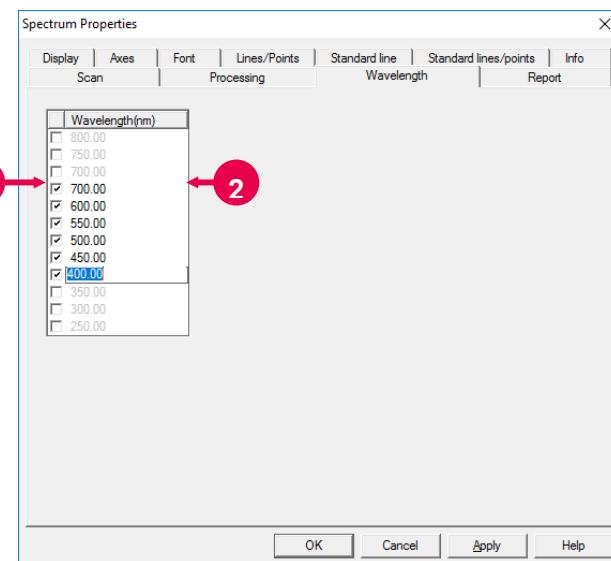
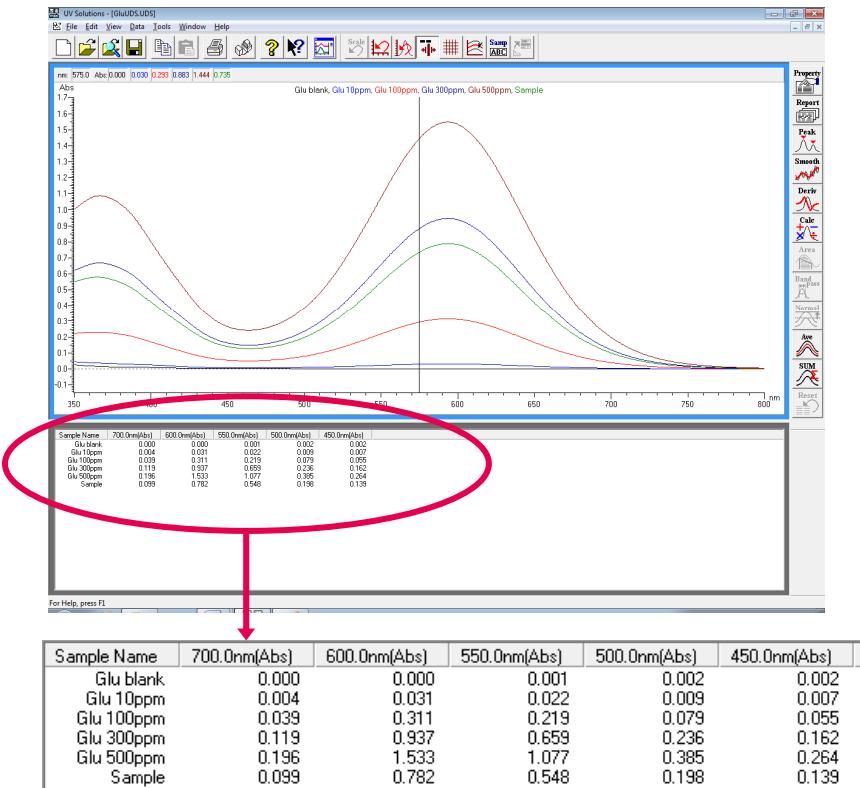


Fig. 5-77

- (3) After change, click the **OK** or **Apply** button. A specified wavelength data table will be displayed according to the new wavelengths specified on the Wavelength tab page of the Spectrum Properties window.



**Fig. 5-78**

**NOTE:** Information changed on the Wavelength tab page of the Spectrum Properties window is only temporary (not saved in the data file). Upon data loading, therefore, data is displayed according to the setting on the Wavelength tab page of the Options window. When wavelengths for data comparison are determined, set them on the Wavelength tab page of the Options window.

## 5.23 Calculating Average Spectrum

### 5.23 Calculating Average Spectrum

An average spectrum is calculated from overlaid spectra.

**NOTE:** An average spectrum is calculated only from displayed spectra. Nondisplayed spectra in the display spectra tab are not calculated.

- (1) Open the data file of the wavelength scan file (\*.fds). (Refer to 5.1.) The window shown in Fig. 5-79 will appear.

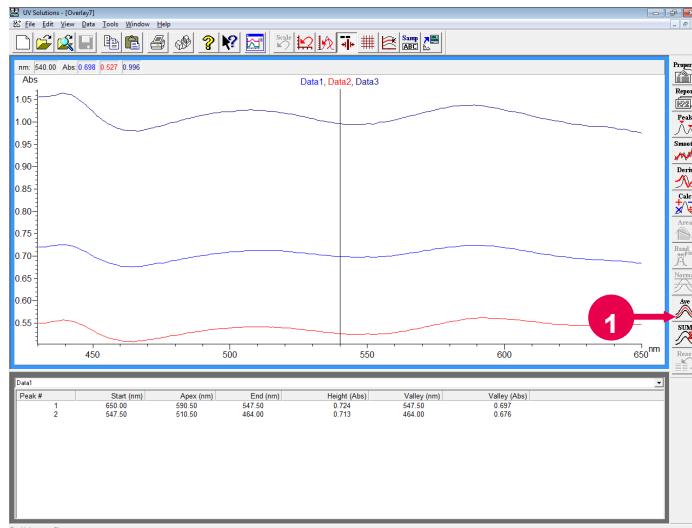


Fig. 5-79

- (2) Click the (Averaged Spectrum) button. (Refer to ① in Fig. 5-79.) Enter the start wavelength and end wavelength for calculation of an average spectrum and click the **OK** button. (Refer to ② in Fig. 5-80.)

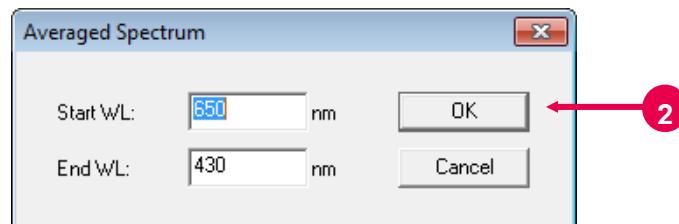


Fig. 5-80

(3) An average spectrum is displayed. (Refer to Fig. 5-81.)

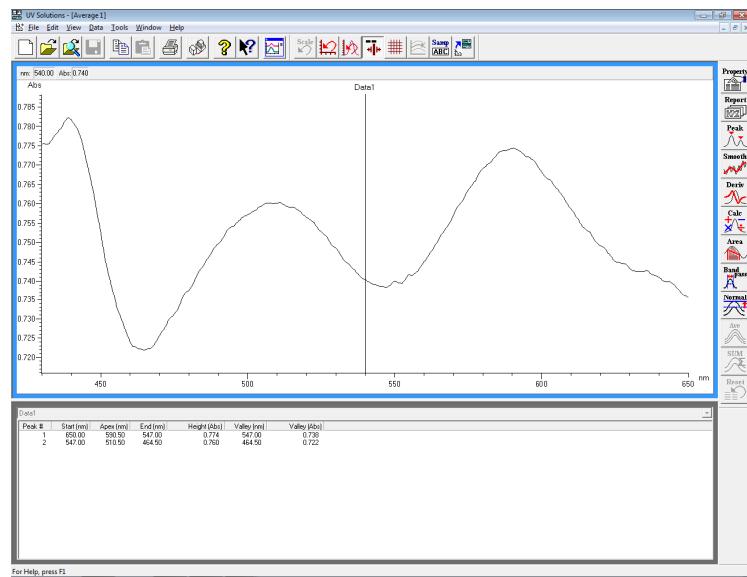


Fig. 5-81

## 5.24 Calculating Sum of Spectra

### 5.24 Calculating Sum of Spectra

The sum of overlaid spectra is calculated.

**NOTE:** The sum of spectra is calculated only from displayed spectra. Nondisplayed spectra in the display spectra tab are not calculated.

- (1) Open the data file of the wavelength scan file (\*.fds). (Refer to 5.1.)  
The window shown in Fig. 5-82 will appear.

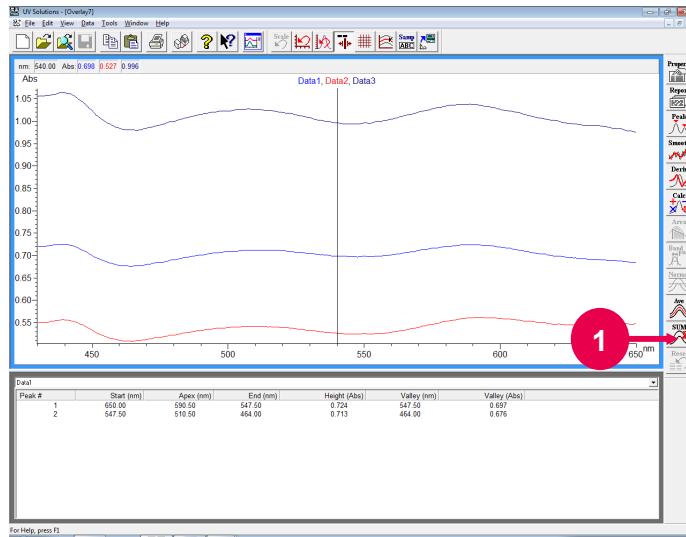


Fig. 5-82

- (2) Click the (Summarized Spectrum) button. (Refer to ① in Fig. 5-82.) Enter the start wavelength and end wavelength for calculation of the sum of spectra and click the **OK** button. (Refer to ② in Fig. 5-83.)

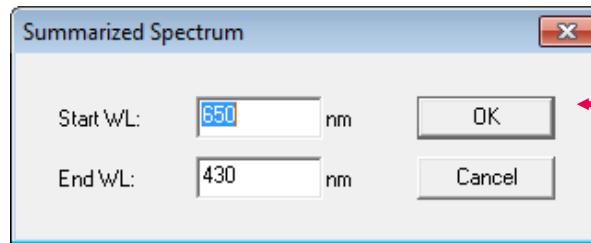


Fig. 5-83

(3) The sum of spectra is displayed. (Refer to Fig. 5-84.)

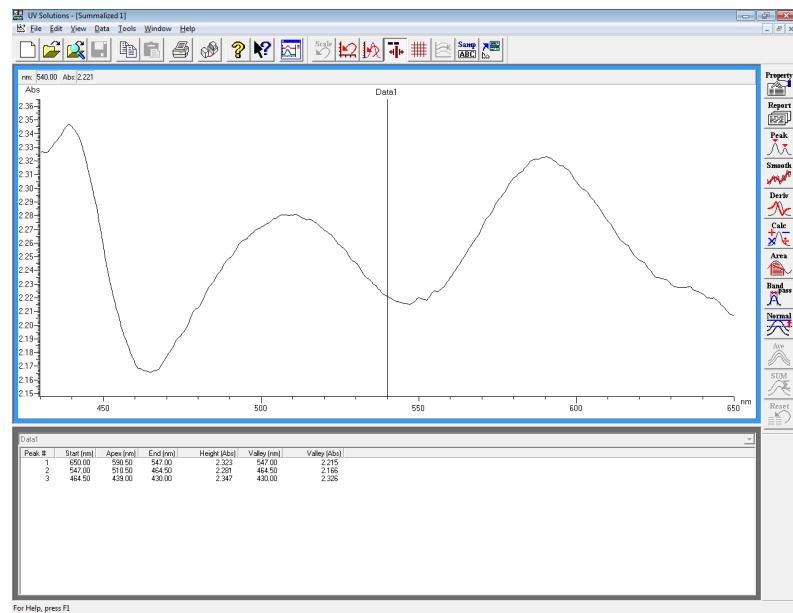


Fig. 5-84

## 5.25 Normalizing Spectra

### 5.25 Normalizing Spectra

The sum of single spectra is calculated.

**NOTE:** Overlaid spectra cannot be standardized.

- (1) Open the data file of the wavelength scan file (\*.fds) or time scan file (\*.fdt). (Refer to 5.1.) The window shown in Fig. 5-85 will appear.

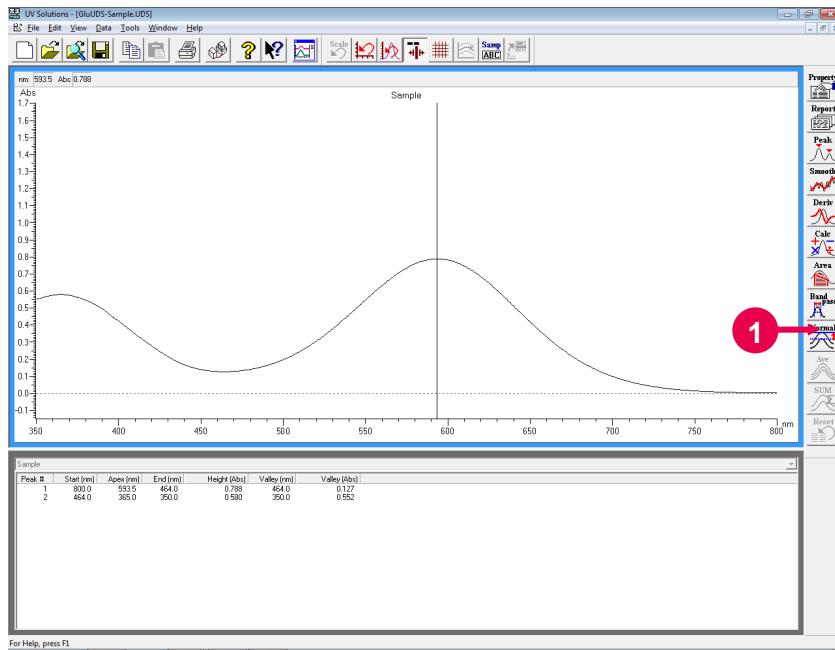
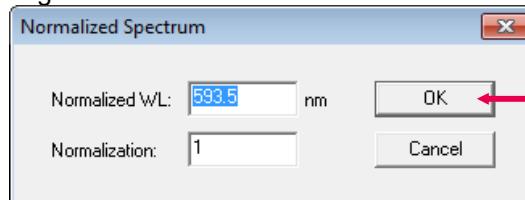


Fig. 5-85

- (2) Click the (Normalized Spectrum) button. (Refer to ① in Fig. 5-85.) Enter the Normalized WL and Normalization and click the OK button. (Refer to ② in Fig. 5-86.)

Wavelength scan data



Time scan data

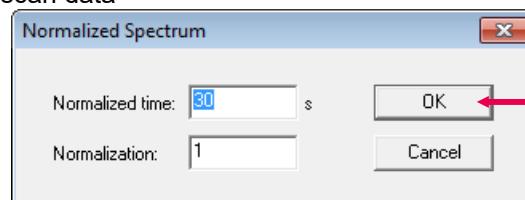


Fig. 5-86

- (3) The standardized spectrum is displayed. (Refer to Fig. 5-87.)  
The specified Nomalized WL (or Nomalized time) is converted into a Nomalization, and the respective spectra are converted at the standardized rate and displayed on a new data processing window.

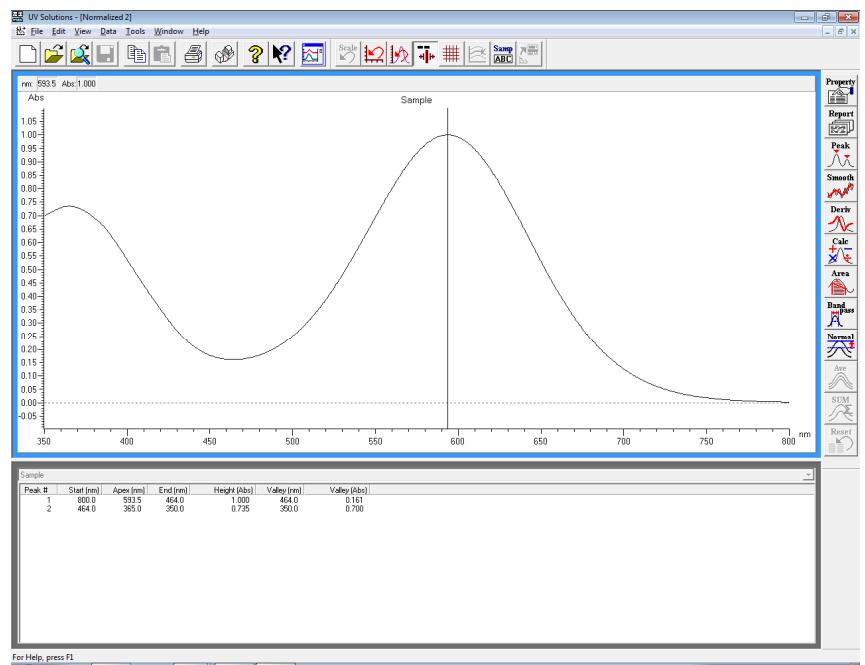


Fig. 5-87

## 5.26 Calculating Half Bandwidth of Peak

### 5.26 Calculating Half Bandwidth of Peak

The half bandwidth of the spectrum displayed currently can be obtained.

Click the  (Half Bandwidth) button on the data processing toolbar. The window shown in Fig. 5-88 will appear. (It is also possible to select the Half Bandwidth (B) command from the data (D) menu.)

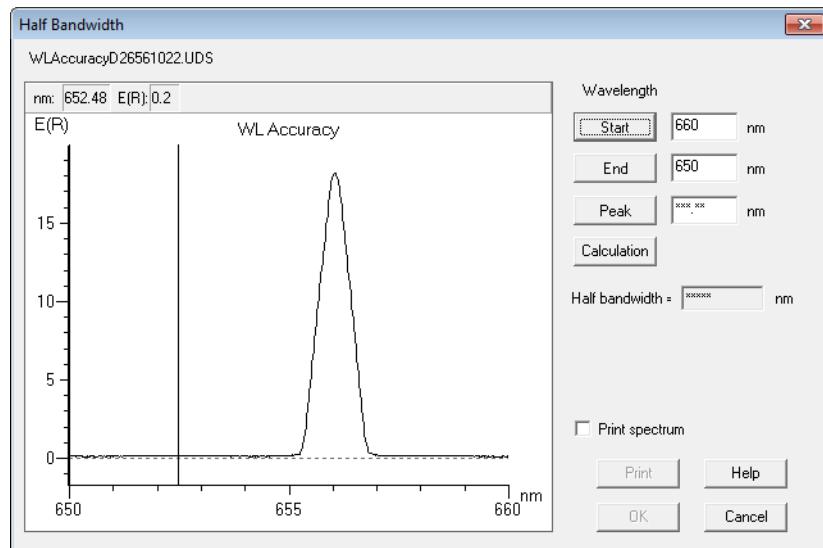


Fig. 5-88

### 5.26.1 Setting Calculation Range

- (1) Enter the desired start wavelength into the start wavelength column.
- (2) Enter the desired end wavelength into the end wavelength column.
- (3) Enter the desired peak wavelength into the peak column.
- (4) Click the **Calculation** button. The result of calculation will be displayed.

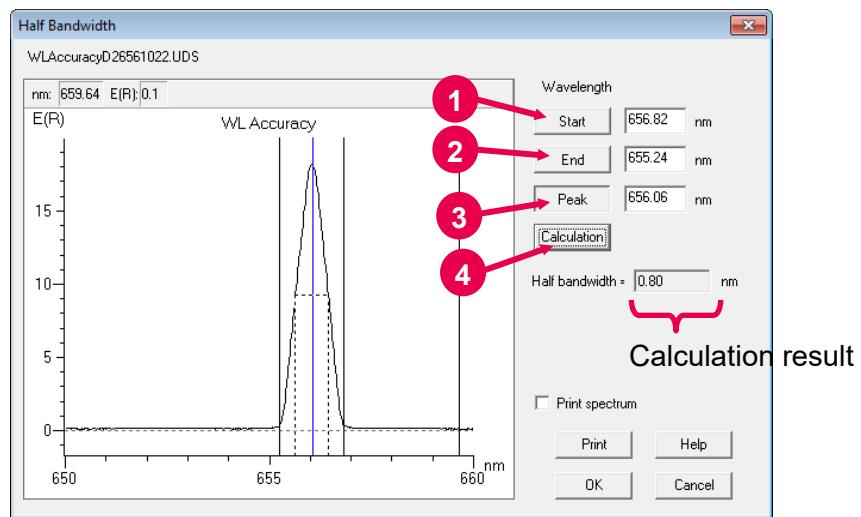


Fig. 5-89

The principle of half bandwidth calculation is shown below.

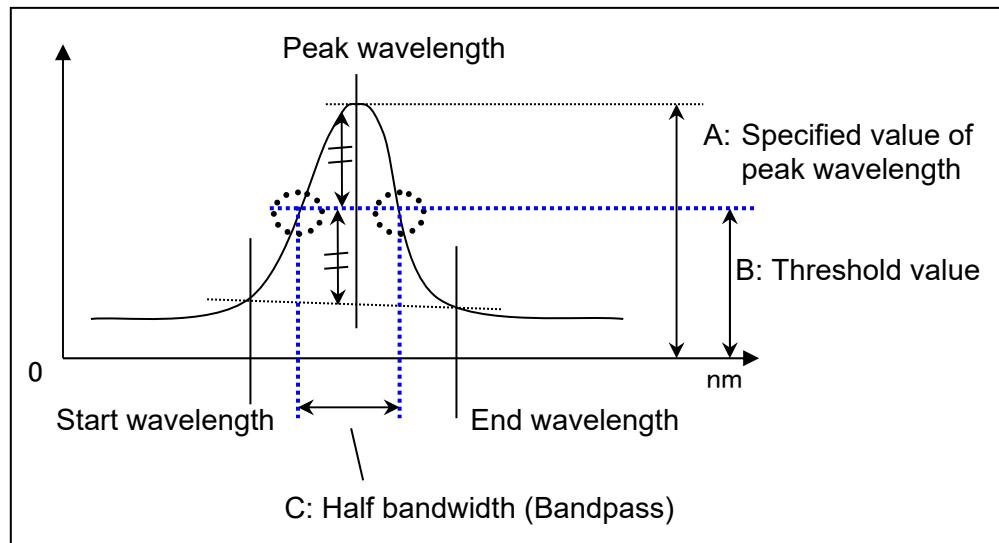


Fig. 5-90 Principle of Calculation

## 5.26 Calculating Half Bandwidth of Peak

### Calculation method

- (1) "A" is the value of peak wavelength.
- (2) The threshold value "B" is a half of the shortest distance between the point of peak wavelength A and the line connecting the points of tangency of the start wavelength and end wavelength.
- (3) The wavelength of the threshold value "B" is calculated by linear interpolation, and that width "C" is the half bandwidth.

### 5.26.2 Printing Calculation Result

The result of half bandwidth calculation can be printed.

- (1) When printing the result of half bandwidth calculation simultaneously with the spectrum, check Print spectrum shown in Fig. 5-91. (Refer to ① in Fig. 5-88.) When the spectrum is not to be printed, uncheck it.
- (2) Click **Print**, and printing will begin. (Refer to ② in Fig. 5-91.) The Half Bandwidth window will close when printing is executed.  
To call up the same window, click the  (Half Bandwidth) button on the data processing toolbar again.

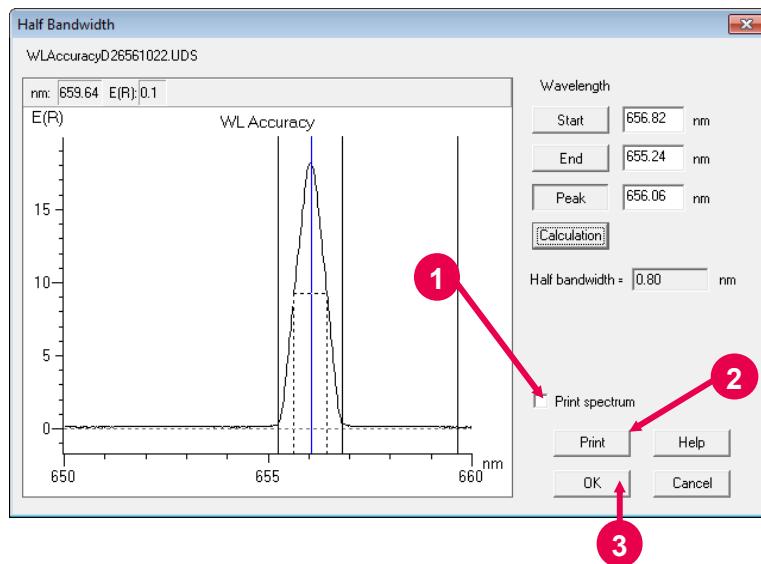
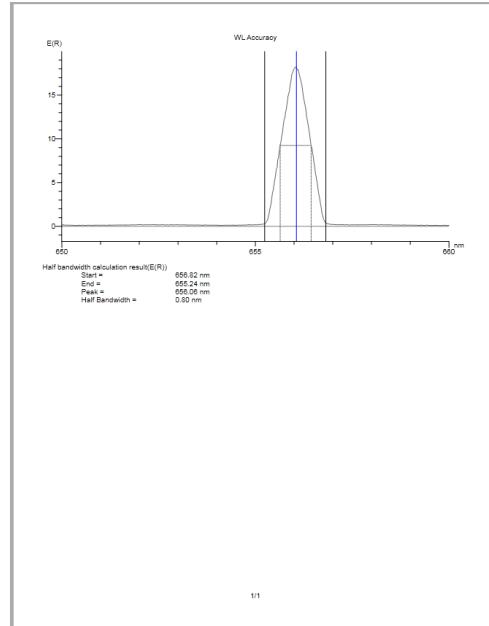


Fig. 5-91 Principle of Calculation



**Fig. 5-92 Example of Printing (with Spectrum Record)**

- (3) After calculation, click the **OK** button (Refer to ③ in Fig. 5-91), and the Half Bandwidth window will close, but the result of calculation will be saved.
- (4) When the data processing window is being displayed, click the  (reset) button on the data processing toolbar, and the calculation result will be reset. Therefore, when the Half Bandwidth window is called up again, “\*\*\*\*\*” will be displayed in the calculation result column.

**NOTE:** When file saving is executed after half bandwidth calculation, the last calculation result will also be saved in the file. Therefore, when the Half Bandwidth window is called up, a numerical value will be displayed in the calculation result column. This value has been saved in the computer, and it cannot be removed even if the reset button is clicked.

## 5.26 Calculating Half Bandwidth of Peak

### 5.26.3 Enlarging Scale

To enlarge the scale on the Area window, left-click the mouse.

- (1) Left-click on the spectrum and drag the mouse to draw a rectangle as shown in Fig. 5-93 to specify the enlarging area.

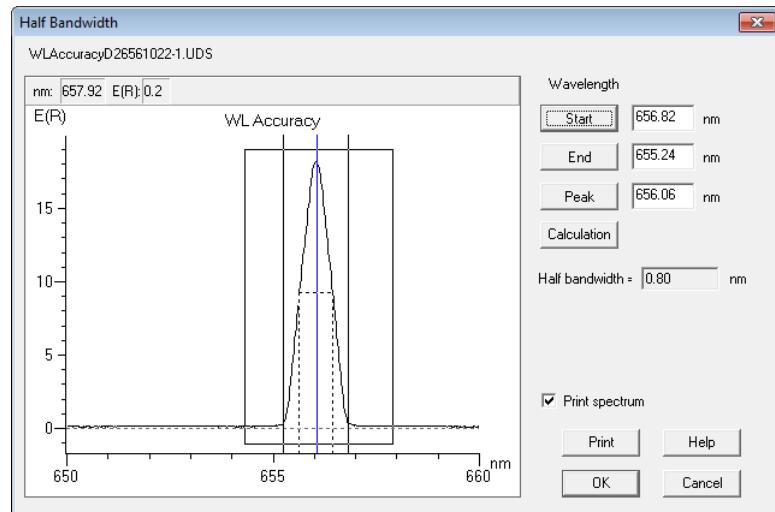


Fig. 5-93

- (2) Release the mouse button while an area is being specified, and an enlarged image will appear as shown in Fig. 5-94.

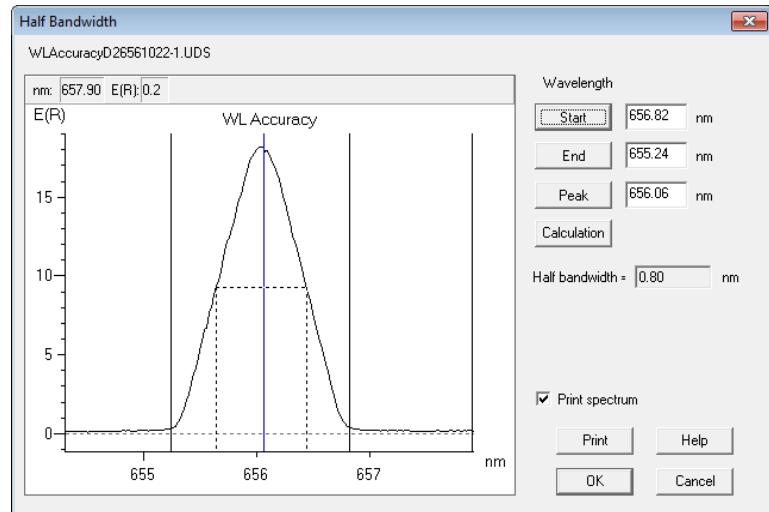


Fig. 5-94

- (3) Double-click the left button on the spectrum, and the scale will return to the original state.

## 5.27 Displaying Data Processing Window during Measurement

The data on the monitor window can be displayed on the data processing window to permit confirmation of the data during measurement when time scan lasts long.

Right-click on the monitor window during measurement, and the menu box shown in Fig. 5-95 will appear. Select [Display Data Processing Window].

**NOTE:** Selection is possible when there are two or more spectra.

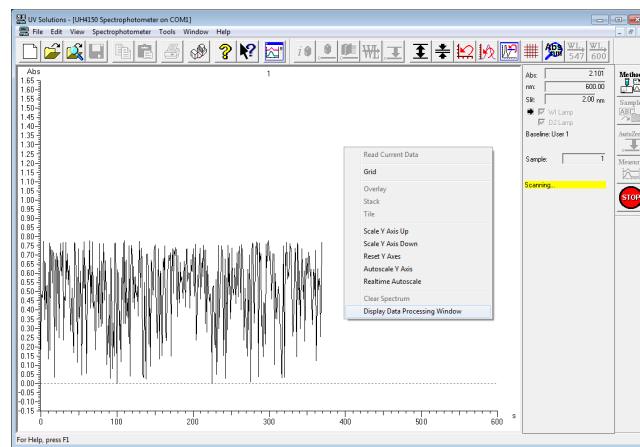


Fig. 5-95

The data processing window appears.

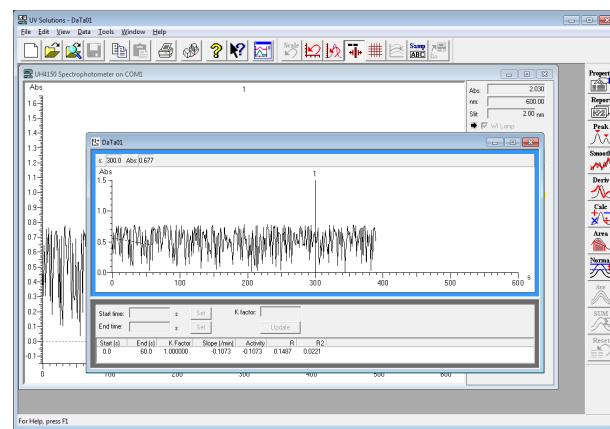


Fig. 5-96

## 5.28 Correct the spectrum of high absorbance

### 5.28 Correct the spectrum of high absorbance

You can correct the currently displayed spectrum. This is an effective function when there is a baseline subduction in the measurement of high absorbance

Instrument: UH4150/UH4150AD+  
Measurement mode: wavelength scan (%T, %R, Abs/O.D.),  
Time scan (Abs/O.D.)

When the following processing is performed, it will not be subject to high absorbance correction.

- Smoothing, derivative, averaged spectrum, sum spectrum, overlay
- Files whose vertical axis unit cannot be changed by data Processing

Click the (High Abso Correction)  button on the data processing toolbar or select the High Abs Correction (C) command from the Data (D) menu.

A screen Figure 5-97 is appeared.

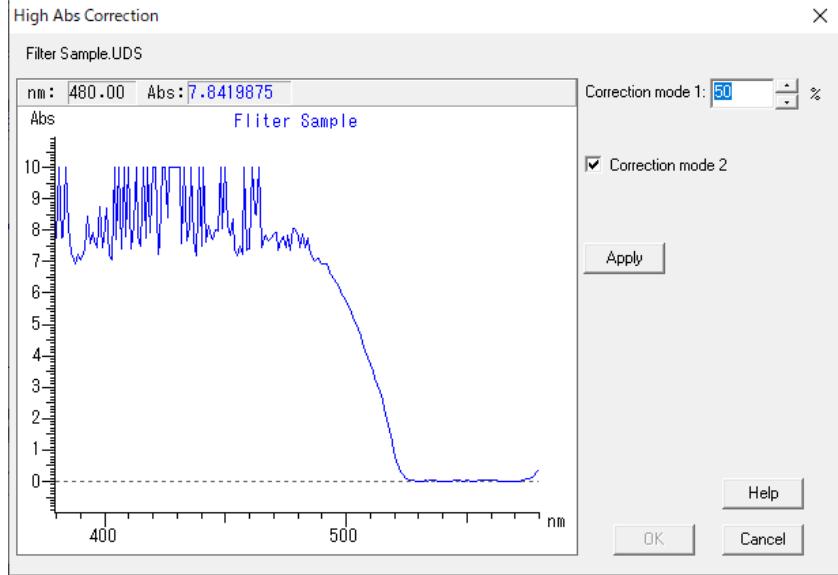


Fig. 5-97

The calculation principle of the high absorbance correction spectrum is shown below.

- Mode 1

All data with a negative value as transmittance is set to 100%. Correct one point of data with the specified ratio so that it becomes 0% T. Even if the correction value is 100%, 1 data will be Abs10 (or the maximum absorbance displayed). 0% does not correct.

Correction range: 0 to 100%

- Mode 2

Data with negative or 0 transmittance is deleted, and linear interpolation is performed with the data before and after the deletion.

(1) Enter the desired value in the correction mode 1.

Correction range: 0 to 100% (When it is 0, there is no correction)

(2) Check the correction mode 2.

(3) Click the 'Apply' button. The corrected spectrum is displayed.

(4) Click the OK button to apply it to the spectrum. To recalculate, re-enter correction mode 1 and correction mode 2 and click the apply button.

(5) After calculation, click the OK button (Fig. 5-97). The high abs correction screen is closed, but the calculation results are memorized.

(6) If you click the (Reset)  button on the data processing toolbar while the data processing screen is displayed, the calculation result will be reset.

**NOTICE:** When you save the file after the high absorbance correction, the final calculation result is also saved in the file at the same time. Once it is saved, it cannot be reset to the original data.

## 5.28 Correct the spectrum of high absorbance

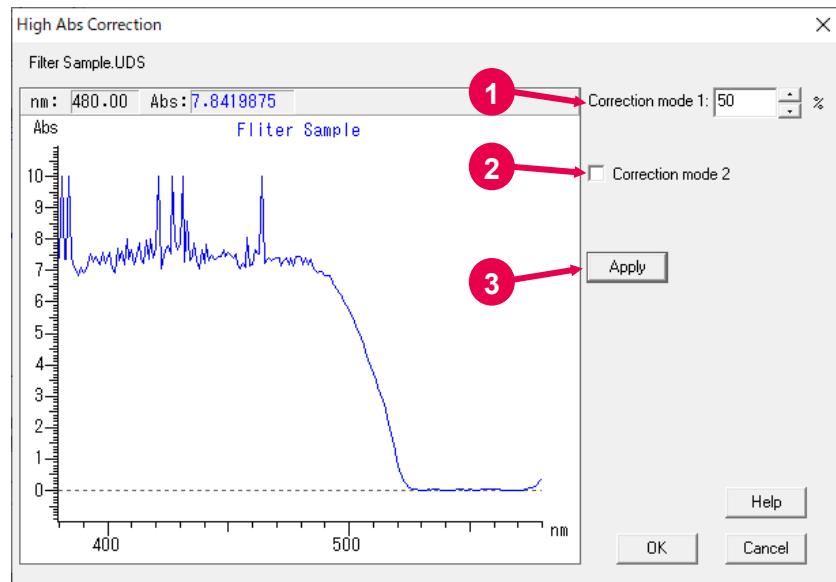


Fig. 5-98 Use only correction mode 1

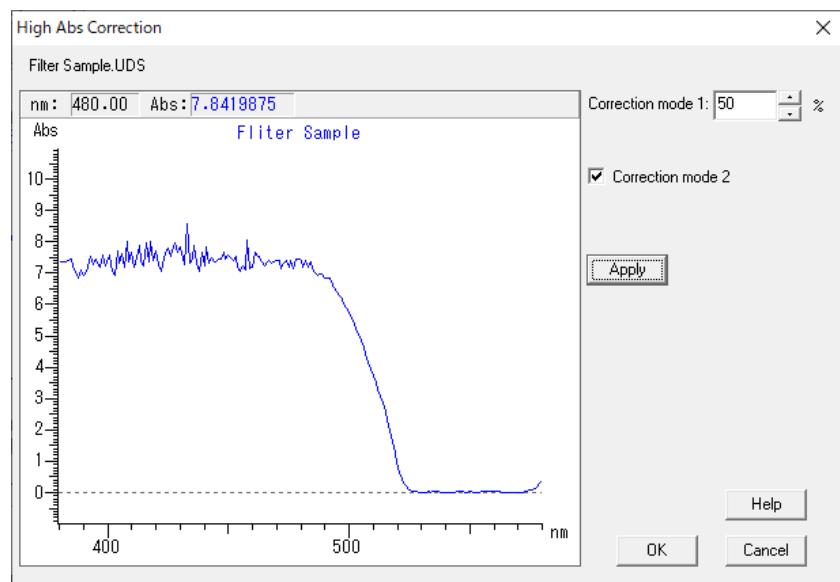


Fig. 5-99 Use both correction mode1 and 2

## 6. MORE CONVENIENT OPERATION (APPLIED USAGE)

### 6.1 Always Starting under the Same Analytical Conditions

The UV Solutions program can be started under the specified analytical conditions. For this purpose, however, some analytical conditions must be saved beforehand as instructed in 6.4.

- (1) As shown in Fig. 6-1, select [Tools]-[Options] (refer to (1) in Fig. 6-1).

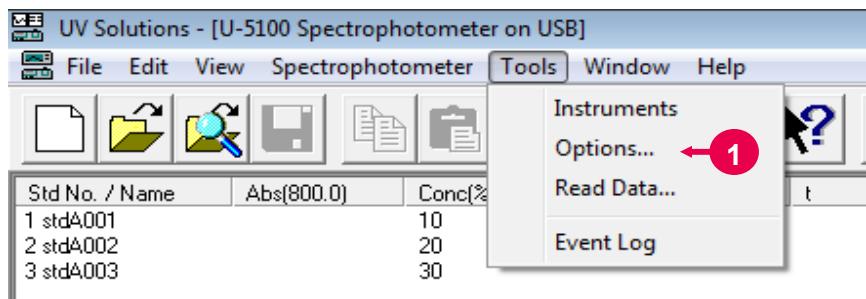
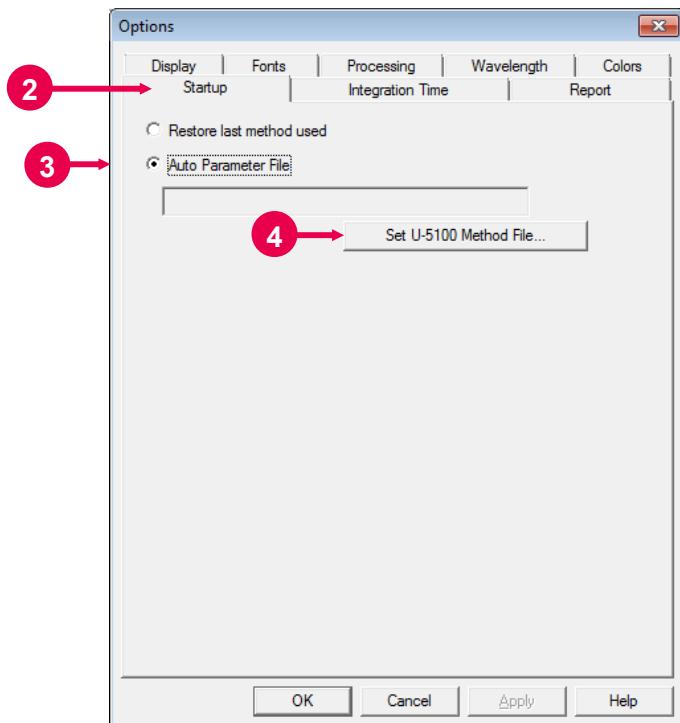


Fig. 6-1 Tools Menu

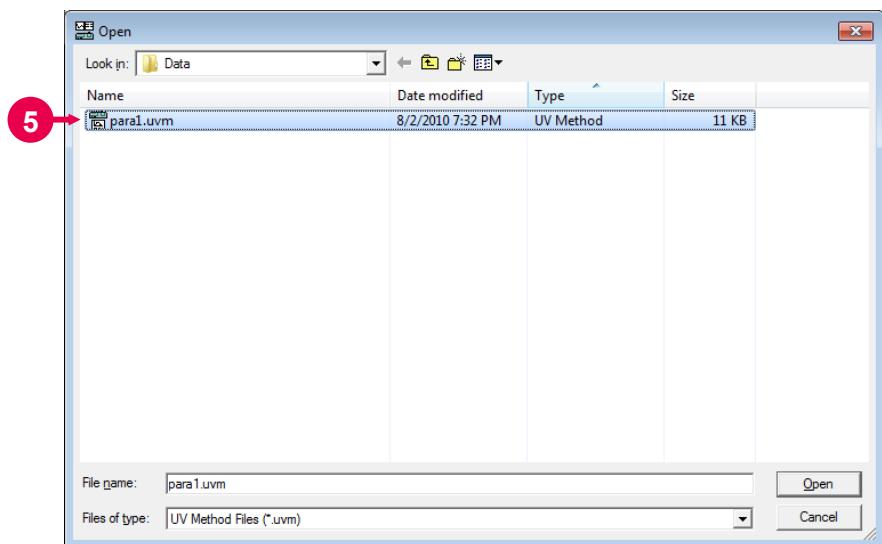
- (2) Select the Startup tab (refer to (2) in Fig. 6-2). A tab page as shown in Fig. 6-2 will appear.
- (3) On the Startup tab page, select "Auto Parameter File" (refer to (3) in Fig. 6-2) and click the **Set ○○○ Method File** button (refer to (4) in Fig. 6-2).  
(○○○ denotes a model name of the instrument in use.)

## 6.1 Always Starting under the Same Analytical Conditions



**Fig. 6-2 Startup Tab**

- (4) A dialog box as shown in Fig. 6-3 will appear. In this dialog box, specify a desired method file (refer to (5) in Fig. 6-3). Note that the extension code of a method file is “\*.uvm”.



**Fig. 6-3**

The setting made in this dialog box will take effect when the UV Solutions program is started again.

**NOTE:** When a method file has been specified for startup of the UV Solutions program, the specified method file will be inapplicable at the time of startup after the spectrophotometer name is changed. In this case, click the  (Open) button to open the specified method file, and check if the spectrophotometer name indicated on the General tab page is correct.

## 6.2 Setting Spectrophotometer Online/Offline

### 6.2 Setting Spectrophotometer Online/Offline

The spectrophotometer can be placed offline. It can also be placed back to the online state.

- (1) On the Standard toolbar, click the  (Instruments) button (or select the Instruments command from the Tools menu). The mouse pointer will take the shape of an hourglass. About 10 seconds later, a dialog box as shown in Fig. 6-4 will appear. In this example, it is indicated that the spectrophotometer is connected.

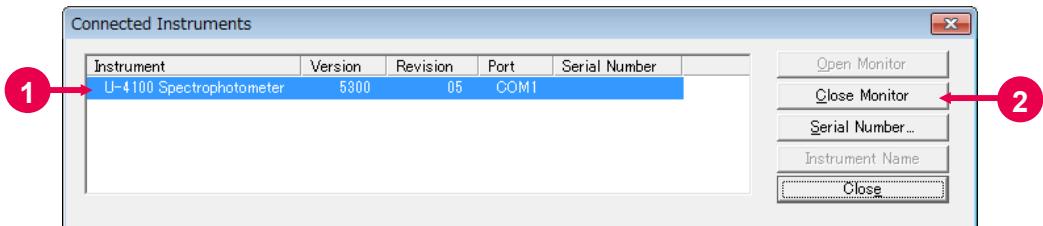


Fig. 6-4 (example of U-4100)

- (2) In the Connected Instruments dialog box, click the spectrophotometer to be connected (refer to (1) in Fig. 6-4), and it will be highlighted in blue. At the same time, the **Close Monitor** and **Close** buttons will become active.
- (3) Click the **Close Monitor** button (refer to (2) in Fig. 6-4). A dialog box as shown in Fig. 6-5 will appear. To place the spectrophotometer offline, click the **Yes** button (refer to (3) in Fig. 6-5). With the U-5100, however, clicking the **Close Monitor** button will place it offline without presenting the dialog box shown in Fig. 6-5.

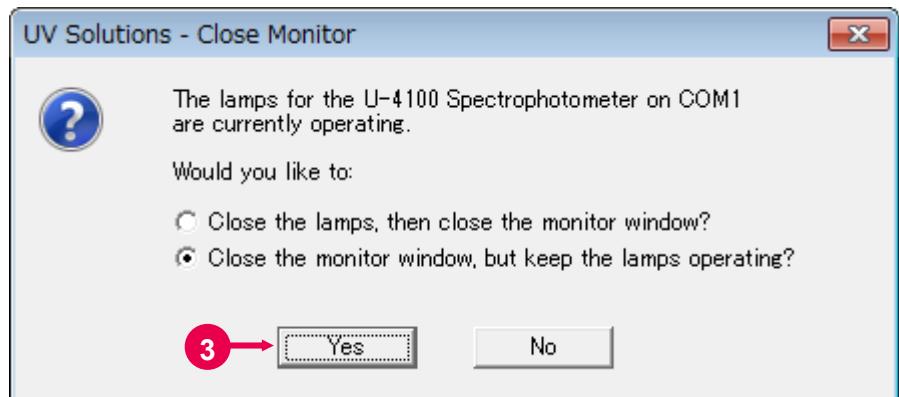


Fig. 6-5 (with U-4100)

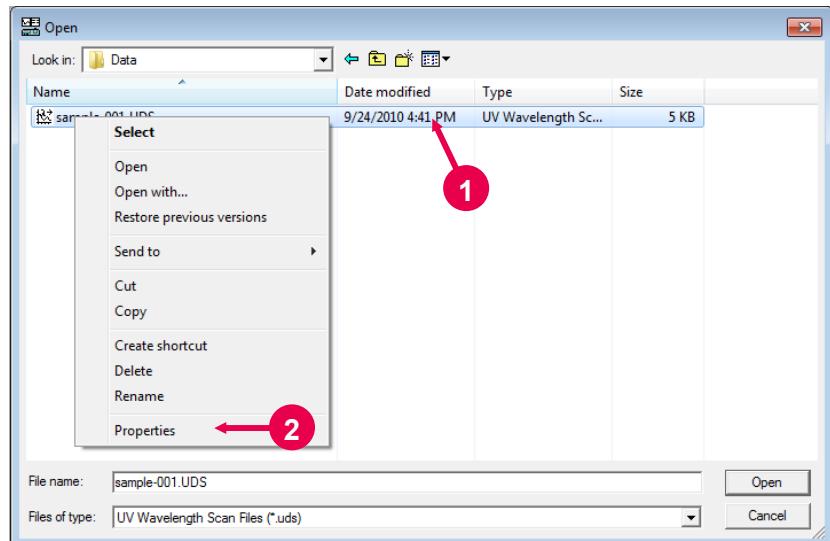
- (4) To return the spectrophotometer to the online state, click the **Open Monitor** button. Initialization will be carried out and the measurement window will appear.

## 6.3 Checking Information on Data File

### 6.3.1 Checking Information on Saved Data File

You can check the measurement conditions and date/time for the data saved in the past.

- (1) Click the  (Open) button on the Standard toolbar (or select the Open command from the File menu). A dialog box as shown in Fig. 6-6 will appear. Find a desired file.
- (2) From the file list in this dialog box, select a desired file (refer to (1) in fig. 6-6). Then, click the right button of the mouse. A menu box will appear. Select “Properties” from the menu box (refer to (2) in Fig. 6-6).



**Fig. 6-6**

- (3) A window as shown in Fig. 6-7 will appear. Click the Info tab and Scan tab as required to check necessary information.

### 6.3 Checking Information on Data File

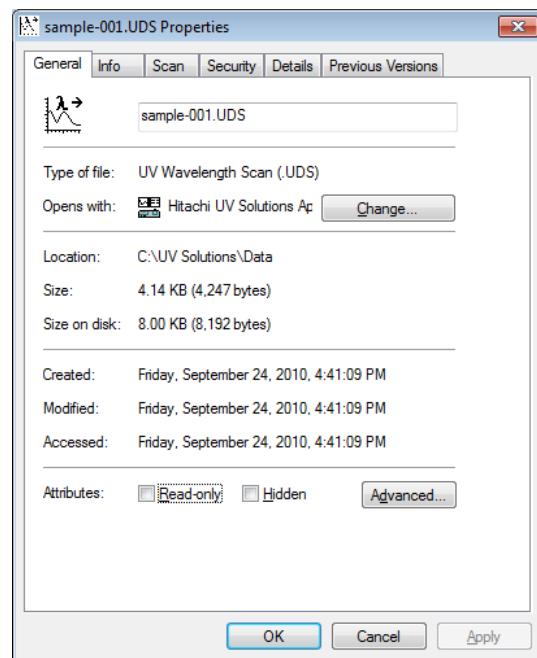
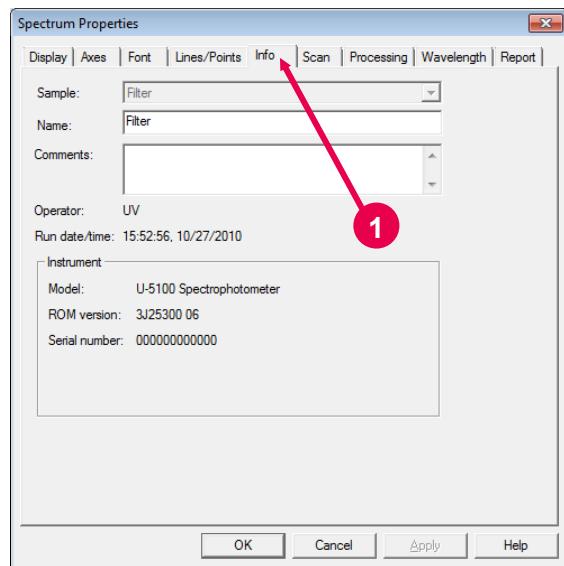


Fig. 6-7

### 6.3.2 Checking Information on Data File Being Open

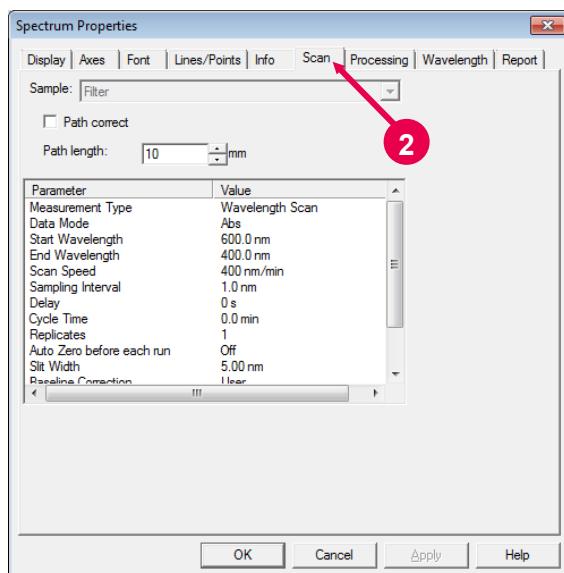
You can also check the analytical conditions and other information on a data file currently being open.

- (1) Click the  (Properties) button on the Data Process toolbar (or select the Properties command from the Edit menu).
- (2) Click the Info tab (refer to (1) in Fig. 6-8). A tab page as shown in Fig. 6-8 will appear. On this tab page, you can check the spectrophotometer name, ROM version and serial number.



**Fig. 6-8 Info Tab**

Clicking the Scan tab (refer to (2) in Fig. 6-9) presents a tab page as shown in Fig. 6-9. On this tab page, you can check the measurement conditions.



**Fig. 6-9 Scan Tab**

### 6.3 Checking Information on Data File

- (3) When two or more spectra are displayed on the window currently being open (in case of overlaid record data), click the drop-down box in the Sample field (refer to (3) in Fig. 6-10). A list of sample names will appear. From this list, select a desired sample name. You can now check the information regarding the selected sample.

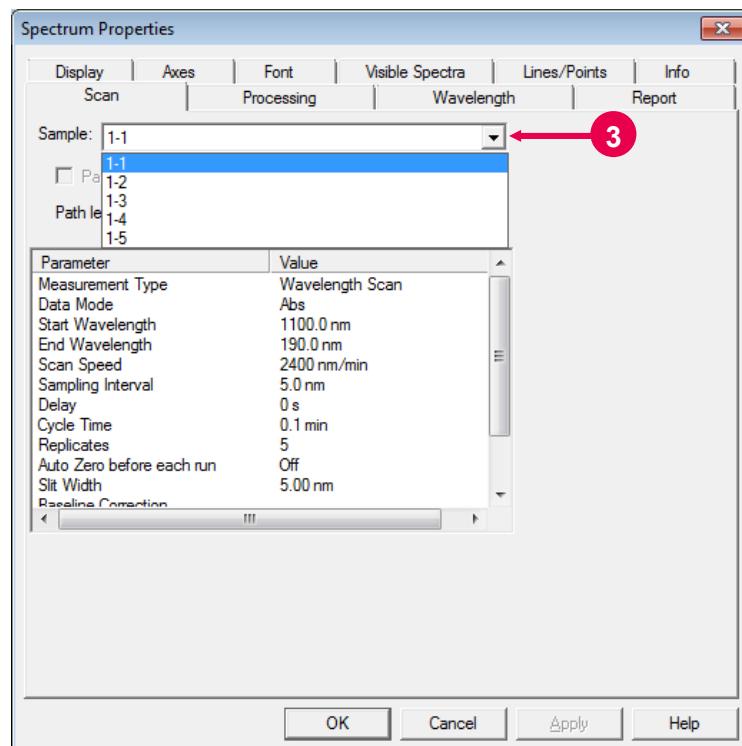
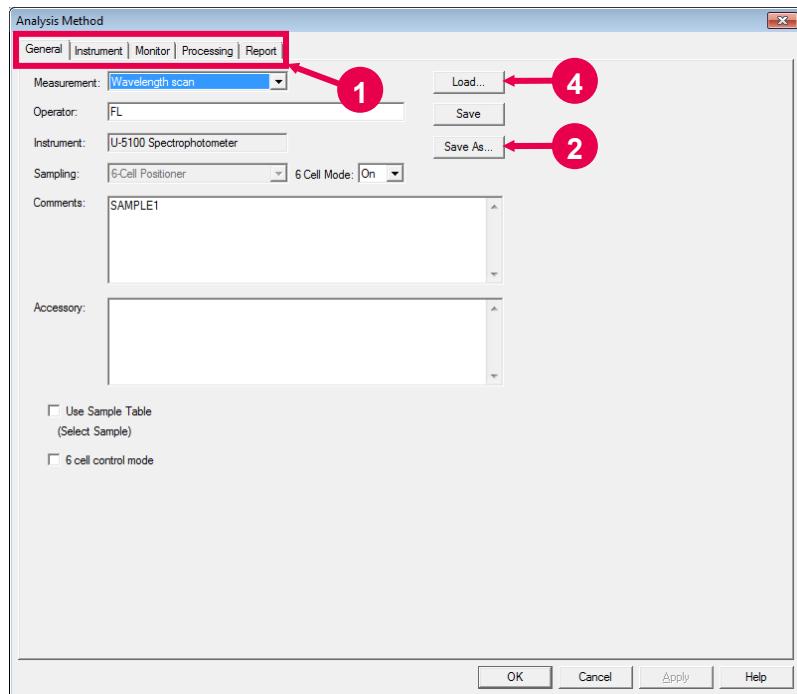


Fig. 6-10

## 6.4 Saving Analytical Conditions

A set of specified analytical conditions can be saved as a file. Thus, without the need to set up analytical conditions for each measurement, you can proceed to measurement just by calling up the analysis method file concerned.

- (1) Click the  (Edit Method) button on the Measurement toolbar (or select the Method command from the Edit menu on the monitor window). A window as shown in Fig. 6-11 will appear.



**Fig. 6-11**

- (2) Select the Instrument tab, Monitor tab, etc. (refer to (1) in Fig. 6-11), and set up analytical conditions, sample names and other necessary items.
- (3) Upon completion of the setting, click the **Save As** button (refer to (2) in Fig. 6-11).

## 6.4 Saving Analytical Conditions

- (4) A dialog box as shown in Fig. 6-12 will appear. Enter a file name (refer to (3) in Fig. 6-12).  
Note that the extension code of an analysis method file is “\*.uvm”.

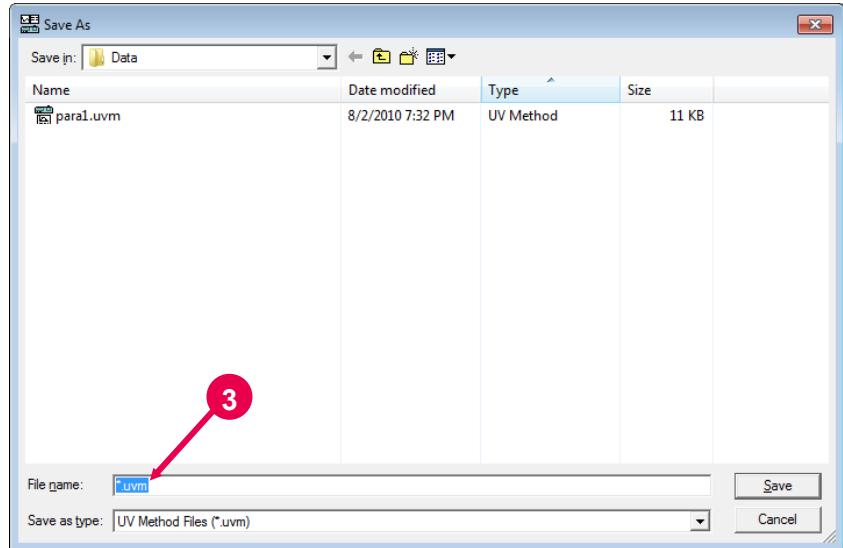


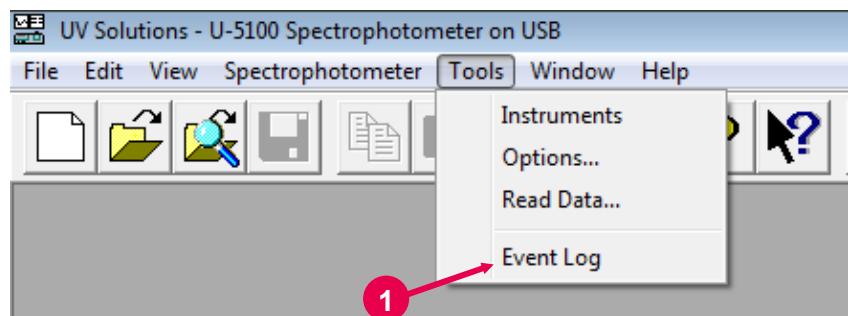
Fig. 6-12

- (5) To call up a saved file, click the **Load** button (refer to (4) in Fig. 6-11) and select the file.

## 6.5 Logging Events

On occurrence of an error during operation of the instrument, the contents of the error are automatically recorded in the event log. It is also possible for the user to store the date/time of lamp replacement and memoranda regarding failures in the event log. The cumulative turn-on time of each lamp is automatically recorded in the event log at the termination of the UV Solutions 4.1 program.

- (1) As shown in Fig. 6-13, select the Event Log command from the Tools menu on the menu bar (refer to (1) in Fig. 6-13).



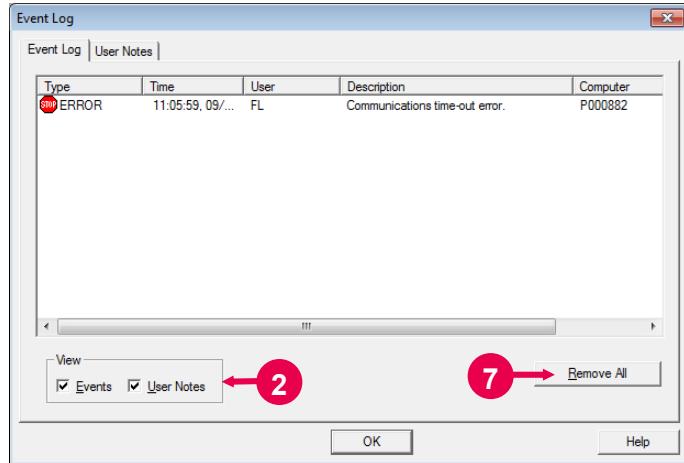
**Fig. 6-13**

- (2) The Event Log tab page shown in Fig. 6-14 will appear. This tab page presents the Time of occurrence, User, Description and Computer for a communication error, etc.
- (3) By putting a check mark at “Events” and “User Notes” in the View field, you can view a list of events and user notes (refer to (2) in Fig. 6-14).

Events : Selected to view events and errors.  
User Notes : Selected to view user notes.

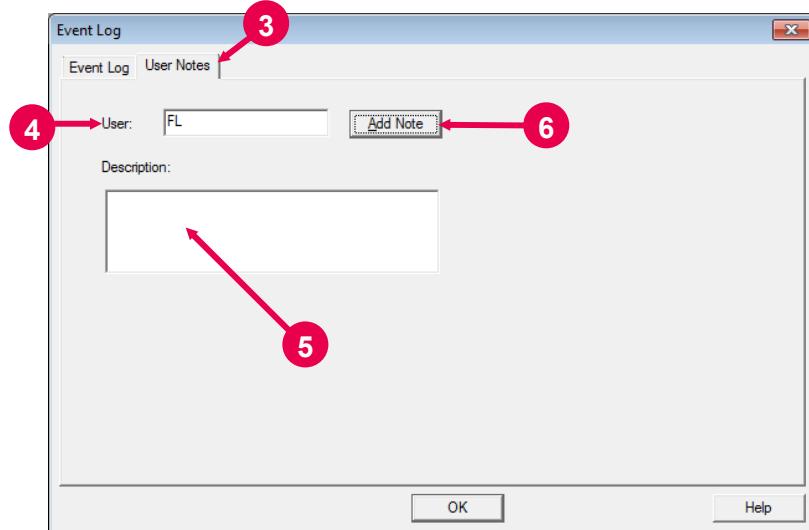
To indicate a list of events and errors only or a list of user notes only, put a check mark at either “Events” or “User Notes”.

## 6.5 Logging Events



**Fig. 6-14 Event Log Tab**

- (4) To record user notes, click the User Notes tab (refer to (3) in Fig. 6-15 (a)). A tab page as shown in Fig. 6-15 (a) will appear.



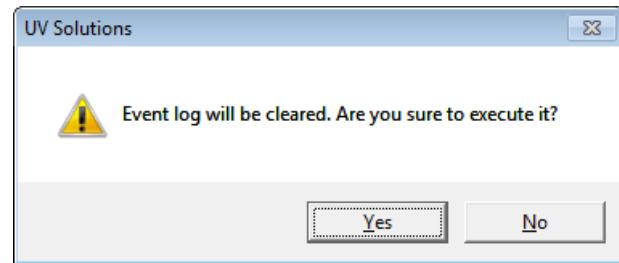
**Fig. 6-15 (a) User Notes Tab**

- (5) Enter a user name (refer to (4) in Fig. 6-15 (a)). Enter notes in the Description field (refer to (5) in Fig. 6-15 (a)).

Number of input characters: Up to 127 characters can be entered.

- (6) Click the **Add Note** button (refer to (6) in Fig. 6-15 (a)).

- (7) Clicking the **Remove All** button brings up the following confirmation message (refer to (7) in Fig. 6-15 (b)).



**Fig. 6-15 (b)**

If you click the **Yes** button, all the event log information is cleared (it is impossible to restore the event long information once this button is clicked).

When not clearing the event log information, click the **No** button.

## 6.6 Checking Program Version Information

### 6.6 Checking Program Version Information

You can check the information on program version.

On occurrence of trouble in the instrument, please notify our service office of the program version information together with detailed symptoms.

As shown in Fig. 6-16, select the About UV Solutions command from the Help menu.

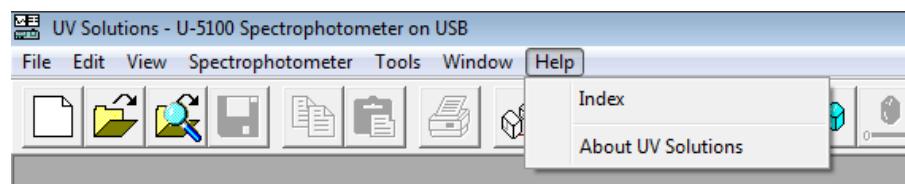


Fig. 6-16

A window as shown in Fig. 6-17 will appear. Check the program code.

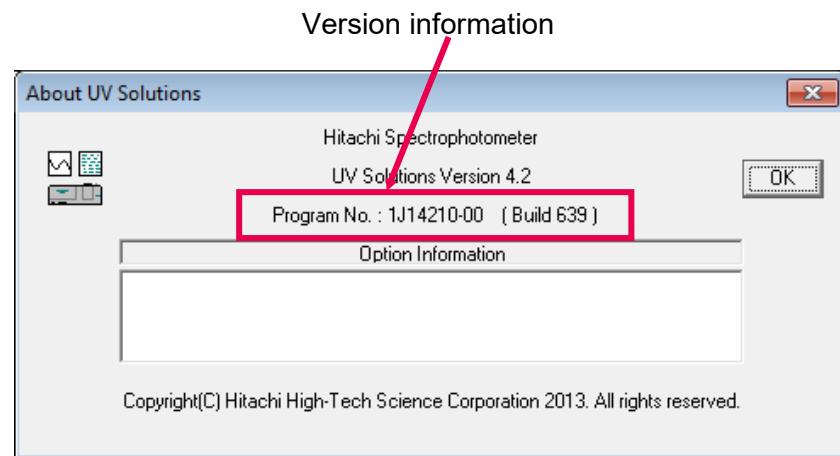
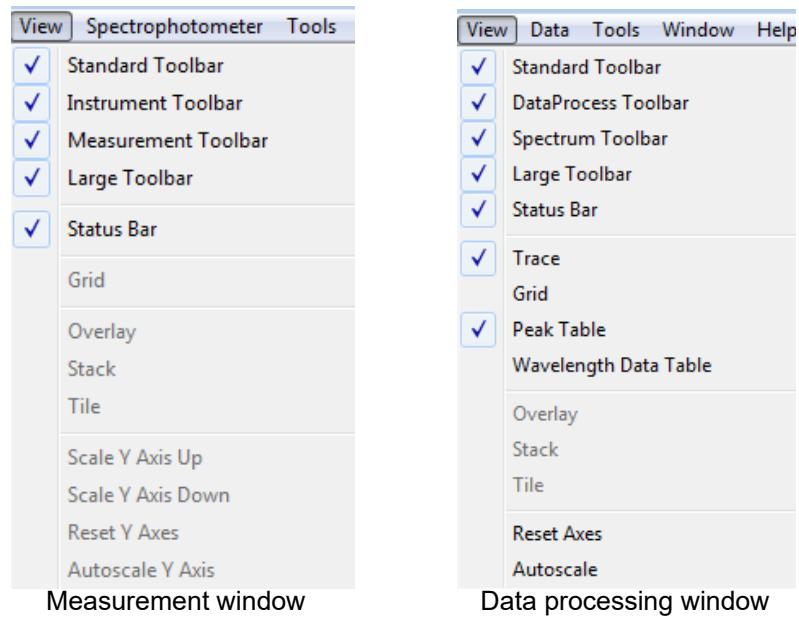


Fig. 6-17

## 6.7 Changing Format for Display of Multiple Spectra

By clicking the View menu from the menu bar, you can select a display format for simultaneous output of multiple spectra.



**Fig. 6-18 Commands on View Menu**

- **Overlay:**  
Two or more spectra are laid over one another. This function is used for such a purpose of spectral comparison. (See Fig. 6-19.)
- **Stack:**  
Each of multiple spectra is displayed in one of rectangular areas arranged vertically. (See Fig. 6-20.)
- **Tile:**  
Each of multiple spectra is displayed in one of the tile-like areas arranged in an array form. For example, an array of  $4 \times 4$  tiles is displayed for 16 spectra, or an array of  $5 \times 3$  tiles is displayed for 15 spectra. (See Fig. 6-21.)
- **Scale Y Axis Up:**  
Increases the ordinate scale 4 times.
- **Scale Y Axis Down:**  
Halves the ordinate scale.

## 6.7 Changing Format for Display of Multiple Spectra

- Reset Y Axes:  
Resets to the ordinate scale specified on the Monitor tab page.
- Autoscale Y Axis:  
Adjusts the ordinate scale according to the size of each spectrum.
- Reset Axes:  
Resets to the scale specified on the Monitor tab page.
- Autoscale:  
Adjusts the scale according to the size of each spectrum.

### Overlay

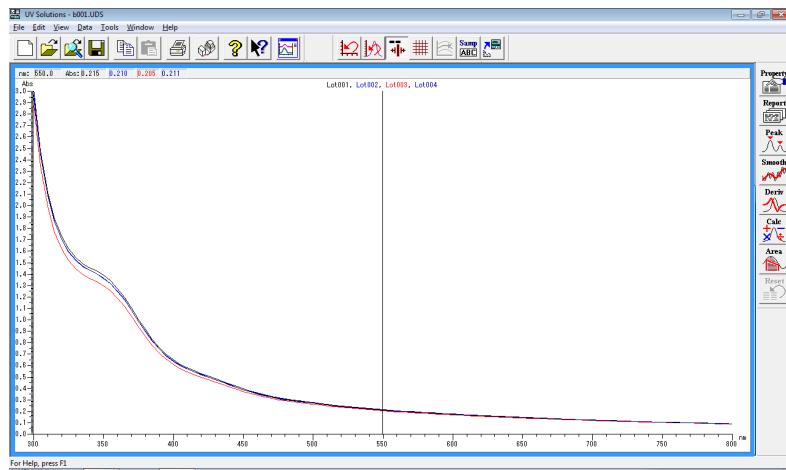


Fig. 6-19

### Stack

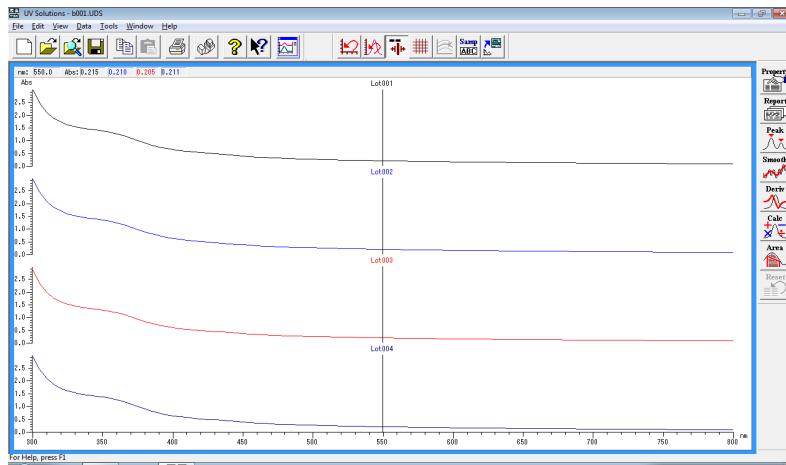


Fig. 6-20

## Tile

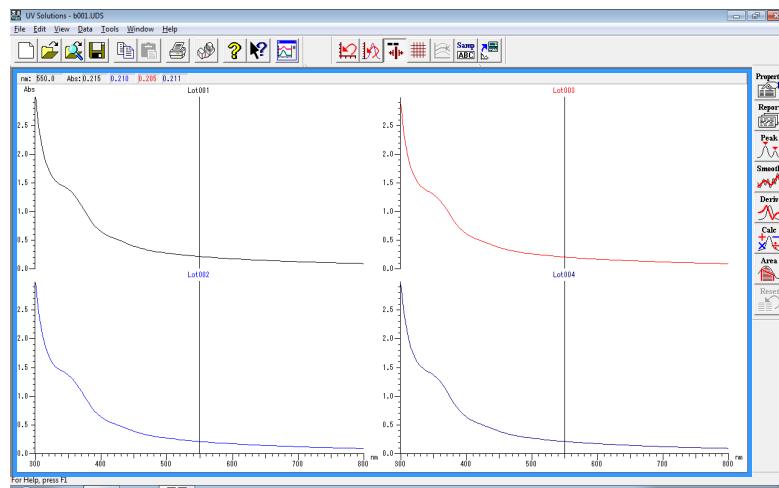


Fig. 6-21

**NOTE:** If six/seven or more spectra are displayed simultaneously, the size of each spectrum may become too small or the traced values may not be all displayed. In such a case, delete unnecessary spectra by using the Overlay command selectable from the Data menu.

## 6.8 Checking Photometric Value at Specified Wavelength

### 6.8 Checking Photometric Value at Specified Wavelength

You can shift the wavelength to a specified one and check a photometric value at the specified wavelength. This function allows you to inspect the adjustment condition of each lamp.

- (1) Click the  (Set Wavelength) button on the Instrument toolbar (or open the measurement window and select the Set Wavelength command from the Spectrophotometer menu on the menu bar).

A dialog box as shown in Fig. 6-22 will appear.

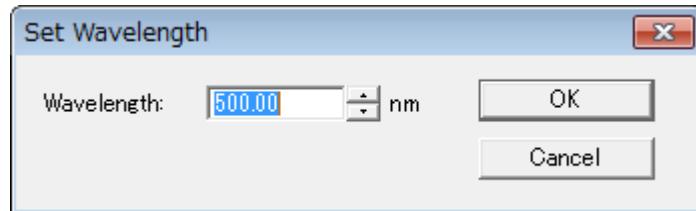


Fig. 6-22

- (2) Enter a wavelength of interest and click the **OK** button.  
After shift to the specified wavelength, a photometric value is indicated on the measurement window (refer to (1) in Fig. 6-23).

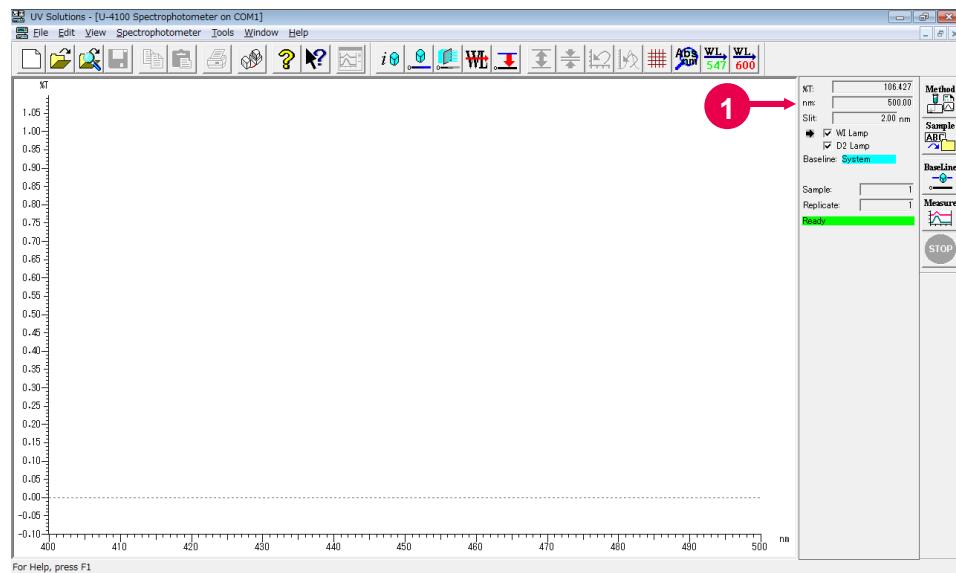
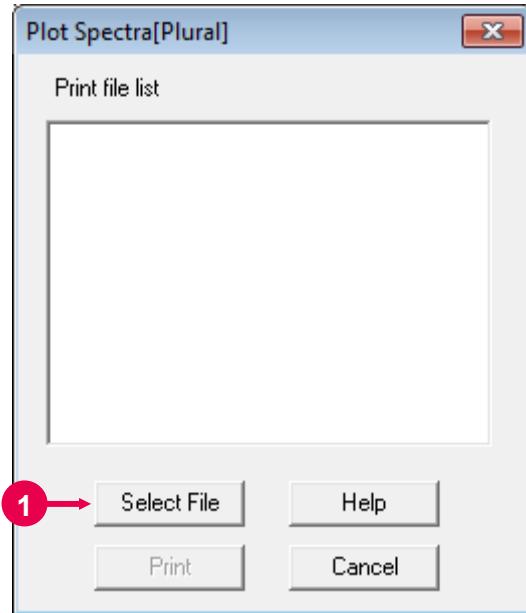


Fig. 6-23

## 6.9 Printing Files Collectively

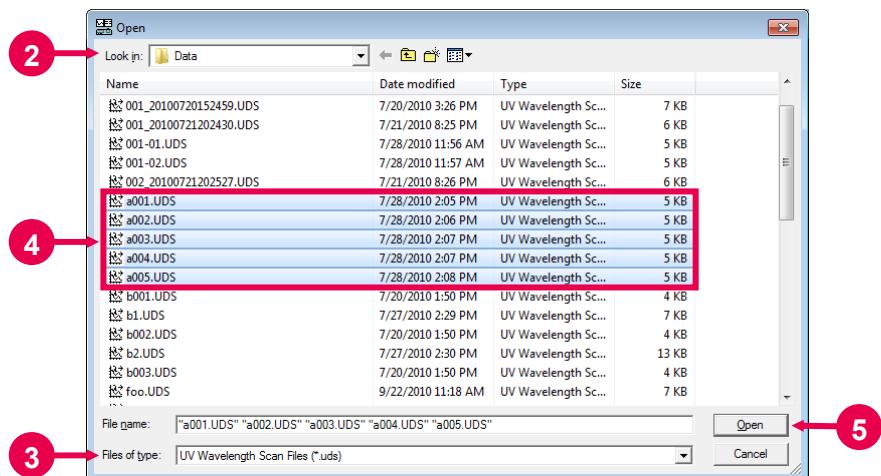
In the procedure described below, you can print out a selected group of wavelength scan data files (\*.uds) or time scan data files (\*.udt).

- (1) From the File menu on the menu bar, select the Plot Spectra [Plural] command. A dialog box as shown in Fig. 6-24 will appear. Click the **Select File** button.



**Fig. 6-24**

- (2) In the “Look in” field, specify a folder containing the files to be printed (refer to (2) in Fig. 6-25).



**Fig. 6-25**

## 6.9 Printing Files Collectively

(3) In the “Files of type” field, select a file type.

(4) Then, select the files concerned.

The following two methods are available for selecting multiple files.

Method 1: Click the first file, and then select the subsequent ones with the ↓ key while holding down the Shift key.

Method 2: Click each file while holding down the Ctrl key.

(5) After completion of file selection, click the **Open** button.

(6) The Plot Spectra [Plural] dialog box will appear, presenting a list of record files (Print file list) as shown in Fig. 6-26. After checking the list, click the **Print** button to start printing (refer to (6) in Fig. 6-26). The items to be printed are automatically selected as specified at the time of saving of each file. It is allowed to specify up to 100 files at the same time.

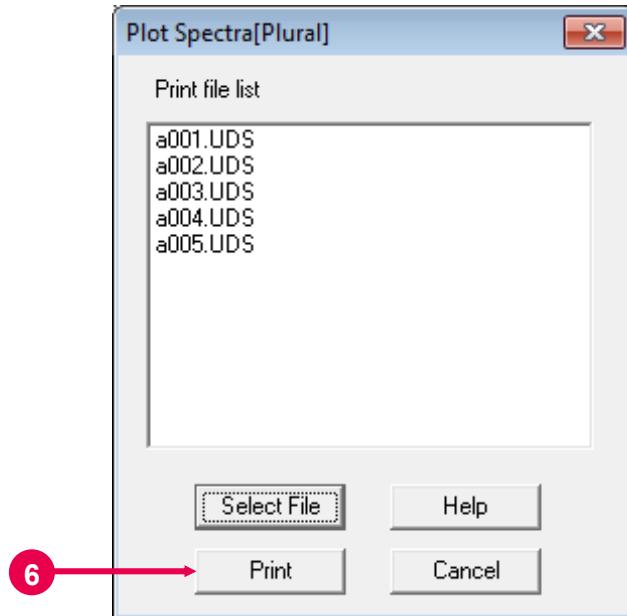
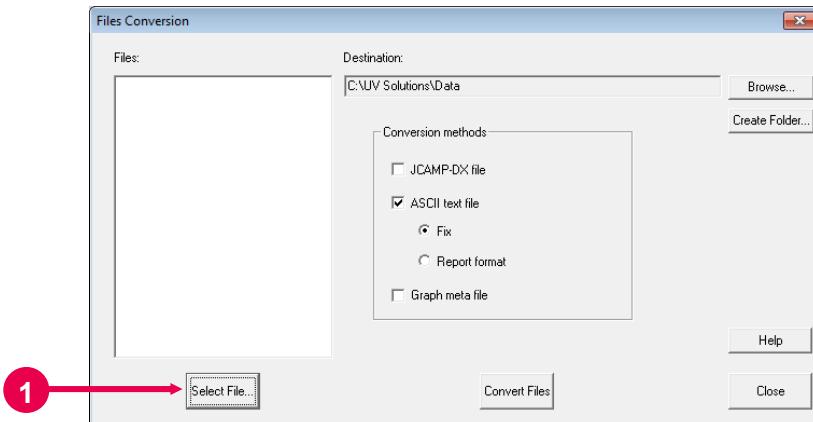


Fig. 6-26

## 6.10 Converting Files Collectively

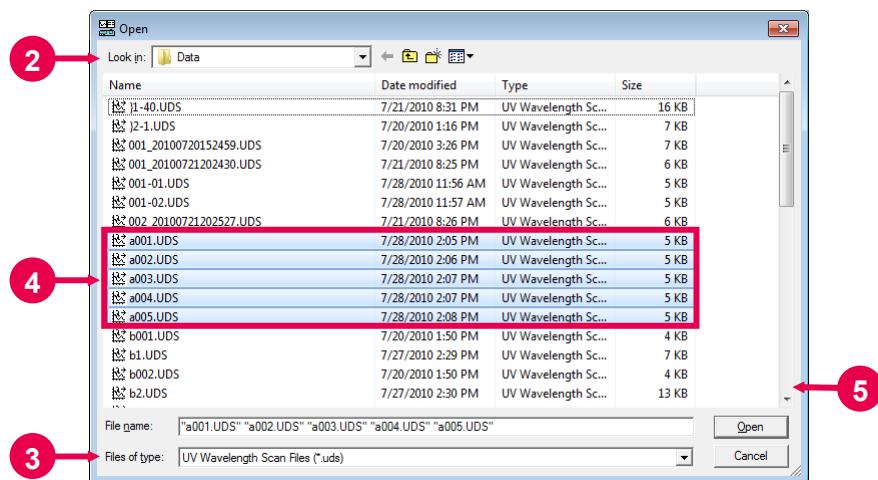
In the following procedure, you can convert data files collectively.

- (1) From the File menu on the menu bar, select the Files Conversion command. A dialog box as shown in Fig. 6-27 will appear. Click the **Select File** button, and a dialog box as shown in Fig. 6-28 will appear.



**Fig. 6-27**

- (2) In the “Look in” field, specify a folder containing the files to be converted.



**Fig. 6-28**

- (3) In the “Files of type” field, select a file type.

## 6.10 Converting Files Collectively

- (4) Then, select the files concerned.

The following two methods are available for selecting multiple files.

Method 1: Click the first file, and then select the subsequent ones with the ↓ key while holding down the Shift key.

Method 2: Click each file while holding down the Ctrl key.

- (5) After completion of file selection, click the **Open** button. The Files Conversion dialog box will appear, presenting a list of files to be converted as shown in Fig. 6-29.

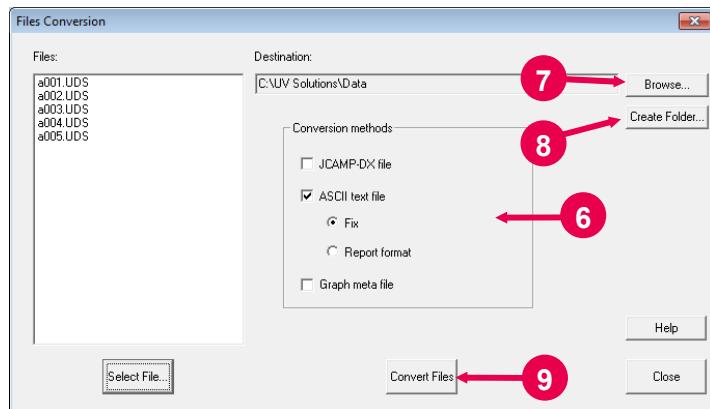


Fig. 6-29

- (6) Select a file format to be taken after conversion. You can make a selection in the Conversion methods field. It is allowed to select two or more formats for simultaneous conversion.

- JCAMP-DX file format
- ASCII text file format

When this format is selected, it is also required to select either one of the following items:

Fix

For other than photometry data, the following are output: date/time, analytical conditions and data.

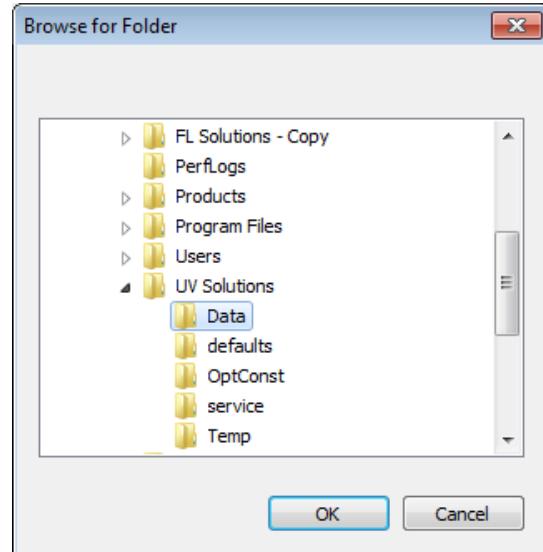
For photometry data, all information other than calibration curve is output.

Report format

Data is output according to the setting on the Report tab page of the Spectrum Properties window.

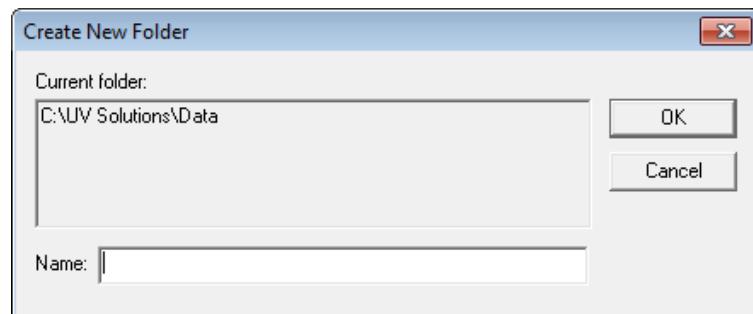
- Graph meta file

- (7) Specify a folder to be used for saving converted files. If there is an existing folder for this purpose, click the **Browse** button. The Browse for Folder dialog box will appear as shown in Fig. 6-30. In this dialog box, specify the existing folder and click the **OK** button.



**Fig. 6-30**

- (8) If there is no existing folder for the above purpose, click the **Create Folder** button. The Create New Folder dialog box will appear as shown in Fig. 6-31. Enter a new folder name in the Name field of this dialog box, and click the **OK** button. A new folder will thus be created.



**Fig. 6-31**

- (9) Click the **Convert Files** button ((9) in Fig. 6-29) to carry out file conversion.

## 6.11 Loading Files in Preview

### 6.11 Loading Files in Preview

Spectral data files can be loaded in the preview mode.

- (1) Click the  (Load Spectrum) button on the Standard toolbar (or select the Load Spectrum command from the File menu on the menu bar). A window as shown in Fig. 6-32 will appear.



Fig. 6-32

- (2) Click the **Browse** button (refer to (1) in Fig. 6-32). A dialog box as shown in Fig. 6-30 will appear. In this dialog box, specify a folder for spectral data loading.
- (3) Select one of the file type buttons (refer to (2) in Fig. 6-32). A list of relevant data files in the folder will be indicated.  
 : Wavelength scan data file  
 : Time scan data file

- (4) From the data file list, select a desired file (refer to (3) in Fig. 6-32).

The data file list is presented on the left side of the window. When a data file is selected from the list, its spectral graph is displayed. The same data file list is shown on the upper and lower parts. So you can preview two files at the same time.

- (5) Click the **Load** button (refer to (4) in Fig. 6-32).

The spectral data being displayed in the preview mode will be loaded and the data processing window will appear.

- (6) To quit the **Load Spectrum** window, click the **Close** button (refer to (5) in Fig. 6-32).

## 6.12 Viewing of Monitor Values in Enlarged Form

### 6.12 Viewing of Monitor Values in Enlarged Form

For easy reading, you can enlarge the present value part on the monitor. (For data display with the U-5100, carry out this operation after monitor measurement in 6.16.)

For this purpose, click the  (Expansion Status Display) button on the Instrument toolbar. As shown in Fig. 6-33, the Instrument Status window will appear. You can enlarge or reduce the size of this window by using the mouse.

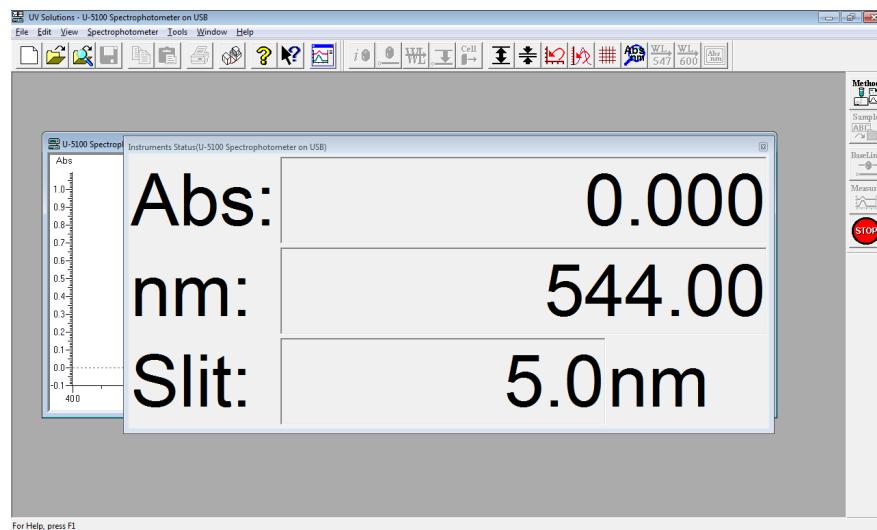
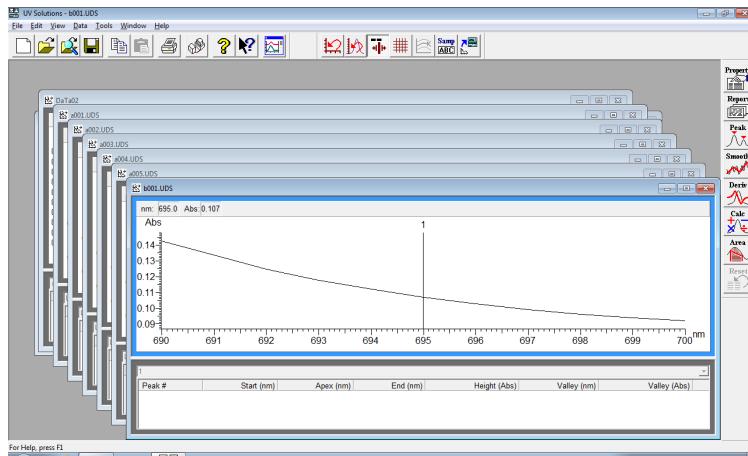


Fig. 6-33

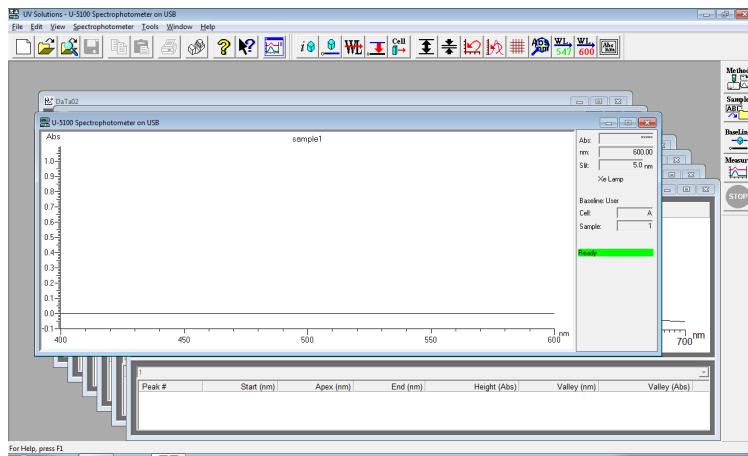
## 6.13 Bringing Monitor Window to Forefront Position

When repetitive measurement or autosampler operation has been performed, multiple spectral data processing windows may be stacked on one another as shown in Fig. 6-34. In this situation, it becomes difficult to locate the measurement window.



**Fig. 6-34**

In this case, click the (Monitor display) button on the Standard toolbar. The monitor window will be brought to the forefront position.



**Fig. 6-35**

## 6.14 Reflecting Analytical Conditions Contained in Data File

### 6.14 Reflecting Analytical Conditions Contained in Data File

Each data file contains analytical conditions that have been used for the measurement concerned. For operation in the wavelength scan, time scan or photometry mode, you can copy analytical conditions from a data file and use them for the current measurement.

- (1) Click the  (Open) button to open the Open dialog box. In this dialog box, select a data file and click the **Open** button. In the example shown here, a data file “Cooling drink-001.UDS” is selected (refer to (1) in Fig. 6-36).

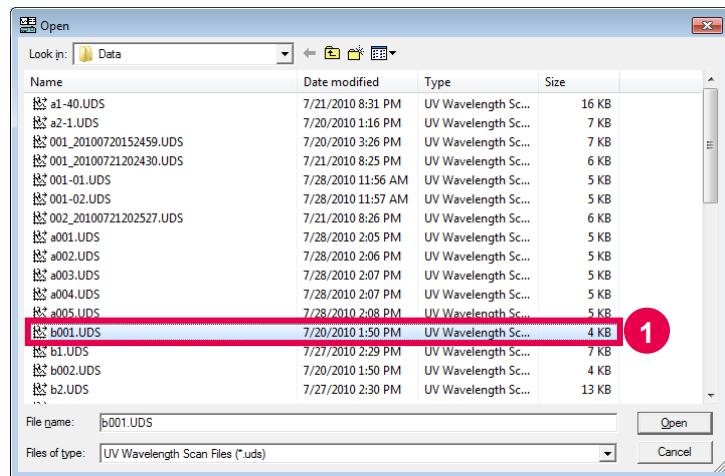


Fig. 6-36

- (2) The data file will be loaded and the data processing window will appear. In this window, click the  (Reflect Method) button (refer to (2) in Fig. 6-37).

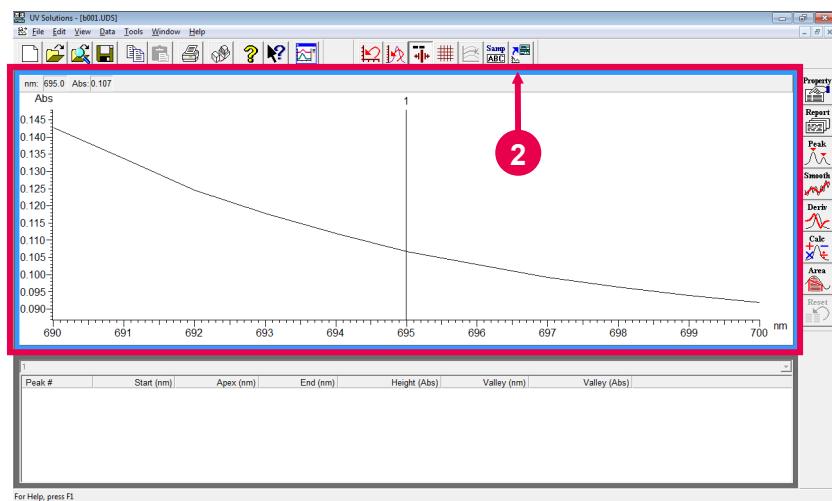
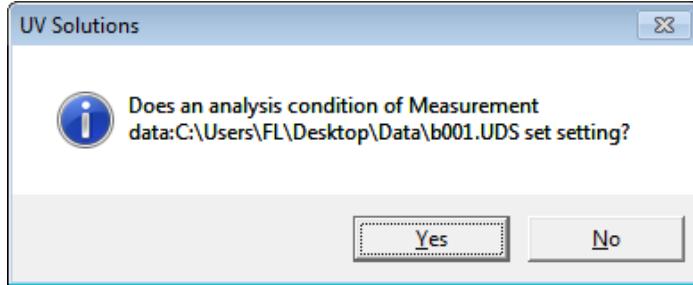


Fig. 6-37

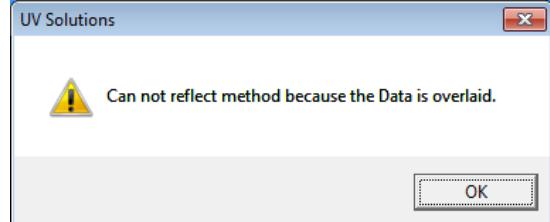
- (3) The following confirmation message will appear.



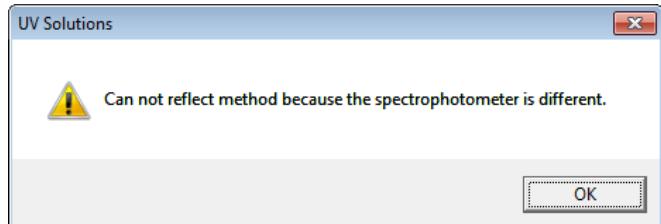
**Yes** : The current analytical conditions are overwritten with those for the data being displayed. Note that it is not allowed to restore to the current analytical conditions after execution of this step. It is advisable to execute this step saving the current analytical conditions in a file.

**No** : Reflection of analytical conditions is not executed.

**NOTES:** 1. In case of overlaid data in the wavelength scan mode or time scan mode, analytical condition reflection is not applicable. If a loaded file contains overlaid data, the following guidance will appear.



2. In case of data created on a different model of spectrophotometer, the following message appears and analytical condition reflection is not applicable.



The model name of the spectrophotometer concerning the loaded data can be checked on the Info tab page of the Spectrum Properties window.

## 6.15 Setting Standard Line

### 6.15 Setting Standard Line

The function is used when you want to display “standard line” on the spectrum that is created in advance.

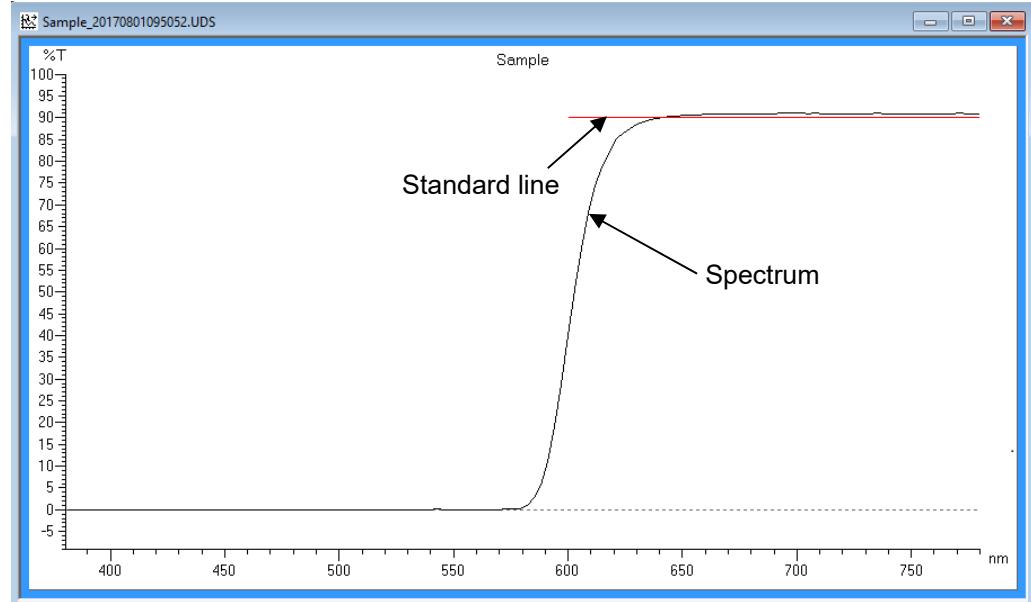


Fig. 6-38

- (1) Create a standard line file. It is created by using text file such as Notepad of Windows 10.

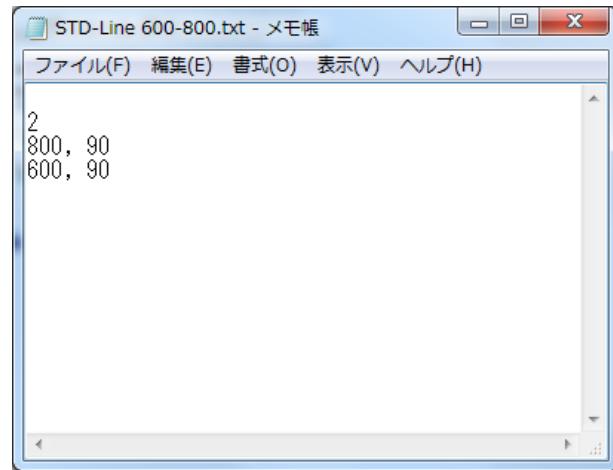
Table 6-1 Standard Line File (\*.usd)

The Number of Line	Data	Comment
1	Unused	Any words such as condition
2	The number of listed data	Enter the number of data from WL1 to WL N.
3	WL1, %T	Enter the WL, (colon), and transmittance (%T) in this order. 0 or 175 ~ 3300.00 nm
4	WL2, %T	Enter the WL, (colon), and transmittance (%T) in this order. 0 or 175 ~ 3300.00 nm
...	...	
n+2	WL (n), %T	

**Caution:** Create the file following the under condition.

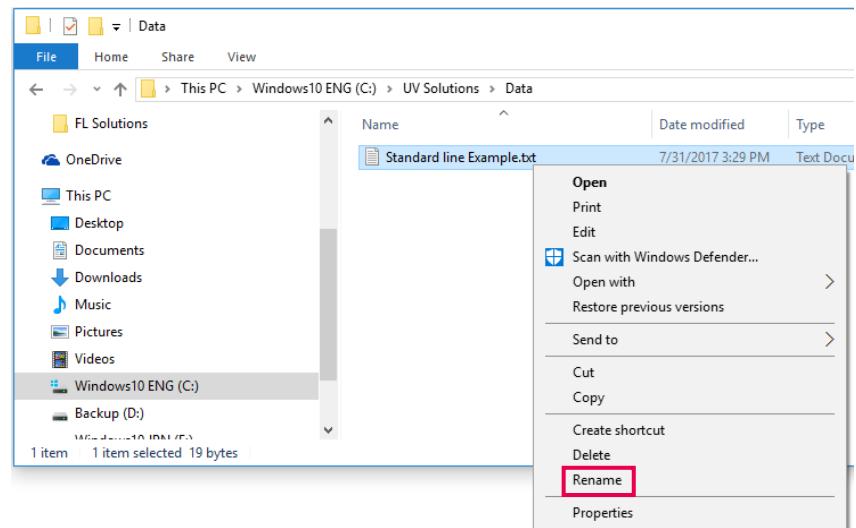
- The number of standard lines ≤ The number of both WL and data.
- WL = 0 means that standard line is not displayed. Several standard line is created in the 1 file. “0” is counted as 1 data.

For instance, when you create 90% transmittance line from wavelength 600 to wavelength 800 nm, table is Fig. 6-39.



**Fig. 6-39 Example in the Notepad**

- (2) After create text file, click the text file on the right. Select “Rename” and change extension from “txt.” to “usd.” (Standard line format).



**Fig. 6-40**

## 6.15 Setting Standard Line

If the caution (Fig. 6-41) is displayed, click "Yes".

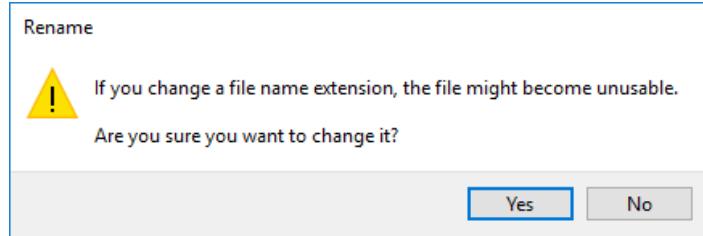


Fig. 6-41

- (3) Next, create a correction factor files. When you want to use factor to the standard line. Correction factor is created by using text file such as Notepad of Windows 10.

[Calculation of correction factor]

Corrected standard line = (Data of standard line)/ (correction factor equivalent to the wavelength of the standard line)  
Refer to the "Appendix E Detail of standard line".

Table 6-2 Correction Factor File (\*.ufa)

The Number of Line	Data	Comment
1	Start WL	Enter the starting WL (176.00 ~ 3300.00 nm)
2	End WL	Enter the ending WL (175.00 ~ 3299.00 nm)
3	WL interval	Enter the interval for correction (0.10 ~ 100.00 nm)
4	After the decimal point	0 ~ 5 digit
5	The number of data	Enter the number of correction factor 2 ~ 500
6	Correction factor 1	Start WL
7	Correction factor 2	Start WL-WL interbal×1
8	Correction factor 3	Start WL-WL interbal×2
9	Correction factor 4	Start WL-WL interbal×3
...		
n+5	Correction factor n = ((Start WL - End WL)/(WL interval) +1	Start WL- (WL interval×(n-1))

**Caution:** Create the file following the under condition.

- Start WL > End WL
- Integral part of ((Start WL-End WL)/WL interval) ≤ 500
- WL interval ≤ (Start WL- End WL)
- Correction factor :  
Enter correction factor at designated WL interval.  
0~99.9999, the number of after decimal point depends on your set up.

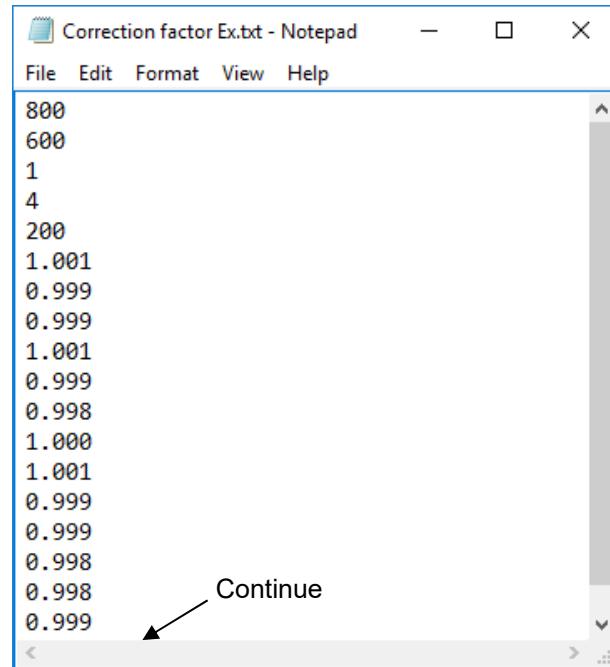
For instance, you create correction factor as follow.

- WL from 600 to 800 nm
- Interval 1 nm
- After decimal point 3 digit.

Table Fig. 6-39 shows the example for Windows 10 Notepad.

**Table 6-3**

1	Start WL (nm)	800
2	End WL (nm)	600
3	WL interval	1
4	After the decimal point	3
5	The number of data	200
6	Correction factor	1.001
7	Correction factor	0.999
...	Correction factor	...
205	Correction factor	1.001



**Fig. 6-42 Example in the Notepad**

## 6.15 Setting Standard Line

- (4) After create text file, click the text file on the right. Select “Rename” and change extension from “txt.” to “ufa.” (correction factor file format).

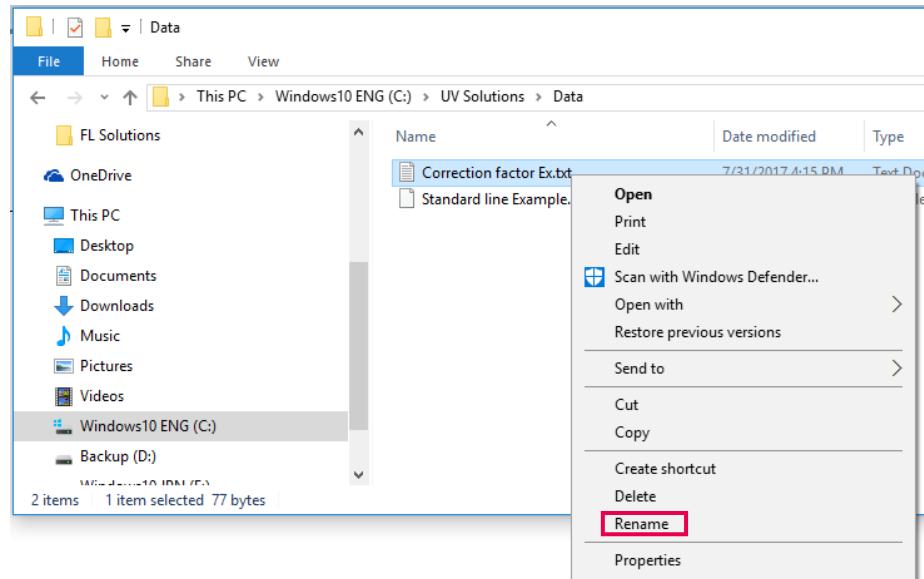


Fig. 6-43 Example in the Notepad

If the caution (Fig. 6-38) is shown, click “Yes”.

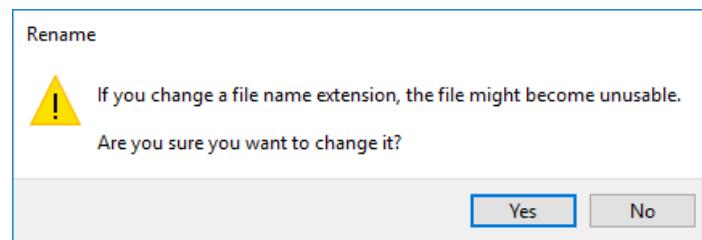
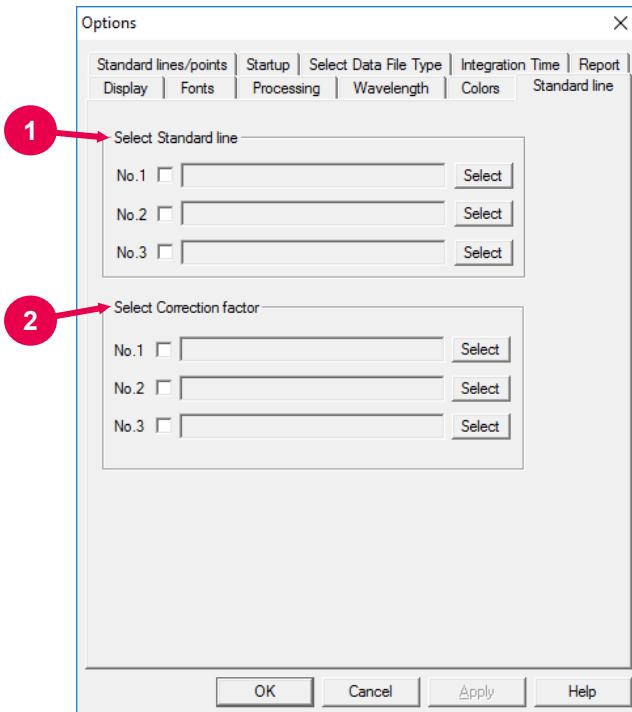


Fig. 6-44

- (5) Load the files (standard line and correction factor) to the UV Solutions. Select “Tool” menu, “Option”, then, standard line.



**Fig. 6-45 Standard line Tab**

1) Select Standard line

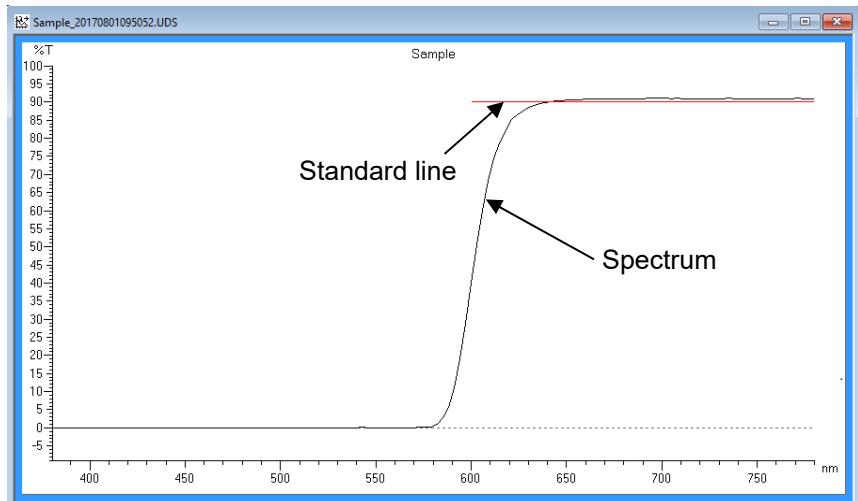
Click “Select” button and designate standard line that you want. From No.1 to No.3 can be selected. When the boxes are clicked, the standard lines are applied.

2) Select correction factor

Click “Select” button and designate correction factor that you want. From No.1 to No.3 can be selected. When the boxes are clicked, the Correction factor are applied.

When the data files are opened, both standard line and spectrum are shown together. Print is possible.

## 6.15 Setting Standard Line



**Fig. 6-46 Standard Line**

## 6.16 Carrying out Monitor Measurement (function only for U-5100)

This function is available only for the U-5100. With the U-5100, the lamp is turned off unless measurement is being made.

The function is used when you want to turn on the lamp and start monitor measurement.

Click the  (Monitor Measurement) button on the Instrument toolbar. The lamp will come on and monitor measurement will start. Then, the current photometric values will be displayed on the screen as shown in Fig. 6-47. To terminate monitor measurement, click the  (Stop) button.

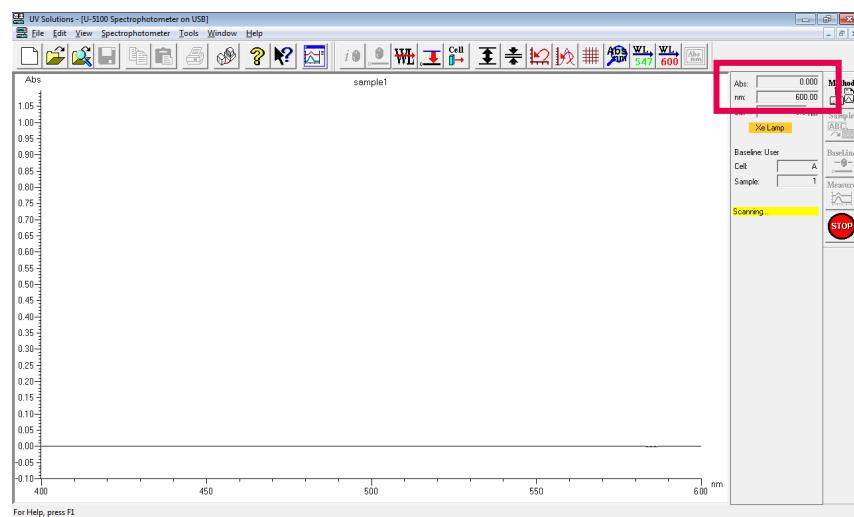


Fig. 6-47

**NOTE:** Monitor measurement is not allowed during measurement and execution of the photometry sequence.

## 6.17 Moving 6-cell Turret (function only for U-5100)

### 6.17 Moving 6-cell Turret (function only for U-5100)

This function is only for the U-5100. By using the function, you can move the 6-cell turret furnished with the U-5100 to an aimed-at cell position.

- (1) Click the  (Move Cell) button on the Instrument toolbar. The **Cell Move** dialog box will appear as shown in Fig. 6-48.

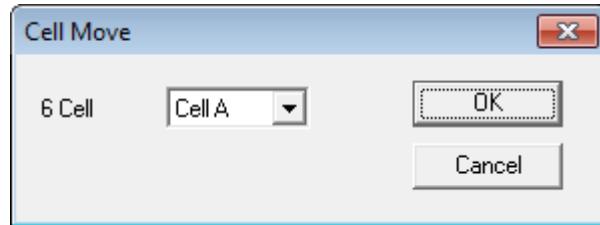


Fig. 6-48

- (2) Click  and select a cell position to which you want to move the 6-cell turret. It will move to the aimed-at cell position.

**NOTE:** This function cannot be used when "Off" is selected for the 6 Cell Mode on the General tab page of the Analysis Method window.

## 6.18 Use the detector zero correction function during wavelength scanning (Only for UH4150/UH4150/UH4150AD+)

This section describes the detector zero correction function during wavelength scanning.

This function stores the zero level of the detector in advance by wavelength scanning, and the correction value can be used when measuring the wavelength scanning of the sample. This function is effective when the zero level of the detector has different ups and downs at each wavelength.

When using this function, select "Detector zero correction" - "ON" in the analysis method for wavelength scanning (Fig. 6-49). When using this function, select user 1 or user 2 as the baseline setting. After setting other analysis method, press the OK button.

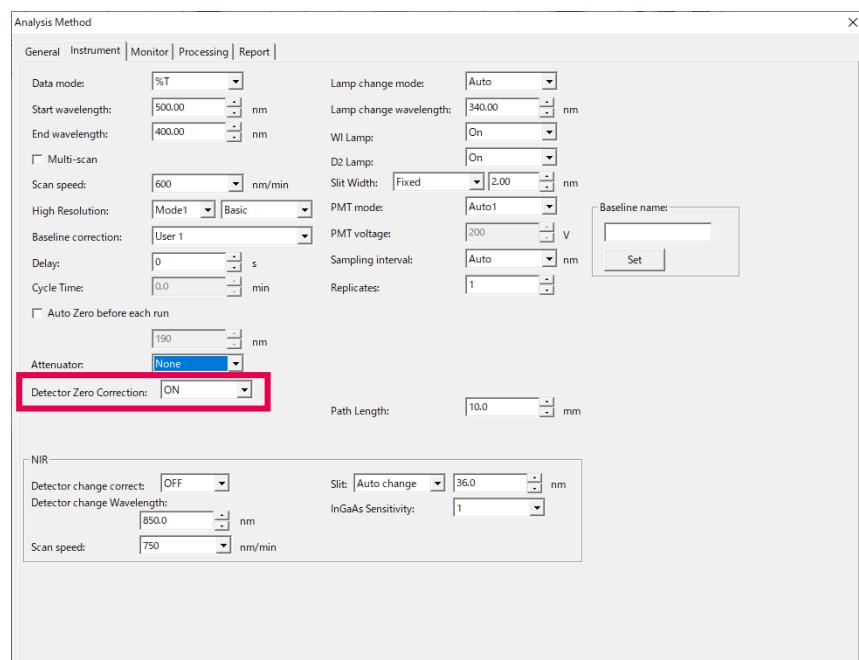


Fig. 6-49

Select the "Record Baseline (B)" command from the

"Spectrophotometer (S)" menu, or click the  (Baseline) button. The screen in Figure 6-50 is displayed.

Select the user baseline (User 1 or User 2) set in "Baseline Correction" on the "Instrument" tab.

Then click the OK button.

## 6.18 Use the detector zero correction function during wavelength scanning (Only for UH4150/UH4150/UH4150AD+)

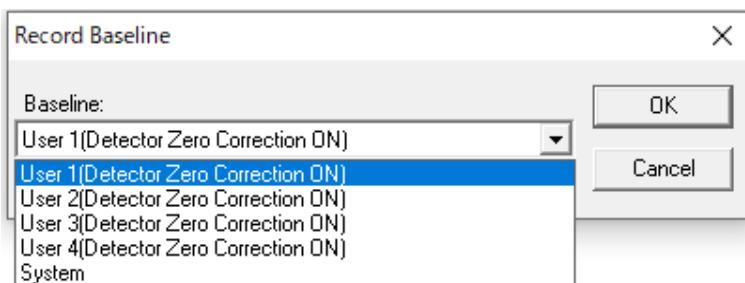


Fig. 6-50

When detector zero correction is set, the guidance in Figure 6-51 is displayed because the detector zero correction scan is performed before the baseline measurement. Set the shutter in the sample side and close the sample compartment. Then click the OK button.

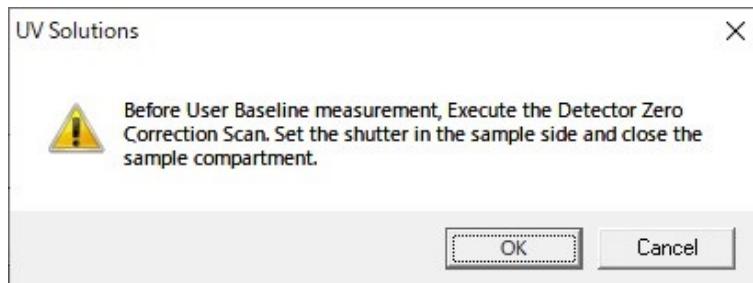


Fig. 6-51

**NOTICE:** 1: Do not open the sample compartment lid during the detector zero correction scan. The correct correction value may not be obtained, and the wrong data may be obtained. If you accidentally open the sample compartment lid, perform zero detector correction again.  
2: When using the R / S inversion function, the luminous flux on the sample side of the device is inverted, so also invert the shutter installation position.

When the detector zero correction is completed, Figure 6-52 is displayed. Remove the shutter set in the sample chamber and close the sample compartment. Then click the OK button.

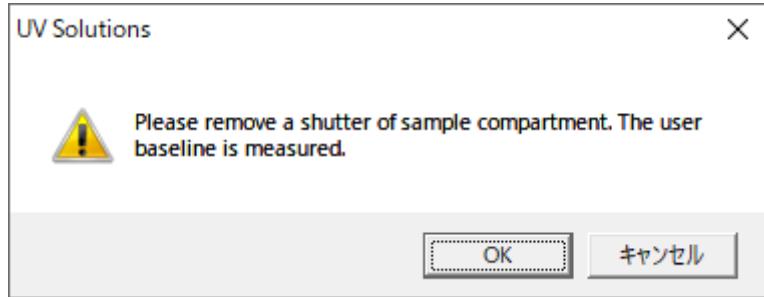


Fig. 6-52

**NOTICE:** 1: Do not open the sample compartment lid during the detector zero correction scan. The correct correction value may not be obtained, and the wrong data may be obtained. If you accidentally open the sample compartment lid, perform zero detector correction again.

A user baseline measurement is performed. After the user baseline measurement, proceed to sample measurement. By the above operation, zero level corrected measurement data can be obtained.

**NOTICE:** 1: Be sure to follow the guidance when making corrections and insert the shutter.  
2: If a significantly different data is obtained when using this function, reconfirm the correction procedure and perform baseline correction again.  
3: Use the same method when measuring samples and when measuring baselines. Using different conditions can cause incorrect data.

## 6.19 High absorbance measurement (Only for UH4150AD+)

### 6.19 High absorbance measurement (Only for UH4150AD+)

When measuring a sample with high absorbance and low transmittance, it is possible to improve the measurement accuracy by dimming the amount of light on the reference side. With the UH4150AD+, it is possible to automatically insert four types of attenuation with dimming rates of 1/10, 1/100, 1/1000, and 1/10000 into the reference side.

Refer to Table 6-4 and set the attenuation conditions according to the absorbance of interest and perform the measurement.

**Table 6-4**

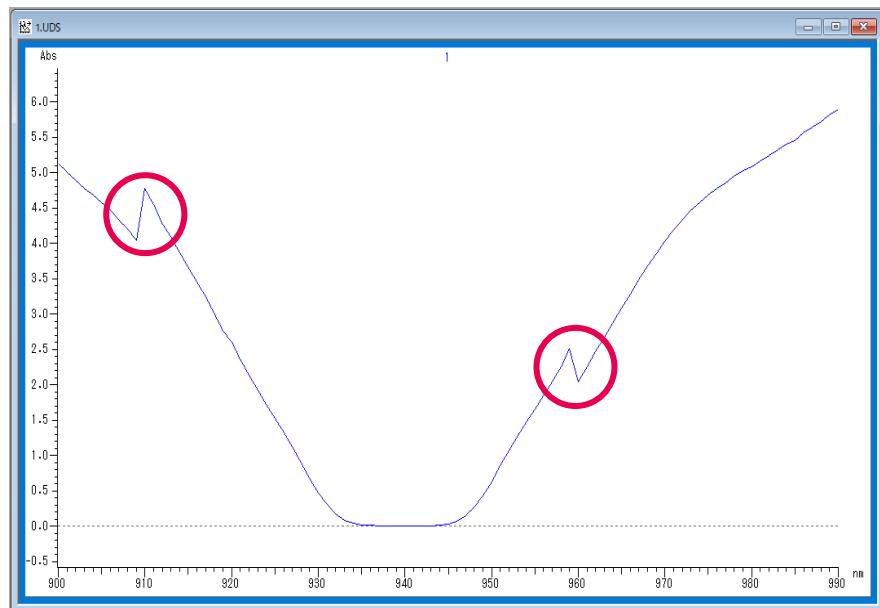
Absorbance of interest	Attenuator condition in analysis method
0-3 Abs	none
1-4 Abs	1/10
2-5 Abs	1/100
3-6 Abs	1/1000
4-8 Abs	1/10000

**NOTICE:** 1: When using the multi-scan function in the near-infrared region, set the attenuator conditions according to Section 6.20.

**NOTICE:** 1: Be sure to follow the guidance when making corrections and insert the shutter.  
When an integrating sphere is used, select from none, 1/10, 1/100, and 1/1000.

## 6.20 How to set multi-scan conditions (Only for UH4150AD+)

When measuring in the near-infrared wavelength range using the multi-scan function, there may be a gap in the spectrum near the switching wavelength of the measurement block (Fig. 6-53). When the near-infrared slit condition is set as automatically controlled, a gap will occur at attenuator switching point.



**Fig. 6-53**

The slit width changes rapidly and the resolution changes. It causes a gap in the spectrum. In order to perform multi-scan measurement so that there is no gap in the near infrared region, set the attenuator so that the amount of light on the sample side is as large as possible. Table 6-5 shows the multi-scan conditions when the above spectrum was measured.

**Table 6-5 Multi-scan conditions when measuring the spectrum in Figure 6-53**

No.	Start WL (nm)	End WL (nm)	Scan speed (nm/min)	Atenuator
1	990	980	30	1/1000
2	980	960	150	1/100
3	960	910	300	none
10	910	900	30	1/1000

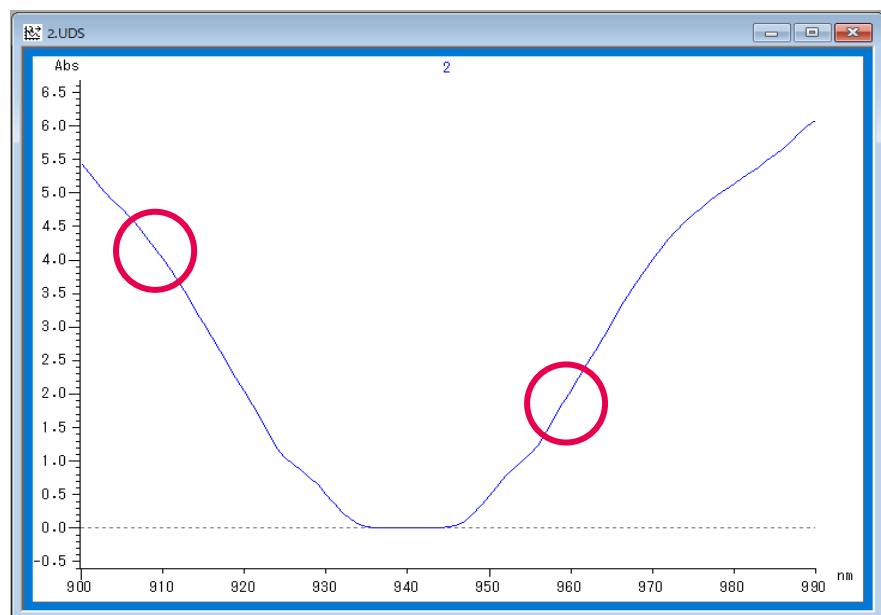
## 6.20 How to set multi-scan conditions (Only for UH4150AD+)

In the spectrum shown in Figure 6-53, there are steps at wavelengths of 960 nm and 910 nm. In these wavelength ranges in Table 6-5, the attenuator is switched from "1/100" to "none" or "none" to "1/1000". At a wavelength of 960 nm, the absorbance of the sample is about 2 to 2.5. At this point, attenuator is changed from "1/100" to "none", and the absorbance of the reference side is 2 to 0. It is rapid change. Regarding slit auto mode, slit is controlled by the either side which is larger amount of light. Under this condition, reference side control the slit width. That causes slit change a lot such as Slit wide (absorbance 2) to Slit narrow (absorbance 0). Rapid slit change causes the gap of spectrum. At a wavelength of 910 nm, the absorbance of the sample is about 4 to 4.5. The absorbance of the reference side is 0 to 3. At this point reference side control the slit width because reference side has large amount of light. That causes slit change a lot such as Slit wide (absorbance 0) to Slit narrow (absorbance 3). Rapid slit change causes the gap of spectrum.

Under this condition, reference side has large amount of light. Attenuator change causes the gap of spectrum. To avoid the gap of spectrum, try to increase the amount of light on the sample side as much as possible. Set the multi-scan conditions as shown in table 6-6. As a result, spectrum without gap is obtained as shown in Fig.6-54.

**Table 6-6 Multi-scan conditions when measuring the spectrum in Figure 6-54**

No.	Start WL (nm)	End WL (nm)	Scan speed (nm/min)	Atenuator
1	990	960	30	1/1000
2	960	920	150	1/100
10	920	900	30	1/1000



**Fig. 6-54**

## 7. MEASUREMENT BY USING ACCESSORIES

A variety of accessories are separately available for the Hitachi spectrophotometer. This section describes how to use the auto sipper and autosampler (AS-1010). For details including cable connection, refer to the instruction manual for each accessory.

### 7.1 Using Auto Sipper

Shown below are the applicable combinations of the spectrophotometer and auto sipper. Check that the auto sipper to be used is proper.

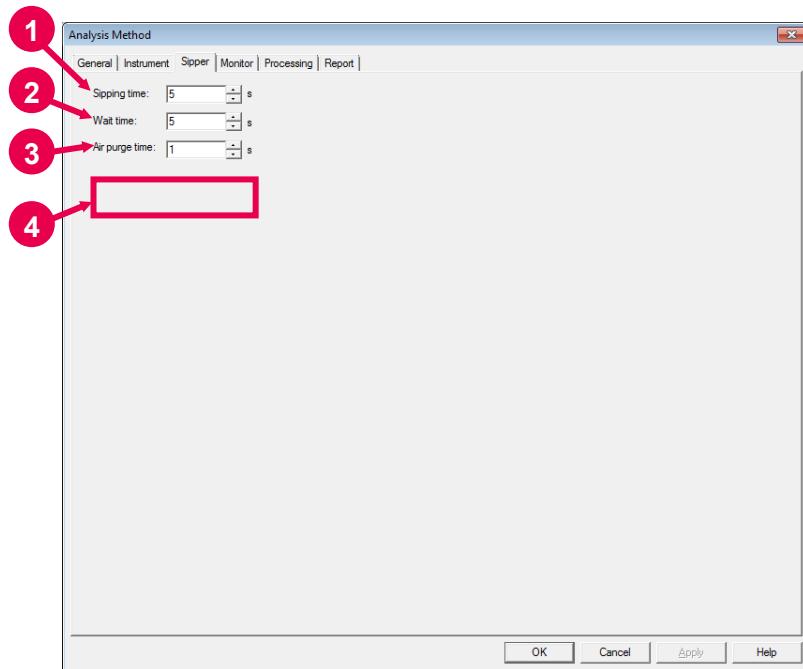
Model	Part No.	
	Auto Sipper (without temperature control function)	Thermoelectric Auto Sipper (with temperature control function)
U-1900	3J0-0100	—
U-2900/2910 U-3900/U-3900H	2J1-0100	2J1-0101
U-5100	3J2-0100	—

## 7.1 Using Auto Sipper

### 7.1.1 Auto Sipper Condition Setting

In the following procedure, you can set up a sipping time and other operating conditions for the auto sipper.

From the Edit menu, select the Method command to open the Analysis Method window. In this window, select the Sipper tab. For details of the other tabs, refer to Sections 2 to 4.



**Fig. 7-1 Sipper Tab**

On the Sipper tab page, set up the following parameters:

(1) Sipping time

Specify a sample sipping time.

Input range: 0.0 to 60.0 s

(2) Wait time

Specify a wait time to be taken after the end of sample sipping until the start of measurement. This period of time is required so that measurement will not be started before a liquid-layer disturbance settles down after sample sipping. When measuring an organic solvent sample or there is a significant difference with respect to the temperature level selected for the flow cell, it is recommended to specify a wait time of 20 seconds or longer.

Input range: 0.0 to 999.9 s

**NOTE:** The Instrument tab page has also a wait time item.  
For this item, set up “0”.

(3) Air purge time

Specify a period of time to be taken for air purging. When this value is “0”, air purging is not carried out. For a sample volume of 0.8 mL or less, it is recommended to perform air purging for about 2 seconds to minimize the degree of carryover in measurement.

Input range: 0.0 to 60.0 s

(4) Temperature (indicated when thermoelectric auto sipper is connected)

The cell part of the auto sipper can be maintained at a constant temperature by using this function. You can set up a constant temperature level in the range given below.

Input range: 20 to 40°C, in steps of 0.1°C

After completion of analytical condition setting, you may proceed to measurement operation. An example of measurement in the photometry mode is described below.

### 7.1.2 Standard Measurement

Create a calibration curve first, and then carry out sample measurement.

- (1) Click the  (Edit Method) button, open the Standards tab page, and check that the standards have been defined (refer to 4.2.4).  
Click the  (Sample/Comment) button or the  (Edit Sample Table) button, and check that the samples have been defined (refer to 4.3).
- (2) Click the  (Start Series) button to start measurement. At the start of measurement, a dialog box as shown in Fig. 7-2 will appear.

## 7.1 Using Auto Sipper

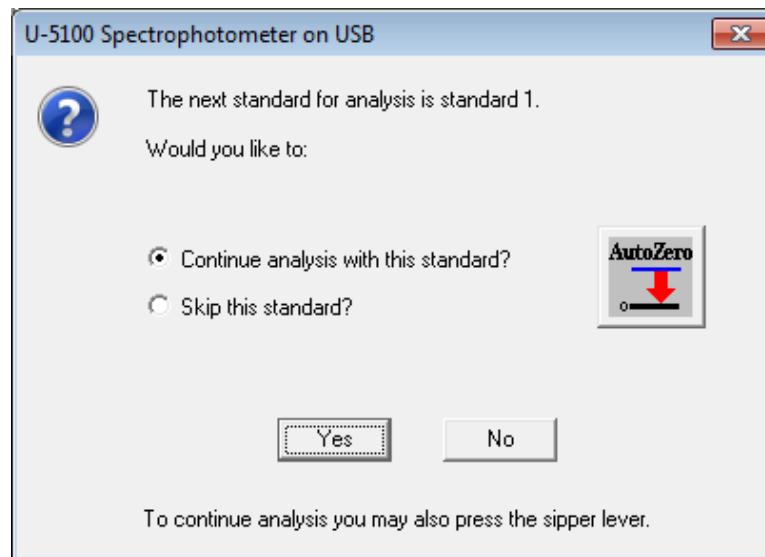


Fig. 7-2

- (3) Set a standard sample and press the sipping lever. The standard sample will be sipped to start its measurement.  
After completion of the first standard measurement, proceed to the next standard measurement. When the dialog box shown in Fig. 7-2 appears, set the next standard sample and press the sipping lever.  
Repeat standard measurement according to the number of standard samples specified on the Standards tab page of the Analysis Method window.
- (4) Upon completion of standard measurement, proceed to sample measurement.

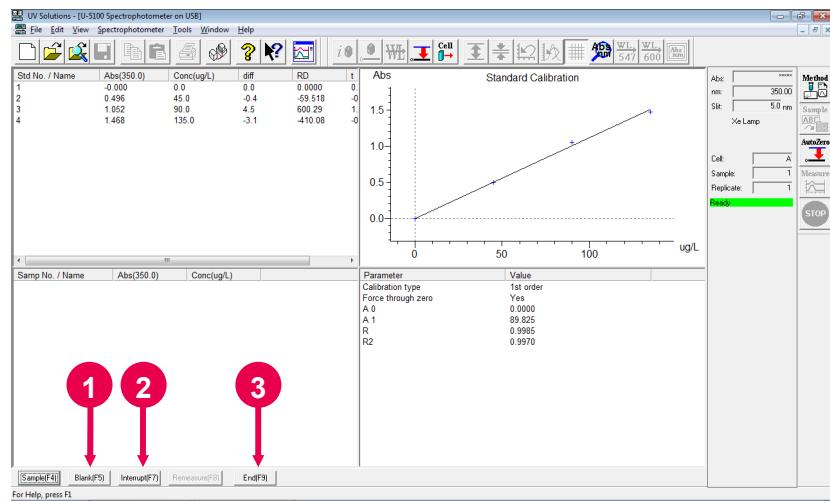
**NOTE:** When repetitive measurement has been specified, the "Waiting" message will appear for measurement of the second and subsequent samples. In answer to this message, press the sipping lever.

### 7.1.3 Sample Measurement

Carry out sample measurement.

Note that the sample measurement procedure differs depending on whether a sample table is used or not.

- (1) When Not Using a Sample Table (when “Use Sample Table” is not turned on in Analysis Method window):



**Fig. 7-3**

Upon completion of standard measurement, a window as shown in Fig. 7-3 will appear.

Set a sample and press the sipping lever. The sample will be sipped and measured, and its measurement result data will be displayed. For measurement of the next sample, set it and press the sipping lever.

Upon completion of sample measurement, click the **End (F9)** button (refer to (3) in Fig. 7-3).

In case that auto saving has been specified, the measurement result data will be automatically saved under a specified file name at a specified location.

In case that auto saving has not been specified, select the Save As command from the File menu for saving the measurement result data.

## 7.1 Using Auto Sipper

### <Blank Measurement>

For blank measurement in the course of sample measurement, click the **Blank (F5)** button (refer to (1) in Fig. 7-3). When a dialog box as shown in Fig. 7-4 appears, set a blank sample and press the sipping lever.

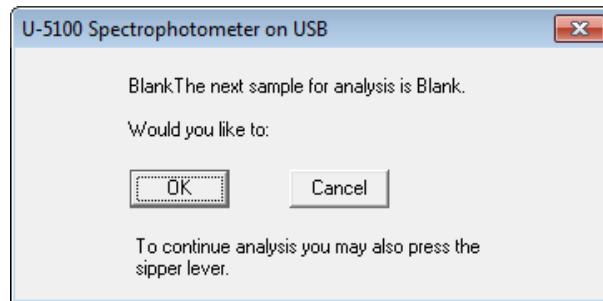


Fig. 7-4

**NOTE:** Clicking the **OK** button starts measurement without sipping.

After sipping of the blank sample, measurement is carried out and its measurement result data is displayed.

### <Interrupt Measurement>

For interrupt measurement in the course of sample measurement, click the **Interrupt (F7)** button (refer to (2) in Fig. 7-3).

When a dialog box as shown in Fig. 7-5 appears, enter an interrupt sample number.

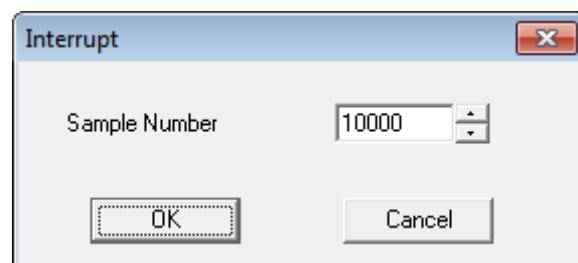


Fig. 7-5

After entering the interrupt sample number, click the **OK** button. A dialog box as shown in Fig. 7-6 will appear.

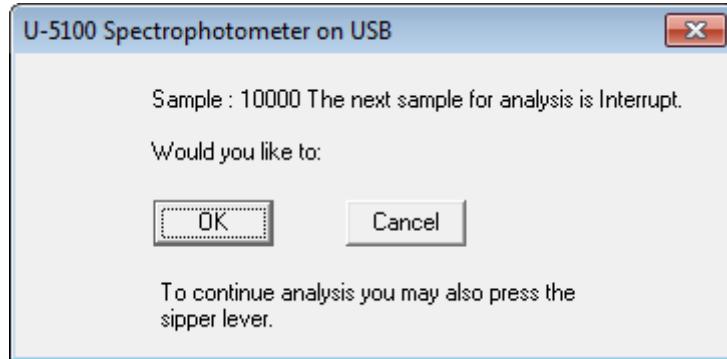


Fig. 7-6

Set a sample and press the sipping lever. Interrupt sample measurement will start. After the sample is sipped, measurement is carried out and its measurement result data is displayed.

#### <Remeasurement>

Click the sample data to be remeasured, and select Remeasure command from the Spectrophotometer menu or click the **Remeasure (F8)** button.

When a message as shown in Fig. 7-7 appears, set a sample and press the sipping lever.

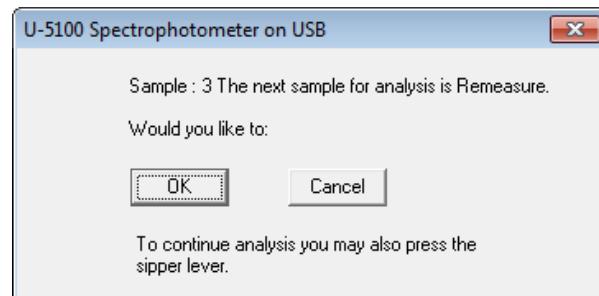


Fig. 7-7

**NOTE:** When standard data has been clicked and then the Remeasure command has been selected from the Spectrophotometer menu or the **Remeasure (F8)** button has been clicked, the message shown in Fig. 7-7 will not appear. Instead, the "Waiting" message will appear. When the "Waiting" message appears, set a sample and press the sipping lever.

## 7.1 Using Auto Sipper

- (2) When Using a Sample Table (“Use Sample Table” is turned on in Analysis Method window):

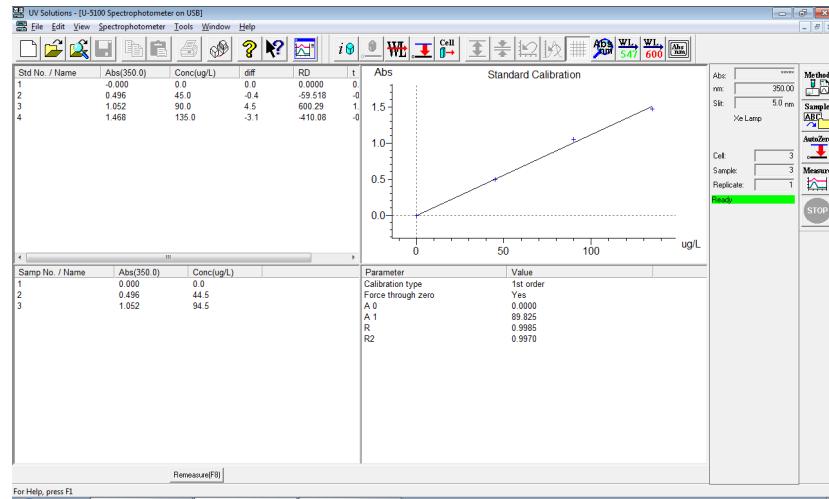


Fig. 7-8

Upon completion of standard measurement, a message box as shown in Fig. 7-9 will appear. Set a sample and press the sipping lever.

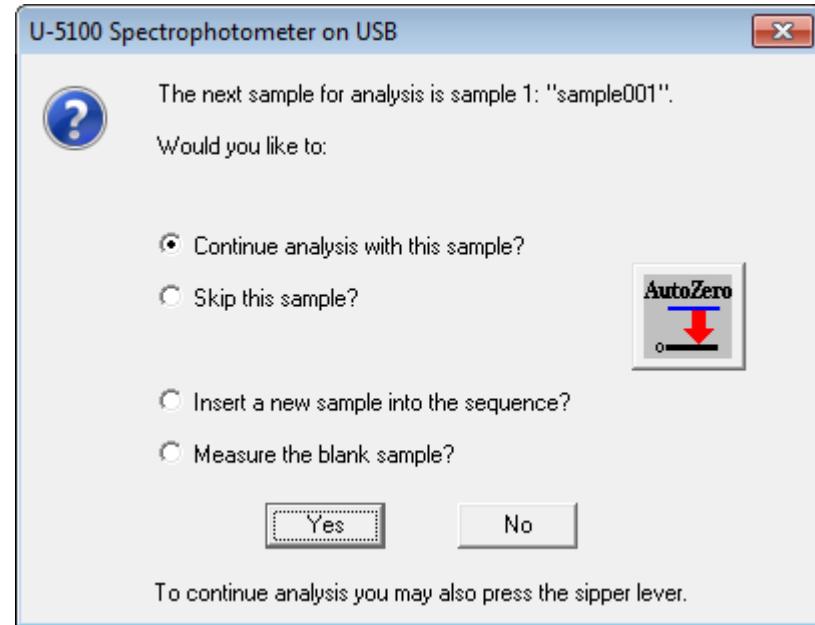


Fig. 7-9

The sample is sipped and measured, and its measurement result data is displayed. According to the sample information specified in the sample table, the message box will appear again. Set the next sample and press the sipping lever.

To halt sample measurement halfway, click the **No** button.

Upon completion of sample measurement, the data processing window shown in Fig. 7-10 will appear automatically (only when “Open data processing window after acquisition” has been selected on the Monitor tab page of the Analysis Method window).

When the samples specified in the sample table are all measured, their photometry data will be automatically saved under a specified file name at a specified location.

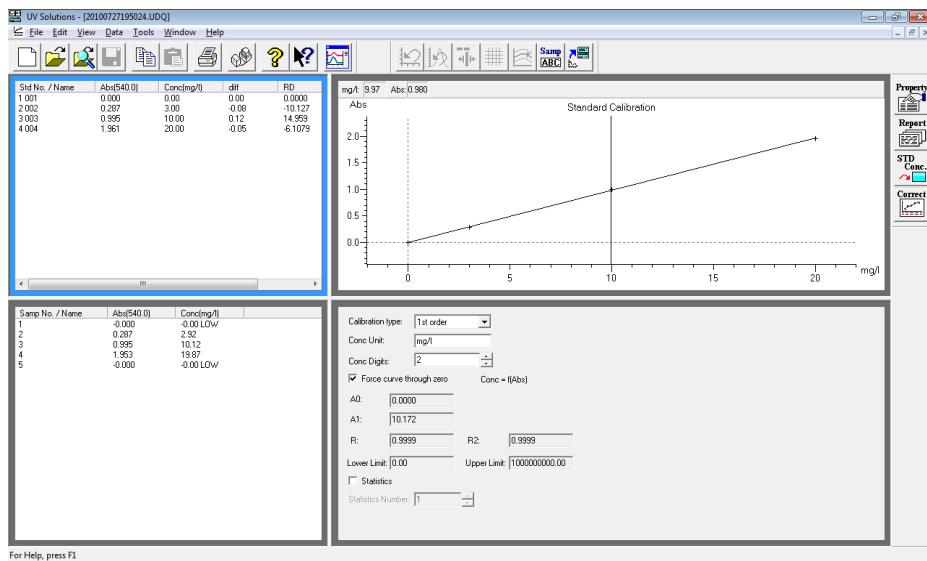


Fig. 7-10

## 7.1 Using Auto Sipper

### <Interrupt Measurement>

For interrupt measurement, select “Insert a new sample into the sequence” as shown in Fig. 7-11 and then click the **Yes** button (refer to (4) in Fig. 7-11).

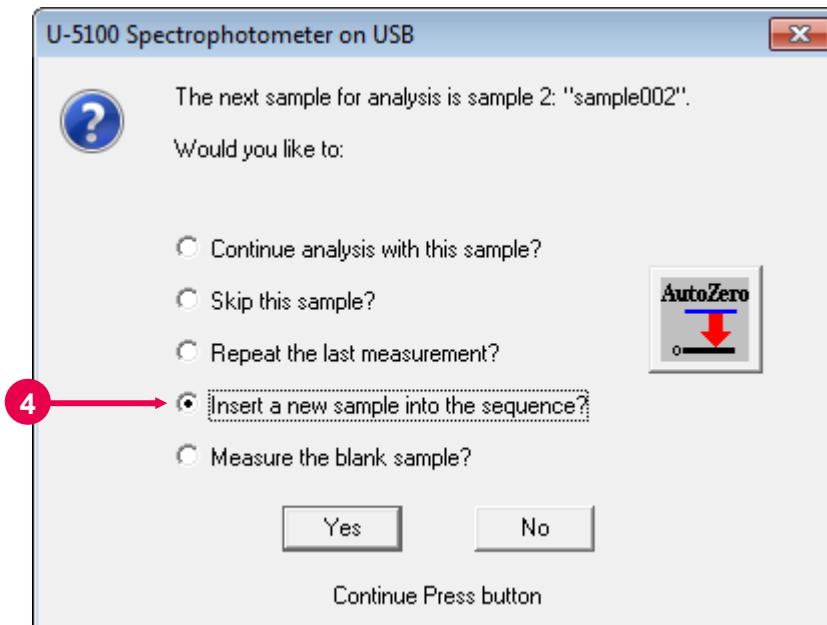


Fig. 7-11

When a dialog box as shown in Fig. 7-12 appears, enter a sample name and comment. Then, click the **OK** button. When the “Waiting” message appears, set an interrupt sample and press the sipping lever.

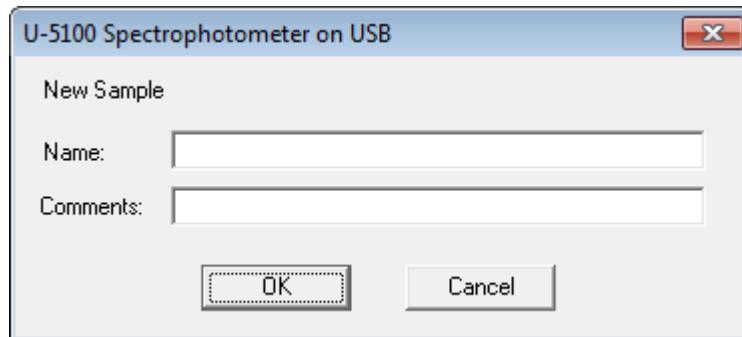


Fig. 7-12

**NOTES:**

1. Information entered in this dialog box is additionally reflected in the monitor window.
2. When repetitive measurement has been specified, the "Waiting" message will appear for measurement of the second and subsequent samples. In answer to this message, press the sipping lever.

<Remeasurement>

When performing remeasurement through the following message box that is to be presented during a series of measurements:

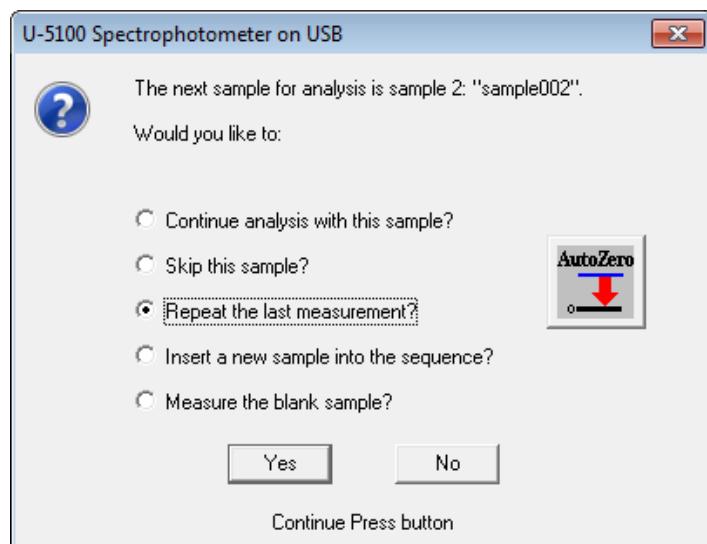


Fig. 7-13

Select "Repeat the last measurement?" and click the **Yes** button.

When the "Waiting" message appears, press the sipping lever.

**NOTE:** If the sipping lever is pressed without clicking the **Yes** button, measurement data is provided for the sample next to the one to be remeasured. To avoid this, be sure to click the **Yes** button. This procedure should be observed for skipping and interrupt measurement also.

## 7.1 Using Auto Sipper

Remeasurement after completion of a series of measurement:

Click the sample data to be remeasured and then select the Remeasure command from the Spectrophotometer menu or click the **Remeasure** button.

When the “Waiting” message appears, press the sipping lever.

<Skipping>

Select “Skip this sample?” and click the **Yes** button.

You can thus proceed to measurement of the next sample.

In the wavelength scan mode or time scan mode, take the following operational procedure.

- When not using a sample table:

After condition setting, the “Ready” message will appear on the monitor window. Then, set a sample and press the sipping lever. The sample is sipped and its measurement is started.

- When using a sample table:

After condition setting, the “Ready” message will appear on the monitor window. Then, click the  (Start Series) button to start measurement.

When a message box as shown in Fig. 7-14 appears, set a sample and press the sipping lever. The sample is sipped and its measurement is started.

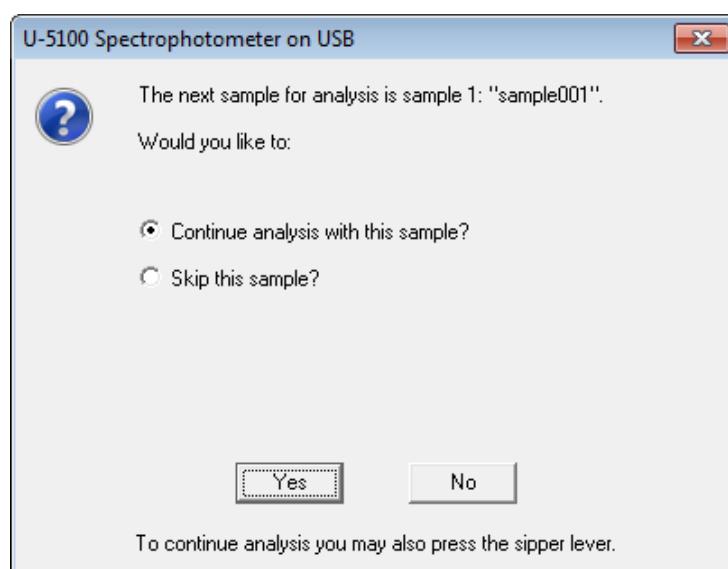


Fig. 7-14

**NOTE:** For repetitive measurement in the wavelength scan mode, specify a value of “2” or larger for Replicates on the Instrument tab page of the Analysis Method window. To execute repetitive measurement, specify “0” for Air purge time on the Sipper tab page of the Analysis Method window. If a value other than “0” is set up, proper measurement will not be carried out.

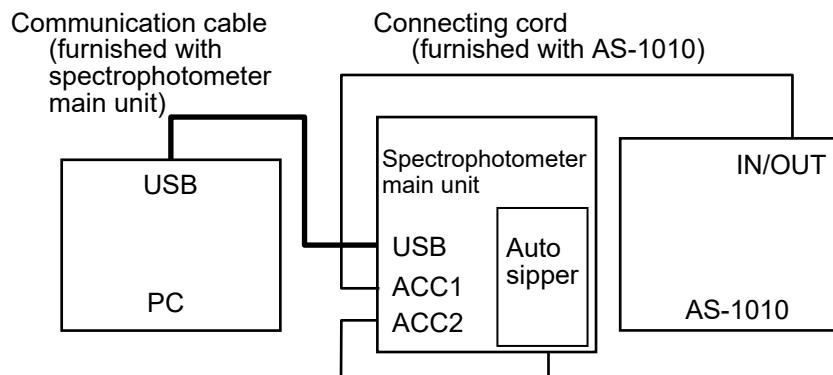
## 7.2 Using As-1010 Autosampler

### 7.2 Using As-1010 Autosampler

**NOTE:** The AS-1010 autosampler is connectable with the following spectrophotometers:  
U-2900/2910/3900/3900H.

<Connection>

Connect the auto sipper and As-1010 as shown below.



**Fig. 7-15 Cord Connection**

<Condition Setting>

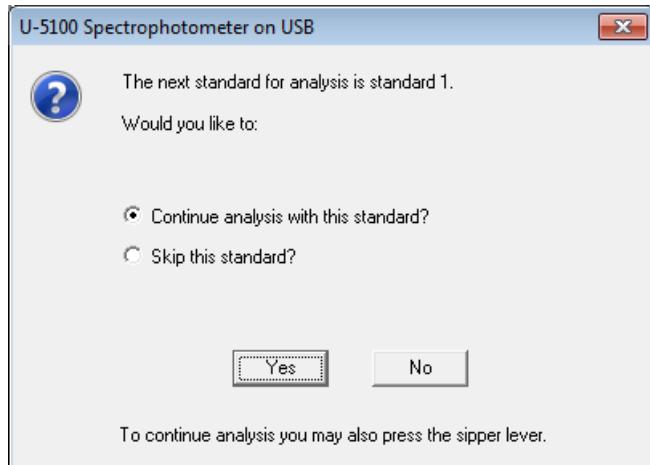
For condition setting, use the Sipper tab page. Refer to 7.1.  
For setting on the other tab pages, refer to Sections 2 to 4.

**NOTE:** The number of samples set on the AS-1010 main unit must meet that specified in the sample table.

After completion of analytical condition setting, proceed to measurement operation. An example of measurement in the photometry mode is described below.

## &lt;Measurement&gt;

- (1) Select the Start Series command from the Spectrophotometer menu of the UV Solutions program or click the  (Start Series) button on the toolbar. A dialog box as shown in fig. 7-16 will appear.



**Fig. 7-16**

- (2) Click the **START** key of the AS-1010 main unit.
- (3) Measurement will start.
- (4) When using a sample table, measurement data will be saved automatically upon completion of measurement of samples corresponding to the specified number of samples. When not using a sample table, click the **End (F9)** button. Measurement data will be saved.

## 7.2 Using As-1010 Autosampler

- NOTES:**
1. During measurement, avoid opening the measurement condition setting window and other setting windows. Otherwise a series of measurements will be forced to stop.
  2. To abort measurement, take the following procedure.
    - (1) First, press the **STOP** key on the AS-1010 side.
      - 1) If measurement is in progress, click the  (Stop Command) button of the UV Solutions program.
      - 2) Click the **No** button if it is indicated in the dialog box.
      - 3) When not using a sample table in the photometry mode, click the **End (F9)** button.

In the wavelength scan mode or time scan mode, take the following operational procedure.

- When not using a sample table:  
After condition setting, the “Ready” message will appear on the monitor window. Then, press the **START** key of the A-1010 main unit to start measurement.
- When using a sample table:  
After condition setting, the “Ready” message will appear on the monitor window. Then, click the  (Start Series) button. A message box as shown in Fig. 7-17 will appear. Press the **START** key of the AS-1010 main unit to start measurement.

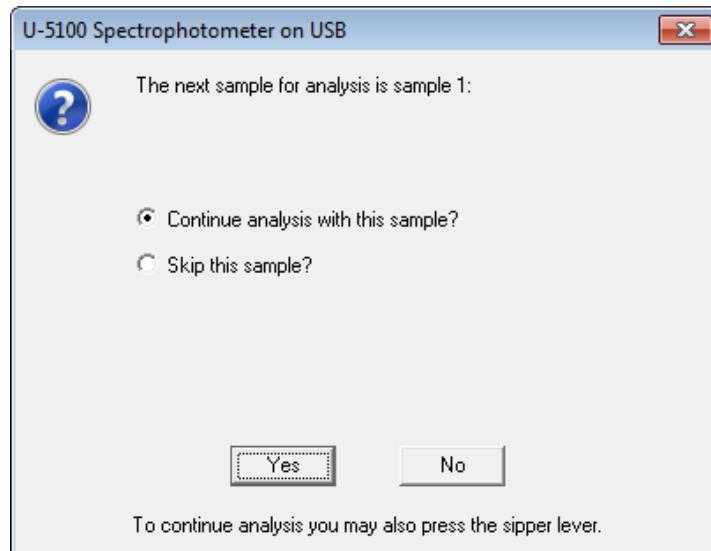


Fig. 7-17

- NOTES:**
1. During measurement, avoid opening the measurement condition setting window and other setting windows. Otherwise a series of measurements will be forced to stop.
  2. To abort measurement, take the following procedure.
    - (1) First, press the **STOP** key on the AS-1010 side.
      - 1) If measurement is in progress, click the **STOP** (Stop Command) button of the UV Solutions program.
      - 2) Click the **No** button if it is indicated in the dialog box.
  3. For execution of wavelength scan, specify a value of "1" for Replicates on the Instrument tab page of the Analysis Method window. If a value of "2" or larger is specified, execution of repetitive measurement causes the next sample to be sipped and measured, resulting in incorrect result data.

# APPENDIX A DETAILS OF PHOTOMETRIC FUNCTION

## A.1 Outline

The Hitachi spectrophotometer has 4 calibration curve types in the photometry mode.

- Calibration curve approximate to primary straight line
- Calibration curve approximate to quadratic curve
- Calibration curve approximate to cubic curve
- Calibration curve approximate to segmented line

These calibration curves are detailed below.

## A.2 Calibration Curve Approximate to Primary Straight Line

A regression curve can be determined using a maximum of 20 data by the least squares method. The determination will be made by the following equation.

$$x = A_1 \cdot y + A_0$$

$$A_1 = \frac{\sum y_i x_i - \frac{1}{n} \sum y_i \cdot \sum x_i}{\sum y_i^2 - \frac{1}{n} (\sum y_i)^2}, \quad A_0 = \frac{\sum x_i}{n} - A_1 \cdot \frac{\sum y_i}{n}$$

Where, x: Concentration of each standard (input value)

y: Absorbance of each standard (measured value)

n: Number of standards

### A.3 Calibration Curve Approximate to Quadratic Curve

A quadratic curve can be determined using a maximum of 20 data by the least squares method. The determination will be made by the following equation.

$$x = A_2 \cdot y^2 + A_1 \cdot y + A_0$$
$$A_2 = \frac{S(y^2 x) S(yy) - S(yx) S(yy^2)}{S(yy) S(y^2 y^2) - \{S(yy^2)\}^2} \quad S(yy) = \sum y_i^2 - \frac{(\sum y_i)^2}{n}$$
$$A_1 = \frac{S(yx) S(y^2 y^2) - S(y^2 x) S(yy^2)}{S(yy) S(y^2 y^2) - \{S(yy^2)\}^2} \quad S(yx) = \sum y_i x_i - \frac{\sum y_i \cdot \sum x_i}{n}$$
$$A_0 = \frac{\sum x_i}{n} - A_1 \frac{\sum y_i}{n} - A_2 \frac{\sum y_i^2}{n} \quad S(yy^2) = \sum y_i^3 - \frac{\sum y_i \cdot \sum y_i^2}{n}$$
$$S(y^2 x) = \sum y_i^2 x_i - \frac{\sum y_i^2 \cdot \sum x_i}{n}$$
$$S(y^2 y^2) = \sum y_i^4 - \frac{(\sum y_i^2)^2}{n}$$

Where, x: Concentration of each standard (input value)  
y: Absorbance of each standard (measured value)  
n: Number of standards

### A.4 Calibration Curve Approximate to Cubic Curve

A cubic curve can be determined using a maximum of 20 data by the least squares method. The determination will be made by the following equation.

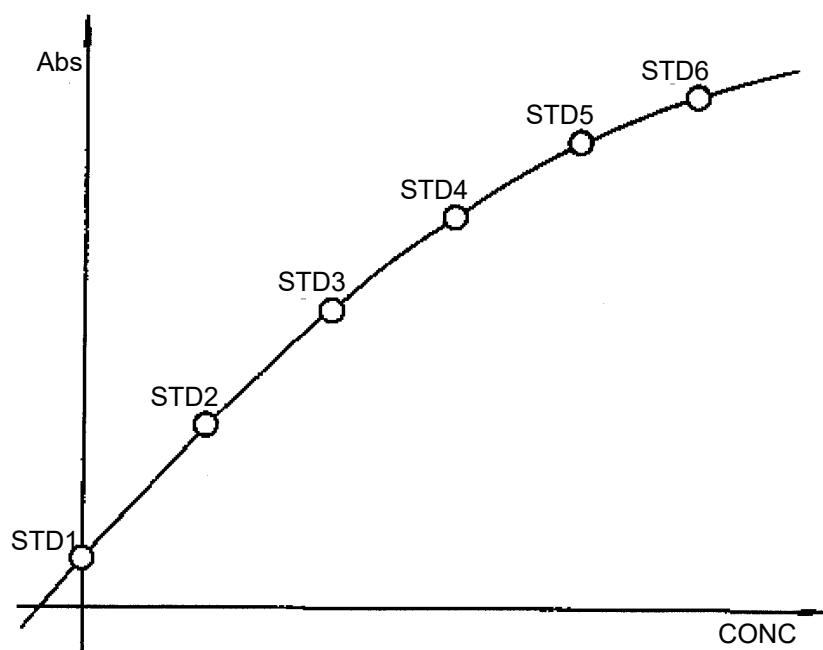
$$x = A_3 \cdot y^3 + A_2 \cdot y^2 + A_1 \cdot y + A_0$$

Where, x: Concentration of each standard (input value)  
y: Absorbance of each standard (measured value)  
n: Number of standards

## A.5 Calibration Curve Approximate to Segmented Line

When turbid samples are measured, the calibration curve may be bent improperly. The photometry program, if used, can correct such calibration curve by using a maximum of 20 standard samples.

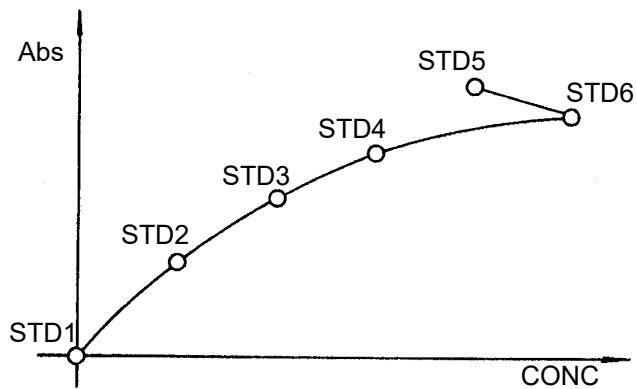
Figure A-1 shows an example of correcting such non-linear calibration curve. For the portion exceeding the measurable range of standard samples, the acquired straight line can be extended simply.



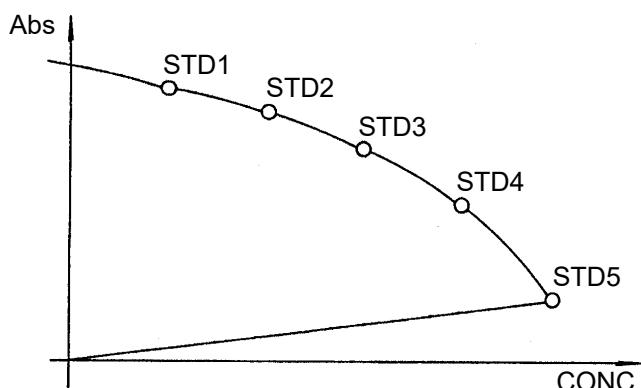
**Fig. A-1 Correction of Non-linear Calibration Curve**

<Precautions on Generation of Calibration Curve Approximate to Segmented Line>

- (1) A proper calibration curve can be generated only when the measured Abs values increase or decrease in proportion to the concentration values. When the curve is tilted in negative direction, be sure to measure a blank solution whose absorbance value is larger than those of other standard samples. If the Abs values do not show a proportional increase, the acquired calibration curve will be as shown in Fig. A-2. If the absorbance of the blank solution is less than those of the standard samples although the tilt is negative, the calibration curve will be formed as shown in Fig. A-3.



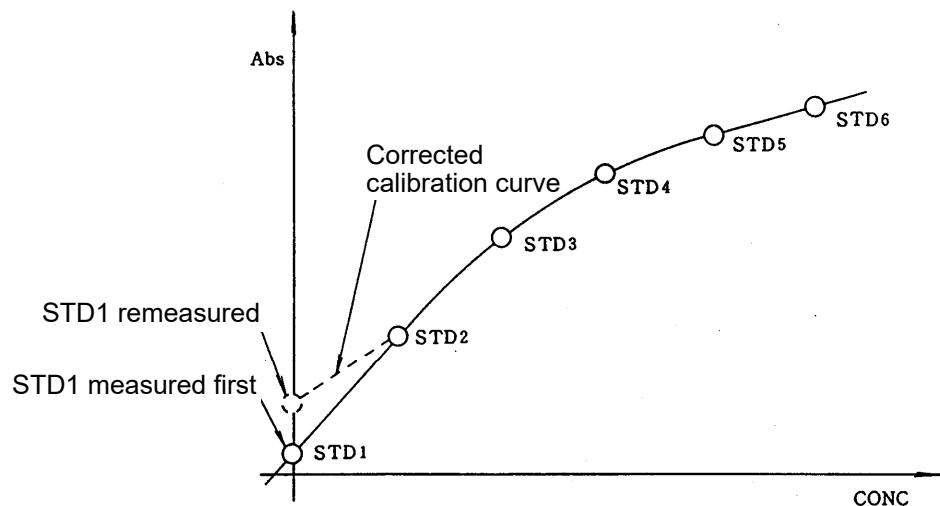
**Fig. A-2 Calibration Curve on which Abs Values Are Not in Proportional Increase (bad example)**



**Fig. A-3 Calibration Curve on which Abs of Blank Solution Is Small with Negative Tilt (bad example)**

## (2) Correction by Remeasurement of Standard Samples

After a calibration curve is prepared once, it can be corrected through remeasurement of the standard samples concerned. In this case, the calibration curve is corrected as shown in Fig. A-4.



**Fig. A-4 Calibration Curve Corrected by  
Remeasurement of Standard Samples**

## APPENDIX B DETAILS OF RATE ASSAY FUNCTION

### B.1 Outline

The rate assay function is used for enzyme reaction analysis. This analytical method finds extensive clinical and biochemical applications at reagent manufacturers and hospitals. The built-in microcomputer calculates concentration from variation in absorbance per unit of time, and the results are displayed/printed.

### B.2 Calculation Method

Figure B-1 shows the timing sequence of rate assay operation. When the initial wait time elapses after the measurement button is pressed, data will be read. From the read data, a regression curve is obtained by the least squares method, with which slope and activity values are calculated.

The calculation formula to be used is detailed below.

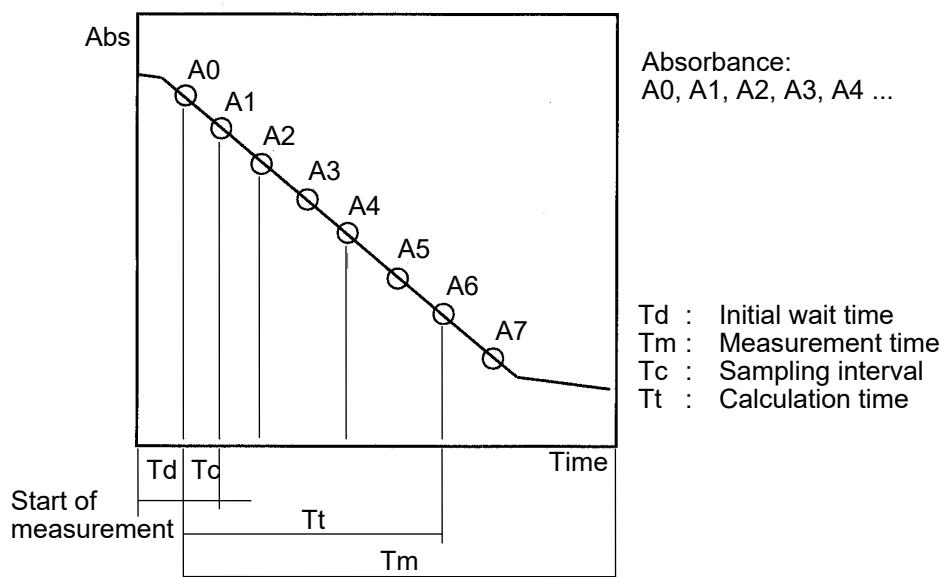


Fig. B-1

From the measured data, a regression curve is generated by the least squares method, thereby determining the decisive factor.

$$y = ax + b$$

$$a = \frac{\sum x_i y_i - \overline{\sum x_i} \overline{\sum y_i}}{\sum x_i^2 - \overline{(\sum x_i)^2}} \quad b = \overline{\sum y_i} - a * \overline{\sum x_i}$$

$x_i$  : Time of each data (s)

$y_i$  : Absorbance of each data

n : Number of samples

Decisive factor CD is given as follows.

$$CD = \frac{(\sum x_i y_i - \overline{\sum x_i} \overline{\sum y_i})^2}{\left( \sum x_i^2 - \overline{(\sum x_i)^2} \right) \left( \sum y_i^2 - \overline{(\sum y_i)^2} \right)}$$

- Slope (slope per minute)

$$D_i = \frac{a}{T_k} = 60a \text{ (/min)}$$

- Activity value

$$C_i = k \cdot D_i$$

- R (correlation factor)

$$R = CD = \sqrt{\frac{(\sum x_i y_i - \overline{\sum x_i} \overline{\sum y_i})^2}{\left( \sum x_i^2 - \overline{(\sum x_i)^2} \right) \left( \sum y_i^2 - \overline{(\sum y_i)^2} \right)}}$$

- R<sup>2</sup> (decisive factor)

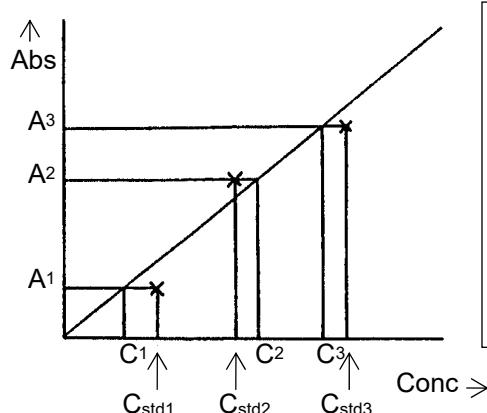
$$R^2 = (CD)^2 = \frac{(\sum x_i y_i - \overline{\sum x_i} \overline{\sum y_i})^2}{\left( \sum x_i^2 - \overline{(\sum x_i)^2} \right) \left( \sum y_i^2 - \overline{(\sum y_i)^2} \right)}$$

**NOTE:** When the range of rate calculation does not match that of the measured data, calculation will be performed according to the measured data within its range.

## APPENDIX C DECISIVE FACTOR OF CALIBRATION CURVE

### C.1 Calculation of Decisive Factor

According to the following formulas, the decisive factor, etc. can be calculated.



$A_n$	: Absorbance of standard (measured value)
$\bar{A}$	: Average absorbance of standard (measured value)
$C_n$	: Concentration on calibration curve in relation to $A_n$
$C_{\text{stdn}}$	: Concentration of standard
$\bar{C}$	: Average concentration on calibration curve in relation to $A_n$
$N$	: Number of standards

Residual

$$\text{DIFF} : \text{DIFF}_n = C_n - C_{\text{stdn}}$$

Relative residual

$$RD : RD_n = \frac{\text{DIFF}}{\bar{A}} \times 100$$

$$\bar{A} = \frac{\sum A_n}{N}$$

Student's t-test

$$: t_n = \frac{\text{DIFF}_n}{\sqrt{\frac{\sum \text{DIFF}^2}{N-1}}}$$

Correlation factor

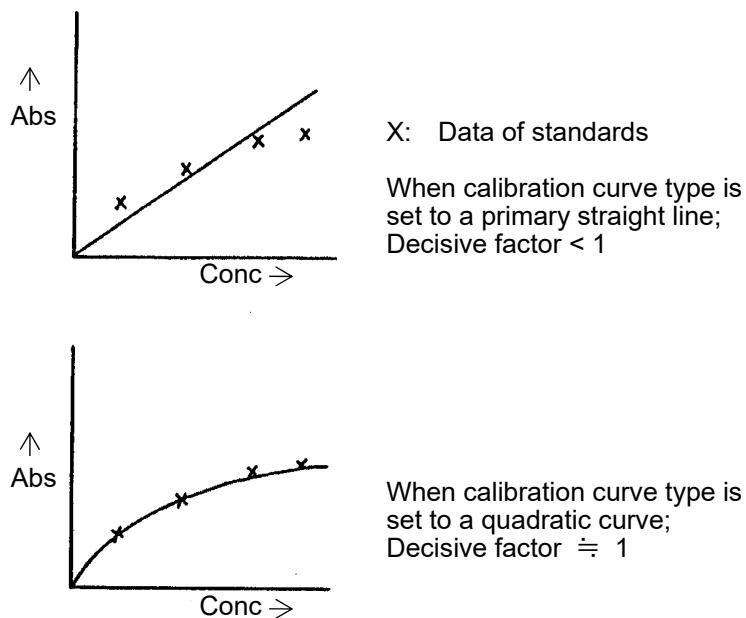
$$: R = \sqrt{\frac{\sum (C_n - \bar{C})^2 - \sum (C_n - C_{\text{stdn}})^2}{\sum (C_n - \bar{C})^2}}$$

Decisive factor

$$: R_2 = (R)^2$$

## C.2 How to Use Decisive Factor

The decisive factor indicates the suitability of the measured standards to the calibration curve, showing that the nearer this value comes to 1, the higher the suitability to the calibration curve. Conversely, if this value deflects widely from 1, it is necessary to measure the standard data again or change the calibration curve mode. Shown below is an example of the decisive factor by selecting a calibration curve mode.



In the case of this standard data, as seen from the graphs, the setting to the quadratic curve gives higher suitability for calibration curve type. Digitizing the calibration curves that were ordinarily judged visually or from experience allows the judgment to be made easier.

# APPENDIX D INTEGRATION METHOD AND SMOOTHING

## D.1 Introduction

The integration method and smoothing used in the UV Solutions program are explained here.

## D.2 Integration Method

The UV Solutions program comes with three integration methods below.

- Rectangular
- Trapezoid
- Romberg

### D.2.1 Rectangular Method

The Rectangular method is the simplest calculation method among the three available. Since one sampling interval equals the width of each sectional area, the total value of all data points covering a peak is approximated as a target area.

As shown in Fig. D-1, the target area is a total of the rectangles due to a linear approximation of the curve drawn by following the data points. When the number of peak data points is small, approximation will become rough.

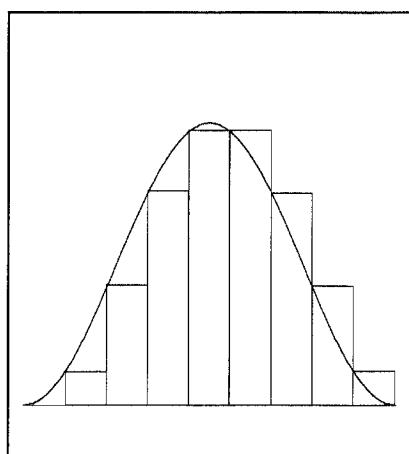


Fig. D-1

## D.2.2 Trapezoid Method

The Trapezoid method is an improved method of peak area calculation.

Each section having a width equal to one sampling interval is indicated by a rectangle and a triangle on it. And the target area is given by totaling the area values of all sections.

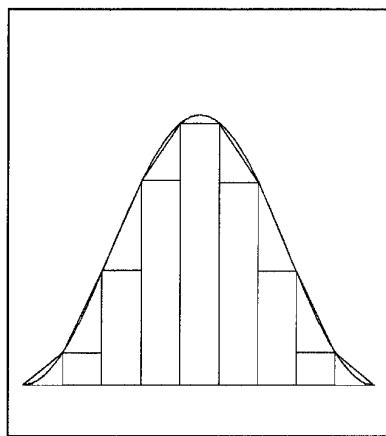
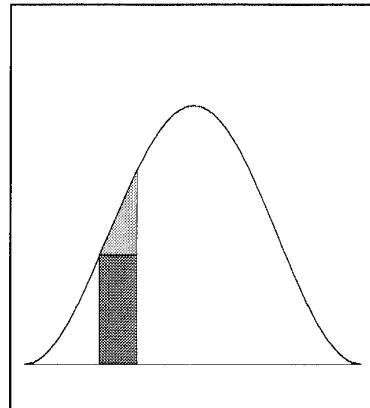


Fig. D-2

When focusing attention on one section, the area  $I_r$  of its rectangular block can be expressed as follows.



$$I_r = f_1 x$$

Where,  $x$  : Sampling interval  
 $f_1$  : Left-side height of rectangle

Fig. D-3

To this rectangle, a triangular part is to be added.

When replacing the sectional area with  $I_T$ , and the triangular area with  $I_t$ ,  $I_T$  is given by the following equation.

$$I_T = I_t + I_r = \frac{f_2 - f_1}{2} x + f_1 x = \left( \frac{f_1 + f_2}{2} \right) x$$

The above equation can be transformed to cover the entire peak as follows.

$$I_T = \left( \frac{f_1}{2} + f_2 + K + f_{n-1} + \frac{f_n}{2} \right) x$$

### D.2.3 Romberg Method

The Romberg method is the most exact integration used in this program. The aforementioned Trapezoid method has different step sizes (sampling intervals) for determining a peak area more exactly. This method capable of using a total of inherent errors can use both of 2 step sizes individually conceivable.

However, step size cannot be reduced freely in the same way as an increase in the horizontal direction, because an exact integration is carried out unlike a classic continuous approximation.

The reason: A spectrum is handled as an average data of the data points which define the spectrum.

Yet, the Romberg method allows an increase in step size by a factor of 2 or 4 when necessary. This method is implemented as follows.

- (1) At every data point, data is integrated by the Trapezoid method.
- (2) At every two data points, data is integrated by the Trapezoid method.
- (3) The results of the above (1) and (2) are combined with each other to obtain the following.

$$I_R = I_n + \frac{I_n - I_{2n}}{3}$$

Where,  $I_R$  : Integration by Romberg method

$I_n$  : Trapezoid integration at every data point

$I_{2n}$  : Trapezoid integration at every two data points

## **D.3 Smoothing**

### **D.3.1 Introduction**

There are four smoothing methods available in the UV Solutions program.

- Savitsky-Golay smoothing
- Mean smoothing
- Median smoothing
- Gaussian smoothing

Details of each method are given in the following.

### **D.3.2 Savitsky-Golay Smoothing**

Please refer to the following literature for details of this method of smoothing.

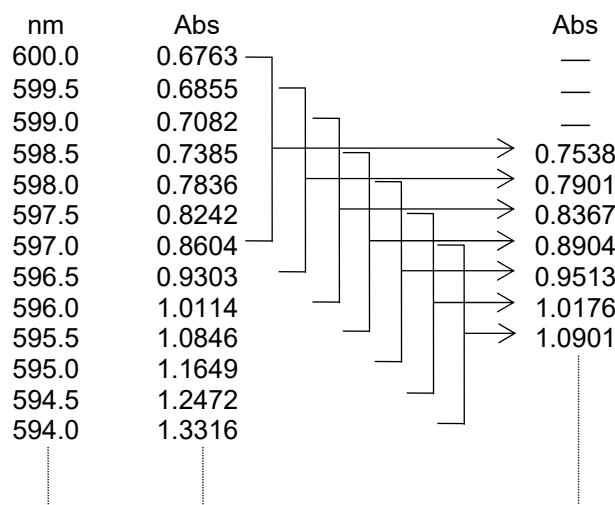
Gorry, P.A.; "General Least-Squares Smoothing and Differentiation by the Convolution (Savitsky-Golay) Method"; *Anal. Chem.* 1990, 62, 570-573.

### D.3.3 Mean Smoothing

A mean value is obtained from the numerical values included in the specified data and set for the central wavelength. For instance, in the case of data where there are 7 data points and 1 cycle, the seven data are averaged, and the mean value is inserted at the central wavelength position, 598.5 nm, upon considering seven points from the 600.0 nm position as shown in the following example.

In this case the data at 3 points on either side of the spectrum is eliminated.

Example: Calculation of data



If an even number  $2n$  is specified for the number of data points,  $2n + 1$  is assumed for the calculation. In other words, if 8 is specified for the number of data points, the result will be the same as with 9 data points.

#### D.3.4 Median Smoothing

A median value is obtained from the numerical values included in the specified data and set for the central wavelength. For instance, in the case of data where there are 7 data points and 1 cycle, and the seven data are arranged in order from smaller to larger values, the value at the center, or the 4th smallest value, is taken as the median value. This value is inserted at the central wavelength position, 598.5 nm, upon considering seven points from the 600.0 nm position as shown in the following example.

In this case the data at 3 points on either side of the spectrum is eliminated.

Example: Calculation of data

nm	Abs	Abs
600.0	0.6763	—
599.5	0.6855	—
599.0	0.7082	—
598.5	0.7385	→ 0.7385
598.0	0.7836	→ 0.7836
597.5	0.8242	→ 0.8242
597.0	0.8604	→ 0.8604
596.5	0.9303	→ 0.9303
596.0	1.0114	→ 1.0114
595.5	1.0846	→ 1.0846
595.0	1.1649	1.1649
594.5	1.2472	
594.0	1.3316	
⋮	⋮	⋮

If an even number  $2n$  is specified for the number of data points,  $2n + 1$  is assumed for the calculation. In other words, if 8 is specified for the number of data points, the result will be the same as with 9 data points.

### D.3.5 Gaussian Smoothing

The numerical value included in the specified number of data points is smoothed the specified number of times and set for the center wavelength. It uses the weighting factors (shown in Table D-1) derived from the normal distribution function (Formula A) below

$$\text{Formula A} \quad \frac{1}{\sqrt{2\pi}\sigma} \exp\left\{-\frac{(x-\mu)^2}{2\sigma^2}\right\}$$

This function calculates with mean  $\mu = 0$  and variance  $\sigma = 2$ .

**Table D-1**

X	Number of Data						
	3	5	7	9	11	13	15
-7							0.0004364
-6						0.0022182	0.0022163
-5					0.0088122	0.0087731	0.0087655
-4				0.0276306	0.0271436	0.0270232	0.0269996
-3			0.0701593	0.0662822	0.0651141	0.0648252	0.0647686
-2		0.1524691	0.1310749	0.1238315	0.1216491	0.1211094	0.1210037
-1	0.3191678	0.2218413	0.1907128	0.1801738	0.1769984	0.1762131	0.1760593
0	0.3616645	0.2513791	0.2161059	0.2041637	0.2005654	0.1996756	0.1995013
1	0.3191678	0.2218413	0.1907128	0.1801738	0.1769984	0.1762131	0.1760593
2		0.1524691	0.1310749	0.1238315	0.1216491	0.1211094	0.1210037
3			0.0701593	0.0662822	0.0651141	0.0648252	0.0647686
4				0.0276306	0.0271436	0.0270232	0.0269996
5					0.0088122	0.0087731	0.0087655
6						0.0022182	0.0022163
7							0.0004364

The weighting coefficient in Table D-1 is a value that is standardized so that the sum of each data score is 1 and rounded to 7 digits after the decimal point.

#### <Example>

The number of data points is 7 and the number of times is 1.

- Multiply the 7 data by the coefficients shown in the 7th row of data points in Table D-1, and the added value will be in the center wavelength value.
- Since it is not possible to obtain 7 data points for the 3 points on both sides of the spectrum, the calculation is performed by extrapolating the wavelength value at the end, the value of 600.0 nm.

### How to collect data

nm	Abs	Abs
-	0.6763	-
-	0.6763	-
-	0.6763	-
600.0	0.6763	0.6795
599.5	0.6855	0.6929
599.0	0.7082	0.7140
598.5	0.7385	0.7423
598.0	0.7836	0.7786
597.5	0.8242	0.8228
597.0	0.8604	0.8750
596.5	0.9303	.
596.0	1.0114	.
595.5	1.0846	.
595.0	1.1649	.
594.5	1.2472	.
594.0	1.3316	.
.	.	.
.	.	.

## APPENDIX E DETAILS OF STANDARD LINE

Standard line is displayed as the following method.

Connect the designated wavelength and the next wavelength. If wavelength is "0", it doesn't connect.

[How to calculate correction factor]

- Linear interpolation is calculated with value of the standard line equivalent to the wavelength of the correction factor  $\Delta$ .
- Linear interpolation is calculated with value of the correction factor equivalent to the wavelength of the standard line  $\square$ .
- Corrected standard line  $\Delta$  and corrected correction factor  $\square$  are used for calculation below.

$$(\text{Corrected standard line} \diamond) = (\text{Standard line Data} \diamond \Delta) / (\text{Correction factor equivalent to Standard line})$$

Caution

- Range of standard line is range of input standard line.
- Standard line that is out of the range for corrected spectrum is not corrected. In this case, calculate at corrected factor = 1

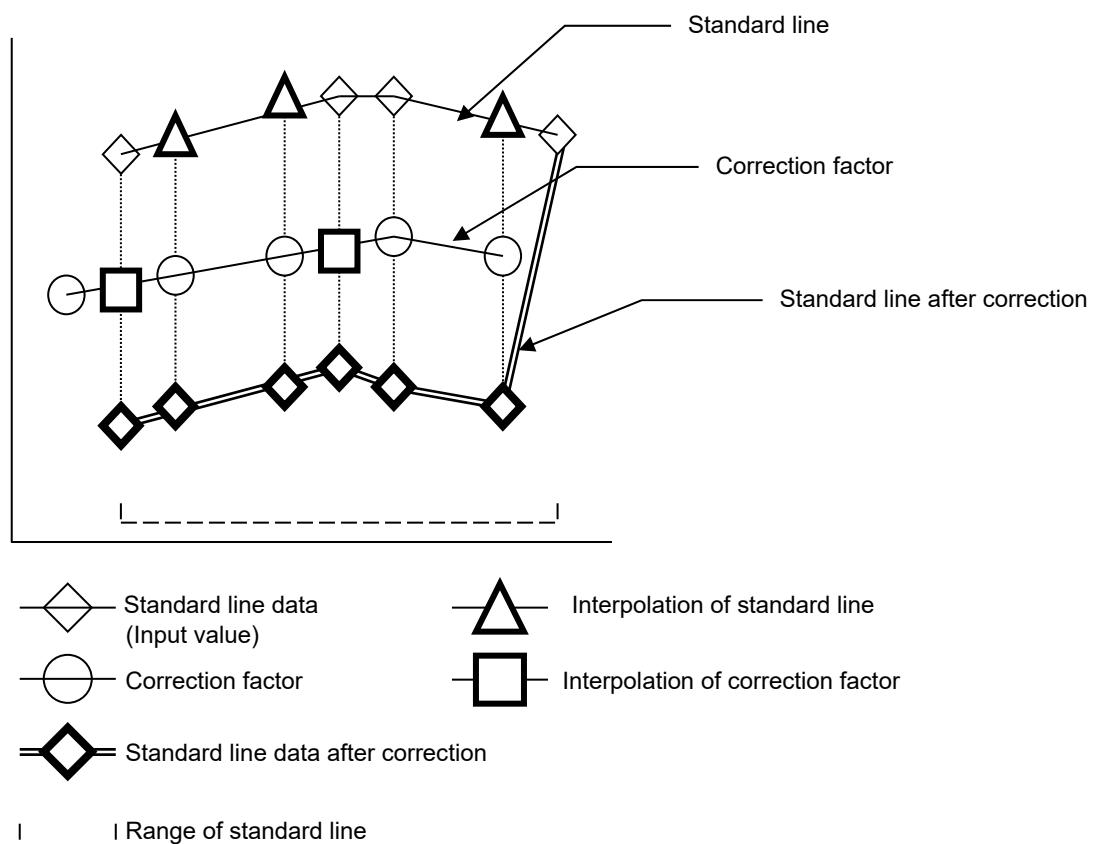


Fig. E-1

## APPENDIX F ANALYSIS DATE AND TIME

Analysis date and time can be printed along with acquired data as shown below.

Measurement Mode	Analysis Date & Time	Analysis Date & Time (at remeasurement)
Wavelength scan	Starting date & time of measurement	—
Time scan	Starting date & time of measurement	—
Photometry: When creating calibration curve with standard solutions	Date & time of measuring standard solution 1	When remeasuring standard solution 1, the date & time of remeasurement is printed. In case of other remeasurements, the date & time will not be changed.
Photometry: When not creating calibration curve with standard solutions	Date & time of measuring first sample	When remeasuring the first sample, the date & time of remeasurement is printed. In case of other remeasurements, the date & time will not be changed.

## **APPENDIX G PARAMETER SETTING RANGES FOR ANALYSIS METHOD**

### **G.1 General Tab: Common to All Measurement Modes**

Parameter Name	Setting Range
Measurement	Wavelength scan, Time scan, Photometry
Operator	Up to 40 characters
Comments	Up to 255 characters
Accessory	Up to 60 characters
Use Sample Table	ON, OFF

ON : Check mark is placed.

OFF : Check mark is not placed.

### G.1.1 Wavelength Scan: Instrument Tab

Parameter Name	Setting Range														
Data mode	%T, Abs/O.D., E(S), E(R), %R (U-1900: %T, Abs/O.D., E(S) and E(R) alone) (U-5100: %T and Abs/O.D. alone)														
Start wavelength	<table border="1"> <thead> <tr> <th>Model</th> <th>Input range</th> </tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/ 3900/3900H/5100</td> <td>191.00 to 1100.00 nm</td> </tr> <tr> <td>U-4100/UH4150</td> <td>176.00 to 3300.00 nm</td> </tr> <tr> <td>UH4150AD+</td> <td>176.00 to 2000.00 nm</td> </tr> </tbody> </table>					Model	Input range	U-1900/2900/2910/ 3900/3900H/5100	191.00 to 1100.00 nm	U-4100/UH4150	176.00 to 3300.00 nm	UH4150AD+	176.00 to 2000.00 nm		
Model	Input range														
U-1900/2900/2910/ 3900/3900H/5100	191.00 to 1100.00 nm														
U-4100/UH4150	176.00 to 3300.00 nm														
UH4150AD+	176.00 to 2000.00 nm														
End wavelength	<table border="1"> <thead> <tr> <th>Model</th> <th>Input range</th> </tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/ 3900/3900H/5100</td> <td>190.00 to 1099.00 nm</td> </tr> <tr> <td>U-4100/UH4150</td> <td>175.00 to 3299.00 nm</td> </tr> <tr> <td>UH4150AD+</td> <td>175.00 to 1999.00 nm</td> </tr> </tbody> </table>					Model	Input range	U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1099.00 nm	U-4100/UH4150	175.00 to 3299.00 nm	UH4150AD+	175.00 to 1999.00 nm		
Model	Input range														
U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1099.00 nm														
U-4100/UH4150	175.00 to 3299.00 nm														
UH4150AD+	175.00 to 1999.00 nm														
Scan speed (nm/min)	<table border="1"> <thead> <tr> <th>Model</th> <th>U-1900/ 2900/ 2910</th> <th>U-3900/ 3900H</th> <th>U-4100/ UH4150/ UH4150AD+</th> <th>U-5100</th> </tr> </thead> <tbody> <tr> <td>Input range</td> <td>3600 2400 1200 800 400 200 100 10</td> <td>2400 1800 1200 600 300 120 60 30</td> <td>2400 1200 600 300 120 60 30 15 (10) 3 1.5</td> <td>2400 1200 800 400 200 100 40 3 0.3</td> </tr> </tbody> </table> <p>( ) : Only UH4150 and UH4150AD+</p>					Model	U-1900/ 2900/ 2910	U-3900/ 3900H	U-4100/ UH4150/ UH4150AD+	U-5100	Input range	3600 2400 1200 800 400 200 100 10	2400 1800 1200 600 300 120 60 30	2400 1200 600 300 120 60 30 15 (10) 3 1.5	2400 1200 800 400 200 100 40 3 0.3
Model	U-1900/ 2900/ 2910	U-3900/ 3900H	U-4100/ UH4150/ UH4150AD+	U-5100											
Input range	3600 2400 1200 800 400 200 100 10	2400 1800 1200 600 300 120 60 30	2400 1200 600 300 120 60 30 15 (10) 3 1.5	2400 1200 800 400 200 100 40 3 0.3											
High Resolution (U-3900/3900H/4100 /UH4150)	On, Off														
High Resolution (UH4150AD+)	Mode 1: High, Middle, Basic, Low Mode 2: On, Off														
Response (U-1900/2900/2910/5100)	Fast, Medium, Slow														

Parameter Name	Setting Range			
Baseline correction				
	Model	U-1900 U-5100	U-2900/ 2910/3900/ 3900H/4100	UH4150/ UH4150AD+
	Input range	User	System User 1 User 2 None	System User 1 User 2 (User 3) (User 4) None
( ) can be used when "Detector Zero Correction" is "OFF" in UH4150 / UH4150AD.				
[System baseline measurement conditions]				
Data mode : Abs Start wavelength : 1100 nm End wavelength : 190 nm Scan speed : 300 nm/min High Resolution : Off Delay : 0 s Lamp change mode : Auto Lamp change wavelength : 340 nm Slit width : 2 nm PMT mode : Auto Sampling interval : Auto				
Delay	0 to 3600 s			
Cycle Time	175.0 to 99.0 min Settable when "2" or more is specified for Replicates.			
Auto Zero before each run	ON, OFF When turned ON (checked), the auto zero wavelength is settable.			
	Model	Input range		
	U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1100.00 nm		
	U-4100/UH4150	175.00 to 3300.00 nm		
	UH4150AD+	175.00 to 2000.00 nm		

Parameter Name	Setting Range		
Data Int. (with U-5100)	<p>Normal, Fine</p> <p>The data interval can be changed. The actual data interval differs depending on the scan speed and measuring wavelength range. For details, refer to APPENDIX G.1.</p>		
UV Scan speed change function (with U-3900/3900H)	<p>ON, OFF</p> <p>When turned ON (checked), the speed change wavelength and scan speed are settable.</p> <p>Speed change Wavelength:</p> <table border="1"> <tr> <td><b>Input range</b></td></tr> <tr> <td>191.00 to 370.00 nm</td></tr> </table> <p>Scan speed (nm/min):</p> <p>2400 1800 1200 600 300 120 60 30 15 3 1.5</p>	<b>Input range</b>	191.00 to 370.00 nm
<b>Input range</b>			
191.00 to 370.00 nm			
Lamp change mode (with other than U-5100)	Auto, D2 only, WI only		
Lamp change wavelength (with other than U-5100)	325.00 to 370.00 nm		
WI Lamp (with other than U-5100)	On, Off		
D2 Lamp (with other than U-5100)	On, Off		
Replicates	1 to 99		
Path correct	ON, OFF		
Path Length	When turned ON (checked), cell length correction is effective. 0.1 to 100.0 mm		

Parameter Name	Setting Range				
Slit width (nm)					
	<table border="1"> <thead> <tr> <th>Model</th><th>U-3900/3900H</th></tr> </thead> <tbody> <tr> <td>Input range</td><td>0.1 0.5 1 2 4 5</td></tr> </tbody> </table>	Model	U-3900/3900H	Input range	0.1 0.5 1 2 4 5
Model	U-3900/3900H				
Input range	0.1 0.5 1 2 4 5				
	<p>U-1900 : Fixed at 4 nm</p> <p>U-2900/2910 : Fixed at 1.5 nm</p> <p>U-5100 : Fixed at 5 nm</p> <p>U-4100/UH4150/UH4150AD+ : Select a slit width in the ultraviolet/visible region. It is recommended to fix the slit width for ordinary measurement.</p> <p>Auto : The slit width is automatically controlled according to the optical energy level under a specified photomultiplier voltage. Concretely, the slit width is widened at a low optical energy level and narrowed at a high optical energy level. In other words, this is a function depending mainly on the S/N ratio (signal-to-noise ratio). In this mode, the slit width automatically changes in a range of about 0.01 to 14 nm. This mode cannot be set simultaneously with PMT mode "Auto".</p> <p>Fixed : The slit width is selectable in a range of 0.1 to 8.0 nm in 0.01 (0.02) nm steps. (The parenthesized step corresponds to slit width 2.4 nm or wider.)</p>				
PMT mode (with U-3900 /3900H)	<p>Auto, Fixed</p> <p>When "Fixed" is selected, the photomultiplier voltage is settable.</p>				
PMT mode (with U-4100/UH4150/ UH4150AD+)	<p>Auto, Fixed</p> <p>When "Fixed" is selected, the photomultiplier voltage is settable.</p> <p>Fixed : Used for measurement in the energy mode. The voltage to be applied to the photomultiplier will be fixed at an entered value. Input range: 0 to 1000 V</p> <p>Auto 1 : Used for ordinary measurement.</p> <p>Auto 2 : The photomultiplier voltage at each wavelength is stored at user baseline measurement and a sample is measured at the stored photomultiplier voltages. This mode is effectively usable at a slow scan.</p>				

Parameter Name	Setting Range		
	Model	U-3900/3900H	U-4100/UH4150 /UH4150AD+
PMT voltage (with U-3900/3900H/ 4100/UH4150/UH4150AD+)	0 to 1000 V		
Sampling interval (nm)	Input range	0.0125 0.025 0.05 0.1 0.2 0.5 1 2 5	0.01 0.02 0.05 0.1 0.2 0.5 1.0 2.0 5.0
	With the U-1900/2900/2910, the sampling interval is automatically set according to the wavelength interval and scan speed. For details, refer to APPENDIX G.1.		
Attenuation (with U-4100/UH4150)	<p>The beam attenuator is inserted on the reference side. Set the attenuation ratio of the attenuator. This setting is usable for a sample whose absorbance and transmittance/reflectance are 4 Abs or more and 0.1%T or less, respectively.</p> <p>For usage, select the Attenuation command from the Spectrophotometer menu after baseline measurement. Then, carry out sample measurement.</p>		
	<p>None 1/10 1/100</p>		
Attenuator (UH4150AD+)	<p>This function is compatible with UH4150 AD+.</p> <p>Set the attenuator on this window. The attenuator is automatically inserted on the reference side.</p> <p>After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19 and 6.20.</p>		
	<p>None 1/10 1/100 1/1000 1/10000</p>		

Parameter Name	Setting Range
Detector change correct (with U-4100/UH4150/UH4150AD+)	<p>A function for automatically correcting the difference in photometric value between the detector changeover points in the near infrared and visible regions.</p> <p>On Off</p>
Detector change wavelength (with U-4100/UH4150 /UH4150AD+)	<p>Set up a wavelength for changeover between the detectors for the ultraviolet/visible and near infrared regions.</p> <p>Input range: 700.0 to 900.0 nm (U-4100/UH4150) Input range: 700.0 to 920.0 nm (UH4150AD+)</p>
Scan speed (with U-4100/UH4150/UH4150AD+)	<p>Set up a scan speed in the near infrared region.</p> <p>(U-4100/U-4150) 0.75 nm/min 7.5 37.5 75 150 300 750 1500 3000 6000</p> <p>(U-4150AD+) 0.75 nm/min 3 10 30 75 150 300 750 1200 1500 3000 6000</p>

Parameter Name	Setting Range
Slit width (with U-4100/UH4150)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm, in 0.1 nm steps</p> <p>Auto : The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. In this mode, the slit width automatically changes in a range of about 0.1 to 36 nm. This mode cannot be set simultaneously with Light control mode "Auto".</p>
Slit width (UH4150AD+)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm, in 0.1 nm steps</p> <p>Auto: The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. The upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.</p>
PbS Gain (with U-4100/UH4150)	<p>Specify a sensitivity level of the detector for the near infrared region. The PbS sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (PbS sensitivity level 3 or 4). However, use of a high sensitivity inevitably entails an increase in noise level. Therefore, PbS sensitivity level 2 is generally recommended. Use Pbs sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>
InGaAs Gain (UH4150AD+)	<p>Specify a sensitivity level of the detector for the near infrared region. The InGaAs sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (InGaAs sensitivity level 3 or 4). However, use of a high sensitivity inevitably entails an increase in noise level. Therefore, InGaAs sensitivity level 2 is generally recommended. Use Pbs sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>

Parameter Name	Setting Range
Light control mode (with U-4100/UH4150)	A mode for controlling the light quantity in the near infrared region.  Fixed : Used for ordinary measurement. Auto : Used when measurement cannot be performed with the slit width fixed because the light quantity in the near infrared region is excessive.

### G.1.2 Wavelength Scan: Multi-scan Tab

Parameter Name	Setting Range
Sampling interval	-9999.99999 to 10000.00000
Detector change wavelength	700.0 to 920.0 nm
Measurement block	ON, OFF
Start wavelength	176.0 to 2000.0 nm
End wavelength	175.0 to 1999.0 nm
Scan speed	UV/Vis 0.3, 3, 10, 15, 30, 60, 120, 300, 600, 1200, 2400 NIR 0.75, 3, 10, 30, 75, 150, 300, 750, 1200, 1500, 3000, 6000
Attenuator (UH4150AD+)	This function is compatible with UH4150 AD+. Set the attenuator on this window. The attenuator is automatically inserted on the reference side. After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19 and 6.20. None 1/10 1/100 1/1000 1/10000

### G.1.3 Wavelength Scan: Monitor Tab

Parameter Name	Setting Range
Y Axis: Max.	-9999.99999 to 10000.00000
Y Axis: Min.	-10000.00000 to 9999.99999
Open data processing window after acquisition	ON, OFF
Open data processing window after acquisition (Overlay)	ON, OFF
Print report after data acquisition	ON, OFF
Overlay	ON, OFF

#### G.1.4 Wavelength Scan: Processing Tab

Parameter Name	Setting Range						
Average Replicates	ON, OFF Effective when "2" or more is specified for Replicates on the Instrument tab page.						
Processing choices	Savitsky-Golay Smoothing Mean Smoothing Median Smoothing Gaussian Smoothing Derivative						
Peak Finding: Integration method	Rectangular Trapezoid Romberg						
Peak Finding: Threshold	Input range: Varies with the data mode. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Data mode</th><th>Input range</th></tr> </thead> <tbody> <tr> <td>Abs/O.D.</td><td>0.0001 to 1.0000</td></tr> <tr> <td>%T, %R, E(R), E(S)</td><td>0.01 to 100.00</td></tr> </tbody> </table>	Data mode	Input range	Abs/O.D.	0.0001 to 1.0000	%T, %R, E(R), E(S)	0.01 to 100.00
Data mode	Input range						
Abs/O.D.	0.0001 to 1.0000						
%T, %R, E(R), E(S)	0.01 to 100.00						
Peak Finding: Sensitivity	1, 2, 4, 8						

### G.1.5 Wavelength Scan: Report Tab

Parameter Name	Setting Range										
Output	Report Use Microsoft Excel Use print generator sheet (to be specified for use of report generator (option))										
Orientation	Portrait, Landscape Effective when "Report" is selected for Output.										
Print items: Print date/time	ON, OFF										
Print items: Wavelength data table	ON, OFF										
Print items: Run date/time	ON, OFF										
Print items: Include method	ON, OFF										
Print items: Include option parameter	ON, OFF Effective when an accessory device such as an auto sipper or 6-cell positioner is connected.										
Print items: Include graph	ON, OFF										
Print items: Include data listing	ON, OFF When turned ON, one of the following items is selectable; Print All Data, Constant and Select data. When "Print All Data" is selected: All data is printed.  When "Constant" is selected: <table border="1"> <thead> <tr> <th>Parameter</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>Data interval</td><td>Minimum sampling interval to measuring wavelength interval</td></tr> <tr> <td>Data start</td><td>Wavelength range specified on Instrument tab page</td></tr> <tr> <td>Data end</td><td>Wavelength range specified on Instrument tab page</td></tr> </tbody> </table> When "Select data" is selected: Select one of 12 wavelengths for printout. Move the mouse pointer to a desired wavelength value point and click the left button of the mouse. Thus, it is allowed to change the current wavelength value.	Parameter	Setting range	Data interval	Minimum sampling interval to measuring wavelength interval	Data start	Wavelength range specified on Instrument tab page	Data end	Wavelength range specified on Instrument tab page		
Parameter	Setting range										
Data interval	Minimum sampling interval to measuring wavelength interval										
Data start	Wavelength range specified on Instrument tab page										
Data end	Wavelength range specified on Instrument tab page										
Print items: Include peak table	ON, OFF In case of "ON", select items to be output to the peak table.  <table border="1"> <thead> <tr> <th>Item</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>Peak WL/Peak data</td><td>ON, OFF</td></tr> <tr> <td>Start WL/End WL</td><td>ON, OFF</td></tr> <tr> <td>Valley WL/Valley data</td><td>ON, OFF</td></tr> <tr> <td>Peak Area</td><td>ON, OFF</td></tr> </tbody> </table>	Item	Setting range	Peak WL/Peak data	ON, OFF	Start WL/End WL	ON, OFF	Valley WL/Valley data	ON, OFF	Peak Area	ON, OFF
Item	Setting range										
Peak WL/Peak data	ON, OFF										
Start WL/End WL	ON, OFF										
Valley WL/Valley data	ON, OFF										
Peak Area	ON, OFF										

### G.2.1 Time Scan: Instrument Tab

Parameter Name	Setting Range								
Data mode	%T, Abs/O.D., E(S), E(R), %R (U-1900: %T, Abs/O.D. E(S) and E(R) alone) (U-5100: %T and Abs/O.D. alone)								
Wavelength	<table border="1"> <thead> <tr> <th></th><th>Input range</th></tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/ 3900/3900H/5100</td><td>190.00 to 1100.00 nm</td></tr> <tr> <td>U-4100/UH4150</td><td>175.00 to 3300.00 nm</td></tr> <tr> <td>UH4150AD+</td><td>175.00 to 2000.00 nm</td></tr> </tbody> </table>		Input range	U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1100.00 nm	U-4100/UH4150	175.00 to 3300.00 nm	UH4150AD+	175.00 to 2000.00 nm
	Input range								
U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1100.00 nm								
U-4100/UH4150	175.00 to 3300.00 nm								
UH4150AD+	175.00 to 2000.00 nm								
Scan time	<table border="1"> <thead> <tr> <th></th><th>Input range</th></tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/5100</td><td>60 to 99999 s</td></tr> <tr> <td>U-3900/3900H</td><td>60 to 99990 s</td></tr> <tr> <td>U-4100/UH4150 /UH4150AD+</td><td>60 to 18400 s</td></tr> </tbody> </table>		Input range	U-1900/2900/2910/5100	60 to 99999 s	U-3900/3900H	60 to 99990 s	U-4100/UH4150 /UH4150AD+	60 to 18400 s
	Input range								
U-1900/2900/2910/5100	60 to 99999 s								
U-3900/3900H	60 to 99990 s								
U-4100/UH4150 /UH4150AD+	60 to 18400 s								
High Resolution (with U-3900/3900H/4100/UH4150)	On, Off								
High Resolution (UH4150AD+)	Mode 1: High, Middle, Basic, Low Mode 2: On, Off								
Response (with U-1900/2900/2910/5100)	Fast, Medium, Slow								
Delay	0 to 3600 s								
Auto Zero before each run	ON, OFF When turned ON (checked), auto zero measurement (100%T set in transmittance mode, 0 Abs set in absorbance mode) is carried out by using the measuring wavelength before each measurement.								
Lamp change mode (for other than U-5100)	Auto, D2 only, WI only								
Lamp change wavelength (for other than U-5100)	325.00 to 370.00 nm								
WI Lamp (for other than U-5100)	On, Off								
D2 lamp (for other than U-5100)	On, Off								

Parameter Name	Setting Range					
Slit width (nm)	<table border="1"> <thead> <tr> <th>Model</th><th>U-3900/3900H</th></tr> </thead> <tbody> <tr> <td>Input range</td><td>0.1 0.5 1 2 4 5</td></tr> </tbody> </table>	Model	U-3900/3900H	Input range	0.1 0.5 1 2 4 5	<p>U-1900 : Fixed at 4 nm      U-2900/2910 : Fixed at 1.5 nm      U-5100 : Fixed at 5 nm      U-4100/UH4150/UH4150AD+:          Select a slit width in the ultraviolet/visible region. It is recommended to fix the slit width for ordinary measurement.      Auto : The slit width is automatically controlled according to the optical energy level under a specified photomultiplier voltage. Concretely, the slit width is widened at a low optical energy level and narrowed at a high optical energy level. In other words, this is a function depending mainly on the S/N ratio (signal-to-noise ratio). In this mode, the slit width automatically changes in a range of about 0.01 to 14 nm. This mode cannot be set simultaneously with PMT mode "Auto".      Fixed : The slit width is selectable in a range of 0.1 to 8.0 nm in 0.01 (0.02) nm steps. (The parenthesized step corresponds to slit width 2.4 nm or wider.)</p>
Model	U-3900/3900H					
Input range	0.1 0.5 1 2 4 5					
PMT mode (for U-3900/3900H /4100/UH4150/UH4150AD+)	Auto, Fixed When "Fixed" is selected, the photomultiplier voltage is settable.					
PMT voltage (for U3900/3900H/4100/UH4150 /UH4150AD+)	0 to 1000 V					
Sampling interval (s)	Refer to APPENDIX G.2.					
Path correct	ON, OFF When turned ON (checked), cell length correction is effective.					
Path Length	0.1 to 100.0 mm					

Parameter Name	Setting Range
Attenuation (with U-4100/UH4150/UH4150AD)	<p>The beam attenuator is inserted on the reference side. Set the attenuation ratio of the attenuator. This setting is usable for a sample whose absorbance and transmittance/reflectance are 4 Abs or more and 0.1%T or less, respectively. For usage, select the Attenuation command from the Spectrophotometer menu after baseline measurement. Then, carry out sample measurement.</p> <p>None 1/10 1/100</p>
Attenuator (UH4150AD+)	<p>This function is compatible with UH4150 AD+. Set the attenuator on this window. The attenuator is automatically inserted on the reference side. After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19.</p> <p>None 1/10 1/100 1/1000 1/10000</p>
Detector change correct (with U-4100/UH4150)	<p>A function for automatically correcting the difference in photometric value between the detector changeover points in the near infrared and visible regions.</p> <p>On Off</p>
Detector change wavelength (with U-4100/UH4150/UH4150AD+)	<p>Set up a wavelength for changeover between the detectors for the ultraviolet/visible and near infrared regions.</p> <p>Input range: 700.0 to 900.0 nm (U-4100/UH4150) Input range: 700.0 to 920.0 nm (UH4150AD+)</p>

Parameter Name	Setting Range
Scan speed (with U-4100/UH4150/UH4150AD+)	<p>Set up a scan speed in the near infrared region.</p> <p>0.75 nm/min 7.5 37.5 75 150 300 750 1500 3000 6000</p>
Slit width (with U-4100/UH4150/UH4150AD)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm, in steps of 0.1 nm</p> <p>Auto : The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. In this mode, the slit width automatically changes in a range of about 0.1 to 36 nm. This mode cannot be set simultaneously with Light control mode "Auto".</p>
Slit width (UH4150AD+)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm, in 0.1 nm steps</p> <p>Auto: The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. The upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.</p>
PbS Gain (with U-4100/UH4150)	<p>Specify a sensitivity level of the detector for the near infrared region. The PbS sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (PbS sensitivity level 3 or 4). However, use of a high sensitivity inevitably entails an increase in noise level. Therefore, PbS sensitivity level 2 is generally recommended. Use PbS sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>

Parameter Name	Setting Range
InGaAs Gain (UH4150AD+)	<p>Specify a sensitivity level of the detector for the near infrared region. The InGaAs sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (InGaAs sensitivity level 3 or 4). However, use of a high sensitivity inevitably entails an increase in noise level. Therefore, InGaAs sensitivity level 2 is generally recommended. Use Pbs sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>
Light control mode (with U-4100/UH4150/UH4150AD)	<p>A mode for controlling the light quantity in the near infrared region.</p> <p>Fixed : Used for ordinary measurement. Auto : Used when measurement cannot be performed with the slit width fixed because the light quantity in the near infrared region is excessive.</p>

### G.2.2 Time Scan: Monitor Tab

Parameter Name	Setting Range
Y Axis: Max.	-9999.99999 to 10000.00000
Y Axis: Min.	-10000.00000 to 9999.99999
X Axis: Max. (Unit: s)	1 to scan time
X Axis: Min. (Unit: s)	0 to (scan time - 1)
Open data processing window after acquisition	ON, OFF
Open data processing window after acquisition (Overlay)	ON, OFF
Print report after data acquisition	ON, OFF
Overlay	ON, OFF

### G.2.3 Time Scan: Processing Tab

Parameter Name	Setting Range						
Processing choices	Savitsky-Golay Smoothing Mean Smoothing Median Smoothing Gaussian Smoothing Derivative						
Peak Finding: Integration method	Rectangular Trapezoid Romberg						
Peak Finding: Threshold	Input range: Varies with the data mode. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Data mode</th><th>Input range</th></tr> </thead> <tbody> <tr> <td>Abs/O.D.</td><td>0.0001 to 1.0000</td></tr> <tr> <td>%T, %R, E(R), E(S)</td><td>0.01 to 100.00</td></tr> </tbody> </table>	Data mode	Input range	Abs/O.D.	0.0001 to 1.0000	%T, %R, E(R), E(S)	0.01 to 100.00
Data mode	Input range						
Abs/O.D.	0.0001 to 1.0000						
%T, %R, E(R), E(S)	0.01 to 100.00						
Peak Finding: Sensitivity	1, 2, 4, 8						
Kinetics: Start time	0 to scan time						
Kinetics: End time	0 to scan time						
Kinetics: K-factor	-9999999.9 to -0.0000001 0.0000001 to 999999.9 Number of significant digits: 7						

#### G.2.4 Time Scan: Report Tab

Parameter Name	Setting Range										
Output	Report Use Microsoft Excel Use print generator sheet (to be specified for use of report generator (option))										
Orientation	Portrait, Landscape Effective when “Report” is selected for Output.										
Print items: Print date/time	ON, OFF										
Print items: Run date/time	ON, OFF										
Print items: Include method	ON OFF										
Print items: Include option parameter	ON, OFF Effective when an accessory device such as an auto sippier or 6-cell positioner is connected.										
Print items: Include graph	ON, OFF										
Print items: Include data listing	ON, OFF When turned ON, one of the following items is selectable; Print All Data, Constant and Select data. When “Print All Data” is selected: All data is printed.  When “Constant” is selected: <table border="1"> <thead> <tr> <th>Parameter</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>Data interval</td><td>Minimum sampling interval to scan time</td></tr> <tr> <td>Data start</td><td>0 to scan time</td></tr> <tr> <td>Data end</td><td>0 to scan time</td></tr> </tbody> </table> When “Select data” is selected: Select one of 12 time periods for printout. Move the mouse pointer to a desired time period value point and click the left button of the mouse. Thus, it is allowed to change the current time period value.	Parameter	Setting range	Data interval	Minimum sampling interval to scan time	Data start	0 to scan time	Data end	0 to scan time		
Parameter	Setting range										
Data interval	Minimum sampling interval to scan time										
Data start	0 to scan time										
Data end	0 to scan time										
Print items: Include peak table	ON, OFF In case of “ON”, select items to be output to the peak table.  <table border="1"> <thead> <tr> <th>Item</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>Peak time/Peak data</td><td>ON, OFF</td></tr> <tr> <td>Start time/End time</td><td>ON, OFF</td></tr> <tr> <td>Valley time/Valley data</td><td>ON, OFF</td></tr> <tr> <td>Peak Area</td><td>ON, OFF</td></tr> </tbody> </table>	Item	Setting range	Peak time/Peak data	ON, OFF	Start time/End time	ON, OFF	Valley time/Valley data	ON, OFF	Peak Area	ON, OFF
Item	Setting range										
Peak time/Peak data	ON, OFF										
Start time/End time	ON, OFF										
Valley time/Valley data	ON, OFF										
Peak Area	ON, OFF										
Print items: Include kinetics	ON, OFF										

### G.3.1A Photometry: Quantitation Tab (Measurement type: Wavelength)

Parameter Name	Setting Range												
Measurement type	Wavelength, Peak area, Peak height, Derivative, Ratio												
Calibration type	None, 1st order, 2nd order, 3rd order, Segmented												
Data Mode	When "None" is selected for Calibration type, one of the following modes is selectable: %T, Abs/O.D. and %R. When other than "None" is selected, "Abs/O.D." is always set up.												
Number of wavelengths	<table border="1"> <thead> <tr> <th>Calibration type</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>None</td><td>1 to 6</td></tr> <tr> <td>1st order</td><td>1 to 3</td></tr> <tr> <td>2nd order</td><td></td></tr> <tr> <td>3rd order</td><td></td></tr> <tr> <td>Segmented</td><td></td></tr> </tbody> </table>	Calibration type	Setting range	None	1 to 6	1st order	1 to 3	2nd order		3rd order		Segmented	
Calibration type	Setting range												
None	1 to 6												
1st order	1 to 3												
2nd order													
3rd order													
Segmented													
Concentration unit	Up to 8 characters												
Manual calibration	ON, OFF In case of "ON", enter a coefficient value. <table border="1"> <thead> <tr> <th>Coefficient</th><th>Setting range</th></tr> </thead> <tbody> <tr> <td>A0 to A3</td><td>-100000.0000 to 100000.0000</td></tr> </tbody> </table>	Coefficient	Setting range	A0 to A3	-100000.0000 to 100000.0000								
Coefficient	Setting range												
A0 to A3	-100000.0000 to 100000.0000												
Force curve through zero	ON, OFF												
Conc Digits	0 to 3												
Lower concentration limit	0 to 1000000000												
Upper concentration limit	0 to 1000000000												

**G.3.1B Photometry: Quantitation Tab (Measurement type: Peak area, Peak height)**

Parameter Name	Setting Range				
Measurement type	Wavelength, Peak area, Peak height, Derivative, Ratio				
Calibration type	None, 1st order, 2nd order, 3rd order, Segmented				
Peak apex	Wavelength range specified on Instrument tab page ± 0.1 to 910.0 nm				
Concentration unit	Up to 8 characters				
Manual calibration	ON, OFF In case of "ON", enter a coefficient value. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Coefficient</th> <th>Setting range</th> </tr> </thead> <tbody> <tr> <td>A0 to A3</td> <td>-100000.0000 to 100000.0000</td> </tr> </tbody> </table>	Coefficient	Setting range	A0 to A3	-100000.0000 to 100000.0000
Coefficient	Setting range				
A0 to A3	-100000.0000 to 100000.0000				
Force curve through zero	ON, OFF				
Conc Digits	0 to 3				
Lower concentration limit	0 to 1000000000				
Upper concentration limit	0 to 1000000000				
Integration method	Rectangular Trapezoid Romberg				
Threshold	Input range: 0.0001 to 1.0000				
Sensitivity	1, 2, 4, 8				

### G.3.1C Photometry: Quantification Tab (Measurement type: Derivative)

Parameter Name	Setting Range				
Measurement type	Wavelength, Peak area, Peak height, Derivative, Ratio				
Calibration type	None, 1st order, 2nd order, 3rd order, Segmented				
Wavelength	Wavelength range specified on Instrument tab page				
Concentration unit	UP to 8 characters				
Manual calibration	ON, OFF In case of "ON", enter a coefficient value.				
	<table border="1"> <thead> <tr> <th>Coefficient</th><th>Setting Range</th></tr> </thead> <tbody> <tr> <td>A0 to A3</td><td>-100000.0000 to 100000.0000</td></tr> </tbody> </table>	Coefficient	Setting Range	A0 to A3	-100000.0000 to 100000.0000
Coefficient	Setting Range				
A0 to A3	-100000.0000 to 100000.0000				
Force curve through zero	ON, OFF				
Conc Digits	0 to 3				
Lower concentration limit	0 to 1000000000				
Upper concentration limit	0 to 1000000000				
Derivative order	2, 4				
Smoothing order	2 to 4				
Number of points	5 to 101				

### G.3.1D Photometry: Quantification Tab (Measurement type: Ratio)

Parameter Name	Setting range
Measurement type	Wavelength, Peak area, Peak height, Derivative, Ratio
Subtract background (Wavelength 3)	ON, OFF
K-Factor 0	-9999 to -0.0001, 0.0001 to 9999
K-Factor 1	
K-Factor 2	
Operand	Plus, minus, times

### G.3.2A Photometry: Instrument Tab (Measurement type: Wavelength, Ratio)

Parameter Name	Setting Range									
Wavelength 1 to 6	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 2px;">Model</th> <th style="text-align: center; padding: 2px;">Input range</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">U-1900/2900/2910/ 3900/3900H/5100</td><td style="padding: 2px;">190.00 to 1100.00 nm</td></tr> <tr> <td style="padding: 2px;">U-4100/UH4150</td><td style="padding: 2px;">175.00 to 3300.00 nm</td></tr> <tr> <td style="padding: 2px;">UH4150AD+</td><td style="padding: 2px;">175.00 to 2000.00 nm</td></tr> </tbody> </table>	Model	Input range	U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1100.00 nm	U-4100/UH4150	175.00 to 3300.00 nm	UH4150AD+	175.00 to 2000.00 nm	
Model	Input range									
U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1100.00 nm									
U-4100/UH4150	175.00 to 3300.00 nm									
UH4150AD+	175.00 to 2000.00 nm									
Delay	0 to 3600 s									
Lamp change mode (for other than U-5100)	Auto, D2 only, WI only									
Lamp change wavelength (for other than U-5100)	325.00 to 370.00 nm									
WI Lamp (for other than U-5100)	On, Off									
D2 lamp (for other than U-5100)	On, Off									
Slit width (nm)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 2px;">Model</th> <th style="text-align: center; padding: 2px;">U-3900/3900H</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Input range</td><td style="padding: 2px;">0.1 0.5 1 2 4 5</td></tr> </tbody> </table> <p style="margin-top: 2px;">U-1900 : Fixed at 4 nm            U-2900/2910 : Fixed at 1.5 nm            U-5100 : Fixed at 5 nm            U-4100/UH4150/UH4150AD+ : Select a slit width in the ultraviolet/visible region. It is recommended to fix the slit width for ordinary measurement.            Auto : The slit width is automatically controlled according to the optical energy level under a specified photomultiplier voltage. Concretely, the slit width is widened at a low optical energy level and narrowed at a high optical energy level. In other words, this is a function depending mainly on the S/N ratio (signal-to-noise ratio). In this mode, the slit width automatically changes in a range of about 0.01 to 14 nm. This mode cannot be set simultaneously with PMT mode "Auto".</p>	Model	U-3900/3900H	Input range	0.1 0.5 1 2 4 5					
Model	U-3900/3900H									
Input range	0.1 0.5 1 2 4 5									

Parameter Name	Setting Range
Slit width (nm)	Fixed : The slit width is selectable in a range of 0.1 to 8.0 nm in 0.01 (0.02) nm steps. (The parenthesized step corresponds to slit width 2.4 nm or wider.)
PMT mode (with U-3900/3900H/ 4100/UH4150/UH4150AD+)	Auto, Fixed When "Fixed" is selected, the photomultiplier voltage is settable.
PMT voltage (with U-3900/3900H/4100/UH4150/ UH4150AD+)	0 to 1000 V
Integration time (with U-3900/3900H)	0.5 to 10.0 s
Replicates (STD)	0 to 20
Replicates (UNK)	0 to 20  Effective when "Use Sample Table" on the General tab page is turned ON.
Statistics	ON, OFF
Statistics Number	2 to 4000  Effective when "Statistics" is turned ON.  <b>NOTE:</b> If "Replicates (UNK)" $\geq$ 2, this parameter is settable in a range of 1 to 4000.
Path correct	ON, OFF  When turned ON (checked), cell length correction is effective.
Path Length	0.1 to 100.0 mm
Attenuation (with U-4100/UH4150)	The beam attenuator is inserted on the reference side. Set the attenuation ratio of the attenuator. This setting is usable for a sample whose absorbance and transmittance/reflectance are 4 Abs or more and 0.1%T or less, respectively. For usage, select the Attenuation command from the Spectrophotometer menu after baseline measurement. Then, carry out sample measurement.  None 1/10 1/100

Parameter Name	Setting Range
Attenuator (UH4150AD+)	<p>This function is compatible with UH4150 AD+.</p> <p>Set the attenuator on this window. The attenuator is automatically inserted on the reference side.</p> <p>After selecting the attenuator on the method window, perform baseline measurement. Attenuator is automatically inserted when it is baseline. After it is baseline, sample is measured. Regarding to setting attenuator, refer to 6.19.</p> <p>None 1/10 1/100 1/1000 1/10000</p>
Detector change correct (with U-4100/UH4150/UH4150AD+)	<p>A function for automatically correcting the difference in photometric value between the detector changeover points in the near infrared and visible regions.</p> <p>On Off</p>
Detector change wavelength (with U-4100/UH4150/UH4150AD+)	<p>Set up a wavelength for changeover between the detectors for the ultraviolet/visible and near infrared regions.</p> <p>Input range: 700.0 to 900.0 nm (U-4100/UH4150) Input range: 700.0 to 920.0 nm (UH4150AD+)</p>
Scan speed (with U-4100/UH4150/UH4150AD)	<p>Set up a scan speed in the near infrared region.</p> <p>0.75 nm/min 7.5 37.5 75 150 300 750 1500 3000 6000</p>

Parameter Name	Setting Range
Slit width (with U-4100/UH4150)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm in steps of 0.1 nm</p> <p>Auto : The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. In this mode, the slit width automatically changes in a range of about 0.1 to 36 nm. This mode cannot be set simultaneously with Light control mode "Auto".</p>
Slit width (UH4150AD+)	<p>Set up a slit width in the near infrared region.</p> <p>Fixed : Input range: 0.1 to 20.0 nm, in 0.1 nm steps</p> <p>Auto: The slit width is automatically controlled according to the optical energy level. This function is intended to keep the S/N ratio (signal-to-noise ratio) constant in the measuring wavelength range as far as possible. The upper limit of the slit width can be set within the range of 0.1 to 36 nm. The default value is 36nm, but if you do not want to use slits above a certain value (do not want to reduce the resolution), enter a value other than 36nm.</p>
PbS Gain (with U-4100/UH4150)	<p>Specify a sensitivity level of the detector for the near infrared region. The PbS sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (PbS sensitivity level 3 or 4). However, use of ahigh sensitivity inevitably entails an increase in noise level. Therefore, PbS sensitivity level 2 is generally recommended. Use Pbs sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>

Parameter Name	Setting Range
InGaAs Gain (UH4150AD+)	<p>Specify a sensitivity level of the detector for the near infrared region. The InGaAs sensitivity is settable at four levels. Level 1 is used as a reference. Levels 2, 3 and 4 are 2, 4 and 8 times as high as level 1, i.e., the sensitivity rises in the order of 1, 2, 4 and 8 (times). For high resolution measurement in the near infrared region, use a higher sensitivity (InGaAs sensitivity level 3 or 4). However, use of a high sensitivity inevitably entails an increase in noise level. Therefore, InGaAs sensitivity level 2 is generally recommended. Use PbS sensitivity level 1 for measuring quite a flat spectrum with no large absorbance change or checking spectral features alone with minimum noise.</p>
Light control mode (with U-4100/UH4150)	<p>A mode for controlling the light quantity in the near infrared region.</p> <p>Fixed : Used for ordinary measurement. Auto : Used when measurement cannot be performed with the slit width fixed because the light quantity in the near infrared region is excessive.</p>

**G.3.2B Photometry: Instrument Tab (Measurement type: Peak area, Peak height)**

Parameter Name	Setting Range																			
Data mode	“Abs/O.D.” is always set up.																			
Start wavelength	<table border="1"> <thead> <tr> <th>Model</th> <th>Input range</th> </tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/ 3900/3900H/5100</td> <td>191.00 to 1100.00 nm</td> </tr> <tr> <td>U-4100/UH4150</td> <td>176.00 to 3300.00 nm</td> </tr> <tr> <td>UH4150AD+</td> <td>176.00 to 2000.00 nm</td> </tr> </tbody> </table>					Model	Input range	U-1900/2900/2910/ 3900/3900H/5100	191.00 to 1100.00 nm	U-4100/UH4150	176.00 to 3300.00 nm	UH4150AD+	176.00 to 2000.00 nm							
Model	Input range																			
U-1900/2900/2910/ 3900/3900H/5100	191.00 to 1100.00 nm																			
U-4100/UH4150	176.00 to 3300.00 nm																			
UH4150AD+	176.00 to 2000.00 nm																			
End wavelength	<table border="1"> <thead> <tr> <th>Model</th> <th>Input range</th> </tr> </thead> <tbody> <tr> <td>U-1900/2900/2910/ 3900/3900H/5100</td> <td>190.00 to 1099.00 nm</td> </tr> <tr> <td>U-4100/UH4150/UH4150AD</td> <td>175.00 to 3299.00 nm</td> </tr> <tr> <td>UH4150AD+</td> <td>176.00 to 1999.00 nm</td> </tr> </tbody> </table>					Model	Input range	U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1099.00 nm	U-4100/UH4150/UH4150AD	175.00 to 3299.00 nm	UH4150AD+	176.00 to 1999.00 nm							
Model	Input range																			
U-1900/2900/2910/ 3900/3900H/5100	190.00 to 1099.00 nm																			
U-4100/UH4150/UH4150AD	175.00 to 3299.00 nm																			
UH4150AD+	176.00 to 1999.00 nm																			
Scan speed (nm/min)	<table border="1"> <thead> <tr> <th>Model</th> <th>U- 1900/ 2900/ 2910</th> <th>U-3900/ 3900H</th> <th>U-4100/ UH4150/ UH4150AD+</th> <th>U-5100</th> </tr> </thead> <tbody> <tr> <td>Input range</td> <td>3600 2400 1200 800 400 200 100 10</td> <td>2400 1800 1200 600 300 120 60 30</td> <td>2400 1200 600 300 120 60 30 15</td> <td>2400 1200 800 400 200 100 40</td> </tr> <tr> <td></td> <td></td> <td>15 3 1.5</td> <td>(10) 3 0.3</td> <td></td> </tr> </tbody> </table> <p>( ):Only UH4150 and UH4150AD+</p>					Model	U- 1900/ 2900/ 2910	U-3900/ 3900H	U-4100/ UH4150/ UH4150AD+	U-5100	Input range	3600 2400 1200 800 400 200 100 10	2400 1800 1200 600 300 120 60 30	2400 1200 600 300 120 60 30 15	2400 1200 800 400 200 100 40			15 3 1.5	(10) 3 0.3	
Model	U- 1900/ 2900/ 2910	U-3900/ 3900H	U-4100/ UH4150/ UH4150AD+	U-5100																
Input range	3600 2400 1200 800 400 200 100 10	2400 1800 1200 600 300 120 60 30	2400 1200 600 300 120 60 30 15	2400 1200 800 400 200 100 40																
		15 3 1.5	(10) 3 0.3																	
High Resolution (with U-3900/3900H/4100/UH4150)	On, Off																			
High Resolution (UH4150AD+)	Mode 1: High, Middle, Basic, Low Mode 2: On, Off																			
Response (with U-1900/2900/2910/5100)	Fast, Medium, Slow																			
Baseline correction	System, User 1, User 2, None																			

Parameter Name	Setting Range						
Delay	<p>0 to 3600 s</p> <table border="1"> <thead> <tr> <th>Model</th><th>Input range</th></tr> </thead> <tbody> <tr> <td>U-1900/2900/2910</td><td>0 to 9999 s</td></tr> <tr> <td>U-3900/3900H/4100/ UH4150/UH4150AD</td><td>0 to 3600 s</td></tr> </tbody> </table>	Model	Input range	U-1900/2900/2910	0 to 9999 s	U-3900/3900H/4100/ UH4150/UH4150AD	0 to 3600 s
Model	Input range						
U-1900/2900/2910	0 to 9999 s						
U-3900/3900H/4100/ UH4150/UH4150AD	0 to 3600 s						
Auto Zero before each run	<p>ON, OFF</p> <p>When turned ON (checked), the auto zero wavelength is settable.</p>						
UV Scan speed change function (only with U-3900/3900H)	<p>ON, OFF</p> <p>When turned ON (checked), the speed change wavelength and scan speed are settable.</p> <p>Speed change wavelength:</p> <table border="1"> <thead> <tr> <th>Input range</th></tr> </thead> <tbody> <tr> <td>191.00 to 370.00 nm</td></tr> </tbody> </table> <p>Scan speed (nm/min):</p> <p>2400 1800 1200 600 300 120 60 30 15 3 1.5</p>	Input range	191.00 to 370.00 nm				
Input range							
191.00 to 370.00 nm							
Lamp change mode (with other than U-5100)	Auto, D2 only, WI only						
Lamp change wavelength (with other than U-5100)	325.00 to 370.00 nm						
WI Lamp (with other than U-5100)	On, Off						
D2 lamp (with other than U-5100)	On, Off						

Parameter Name	Setting Range				
Slit width (nm)	<table border="1"> <thead> <tr> <th>Model</th><th>U-3900/3900H</th></tr> </thead> <tbody> <tr> <td>Input range</td><td>           0.1            0.5            1            2            4            5         </td></tr> </tbody> </table>	Model	U-3900/3900H	Input range	0.1 0.5 1 2 4 5
Model	U-3900/3900H				
Input range	0.1 0.5 1 2 4 5				
	<p>U-1900 : Fixed at 4 nm</p> <p>U-2900/2910 : Fixed at 1.5 nm</p> <p>U-5100 : Fixed at 5 nm</p> <p>U-4100/UH4150/UH4150AD+ : Select a slit width in the ultraviolet/visible region. It is recommended to fix the slit width for ordinary measurement.</p> <p>Auto : The slit width is automatically controlled according to the optical energy level under a specified photomultiplier voltage. Concretely, the slit width is widened at a low optical energy level and narrowed at a high optical energy level. In other words, this is a function depending mainly on the S/N ratio (signal-to-noise ratio). In this mode, the slit width automatically changes in a range of about 0.01 to 14 nm. This mode cannot be set simultaneously with PMT mode "Auto".</p> <p>Fixed : The slit width is selectable in a range of 0.1 to 8.0 nm in 0.01 (0.02) nm steps. (The parenthesized step corresponds to slit width 2.4 nm or wider.)</p>				
PMT mode (with U-3900/3900H/4100/UH4150/UH4150AD+)	Auto, Fixed When "Fixed" is selected, the photomultiplier voltage is settable.				
PMT voltage (with U-3900/3900H/4100/UH4150/UH4150AD+)	0 to 1000 V				

Parameter Name	Setting Range		
	Model	U-3900/3900H	U-4100/ UH4150/ UH4150AD+
Sampling interval (nm)	Input range	0.0125 0.025 0.05 0.1 0.2 0.5 1 2 5	0.01 0.02 0.05 0.1 0.2 0.5 1.0 2.0 5.0
	With the U-1900/2900/2910, the sampling interval is automatically set according to the wavelength interval and scan speed. For details, refer to APPENDIX G.1.		
Replicates (STD)	0 to 20 Not specifiable when "Ratio" is selected for Measurement type or "None" is selected for Calibration type.		
Replicates (UNK)	0 to 20 Effective when "Use Sample Table" on the General tab page is turned ON.		
Statistics	ON, OFF		
Statistics Number	2 to 4000 Effective when "Statistics" is turned ON.  <b>NOTE:</b> If "Replicates (UNK)" $\geq$ 2, this parameter is settable in a range of 1 to 4000.		
Path correct	ON, OFF When turned ON (checked), cell length correction is effective.		
Path Length	0.1 to 100.0 mm		

### **G.3.3 Photometry: Standards Tab**

<b>Parameter Name</b>	<b>Setting Range</b>
Auto Zero before sequence (with U-5100)	ON, OFF
Standard name	Up to 40 characters
Comments	Up to 255 characters
Concentration	0 to 1000000000
Number of Standards	1 to 20
Common Standard Name	Up to 36 characters
Auto Numbering	ON, OFF
Start No.	1 to 999

### **G.3.4 Photometry: Monitor Tab**

<b>Parameter Name</b>	<b>Setting Range</b>
Y Axis: Max.	-9999.99999 to 10000.00000
Y Axis: Min.	-10000.00000 to 9999.99999
Open data processing window after acquisition	ON, OFF
Print report after data acquisition	ON, OFF

### G.3.5 Photometry: Report Tab

Parameter Name	Setting Range
Output	Report, Use Microsoft Excel, Use print generator sheet
Print items: Print date/time	ON, OFF
Print items: Run date/time	ON, OFF
Print items: Include method	ON, OFF
Print items: Include option parameter	ON, OFF Effective when an accessory device such as an auto sipper or 6-cell positioner is connected.
Print items: Include calibration curve	ON, OFF
Print items: Include standards data	ON, OFF
Print items: Include standards comment	ON, OFF
Print items: Calibration Curve	ON, OFF
Print items: Include sample data	ON, OFF
Print items: Include sample comment	ON, OFF
Print items: Conc correction factor	ON, OFF

## APPENDIX H SAMPLING INTERVALS

### H.1 Wavelength Scan

<U-1900/2900/2910>

The sampling interval varies with the measuring wavelength range and scan speed. Either the sampling interval determined by the wavelength range or that determined by the scan speed whichever longer is effective.

For instance, if the measuring wavelength range is 600 to 400 nm and the scan speed is 400 nm/min, a sampling interval of 0.5 nm is set.

#### (1) Sampling Interval according to Scan Speed

Scan Speed (nm/min)	Sampling Interval (nm)
3600	5.0
2400	5.0
1200	2.0
800	1.0
400	0.5
200	0.2
100	0.1
10	0.1

#### (2) Sampling Interval according to Wavelength Range

Wavelength Range (nm)	Sampling Interval (nm)
$\lambda > 500$	1.0
$500 \geq \lambda > 200$	0.5
$200 \geq \lambda > 100$	0.2
$100 \geq \lambda$	0.1

## <U-3900/3900H>

When “Auto” is specified for Sampling interval on the Instrument tab page, the sampling interval depends on the measuring wavelength range and scan speed. Either the sampling interval determined by the wavelength range or that determined by the scan speed whichever longer is effective.

For instance, if the measuring wavelength range is 600 to 400 nm and the scan speed is 300 nm/min, the sampling interval will be set to 0.5 nm.

### Sampling Interval according to Scan Speed

Scan Speed (nm/min)	Sampling Interval (nm)
2400	5.0
1800	5.0
1200	1.0
600	0.5
300	0.5
120	0.2
60	0.1
30	0.05
15	0.025
3	0.0125
1.5	0.0125

### Sampling Interval according to Wavelength Range

Wavelength Range (nm)	Sampling Interval (nm)
$\lambda > 500$	0.1
$200 < \lambda \leq 500$	0.05
$100 < \lambda \leq 200$	0.025
$\lambda \leq 100$	0.0125

**NOTE:** When “UV Scan speed change function” is turned on (checked), the sampling interval is determined according to either the ordinary measurement scan speed or the UV measurement scan speed, whichever is higher.  
For example, if the measuring wavelength range is 600 to 200 nm with “1200 nm/min” specified for the ordinary measurement scan speed and “300 nm/min” specified for the UV measurement scan speed, a sampling interval of 1.0 nm will be set.

<U-4100/UH4150>

When "Auto" is specified, either the sampling interval determined by the scan speed (shown in Tables H-1 and H-2) or that determined by the wavelength range (shown in Table H-3) whichever longer is automatically set.

For instance, if the wavelength range is 780 to 380 nm and the scan speed is 300 nm/min, a sampling interval of 0.5 nm will be automatically set.

**Table H-1 Minimum Sampling Interval according to Scan Speed**

Ultraviolet/Visible Region

Scan Speed	Sampling Interval
2400	5.0
1200	2.0
600	1.0
300	0.5
120	0.2
60	0.1
30	0.05
15	0.02
(10)	(0.02)
3	0.01
1.5	0.01

( ): Only UH4150

Near Infrared Region

Scan Speed	Sampling Interval
6000	10.0
3000	5.0
1500	2.0
750	1.0
300	0.5
150	0.2
75	0.1
37.5	0.05
7.5	0.025
0.75	0.025

**Table H-2 Maximum Scan Speed with respect to Sampling Interval**

Interval	Ultraviolet/Visible Region	Near Infrared Region
0.010	3	—
0.020	15	—
0.025	—	7.5
0.05	30	37.5
0.1	60	75
0.2	120	150
0.5	300	300
1.0	600 (1200)	750 (1200)
2.0	1200	1500
5.0	2400	3000
10	2400	6000

( ): Only UH4150

**Table H-3 Minimum Sampling Interval according to Wavelength Range**

Wavelength Range	Only in Ultraviolet/Visible Region	Only in Near Infrared Region	In Ultraviolet/Visible & Near Infrared Regions
$\lambda > 1500$	—	0.1	0.1
$1500 \geq \lambda > 600$	0.05	0.05	0.05
$600 \geq \lambda > 300$	0.02	0.025	0.05
$300 \geq \lambda$	0.01	0.025	0.05

<UH4150AD+>

When "Auto" is specified, either the sampling interval determined by the scan speed (shown in Tables H-4 and H-5) or that determined by the wavelength range (shown in Table H-6) whichever longer is automatically set.

For instance, if the wavelength range is 780 to 380 nm and the scan speed is 300 nm/min, a sampling interval of 0.5 nm will be automatically set.

**Table H-4 Minimum Sampling Interval according to Scan Speed**

Ultraviolet/Visible Region		Near Infrared Region	
Scan Speed	Sampling Interval	Scan Speed	Sampling Interval
2400	5.0	6000	10.0
1200	1.0	3000	5.0
600	1.0	1500	2.0
300	0.5	1200	1.0
120	0.2	750	1.0
60	0.1	300	0.5
30	0.05	150	0.2
15	0.02	75	0.1
10	0.02	30	0.05
3	0.01	10	0.025
0.3	0.01	3	0.025
-	-	0.75	0.025

**Table H-5 Maximum Scan Speed with respect to Sampling Interval**

Interval	Ultraviolet/Visible Region	Near Infrared Region
0.010	3	--
0.020	15	--
0.025	--	10
0.05	30	30
0.1	60	75
0.2	120	150
0.5	300	300
1.0	1200	1200
2.0	1200	1500
5.0	2400	3000
10	2400	6000

**Table H-6 Minimum Sampling Interval according to Wavelength Range**

<b>Wavelength Range</b>	<b>Only in Ultraviolet/ Visible Region</b>	<b>Only in Near Infrared Region</b>	<b>In Ultraviolet/Visible &amp; Near Infrared Regions</b>
$\lambda > 1500$	--	--	0.1
$1500 \geq \lambda > 600$	0.05	0.05	0.05
$600 \geq \lambda > 300$	0.02	0.025	0.05
$300 \geq \lambda$	0.01	0.025	0.05

<U-5100>

The data interval differs depending on the scan speed and measuring wavelength range. Either the data interval determined by the scan speed or that determined by the wavelength range whichever longer is effective. In case of scanning at 400 nm/min in a range of 600 to 400 nm for example, the data interval is set to 2 nm when "Normal" is selected, and to 1 nm when "Fine" is selected.

#### Scan Speed and Data Interval

Scan Speed (nm/min)	Data Interval (nm)	
	Normal	Fine
40	0.2	0.1
100	0.5	0.2
200	1	0.5
400	2	1
800	3	2
1200	5	3
2400	5	5

#### Data Interval according to Measuring Wavelength Range

Measuring Wavelength Range (nm)	Data Interval (nm)
$\lambda > 500$	1.0
$500 \geq \lambda > 200$	0.5
$200 \geq \lambda > 100$	0.2
$100 \geq \lambda$	0.1

## H.2 Time Scan

The data sampling interval is set up as shown below according to the scan time.

<U-1900/2900/2910>

Scan Time (s)	Sampling Interval (s)
60 ≤ Scan time < 100	0.1
100 ≤ Scan time < 200	0.2
200 ≤ Scan time < 500	0.5
500 ≤ Scan time < 1000	1.0
1000 ≤ Scan time < 2000	2.0
2000 ≤ Scan time < 5000	5.0
5000 ≤ Scan time < 10000	10.0
10000 ≤ Scan time < 99999	100.0

<U-3900/3900H>

Scan Time (s)	Sampling Interval (s)
60 ≤ Scan time ≤ 1000	0.1
1000 < Scan time ≤ 2000	0.2
2000 < Scan time ≤ 5000	0.5
5000 < Scan time ≤ 10000	1.0
10000 < Scan time ≤ 20000	2.0
20000 < Scan time ≤ 50000	5.0
50000 < Scan time ≤ 99990	10.0

<U-4100/UH4150/UH4150AD+>

Scan Time (s)	Sampling Interval (s)
60 ≤ Scan time < 3600	0.1
3600 ≤ Scan time < 7200	0.2
7200 ≤ Scan time < 21600	0.5
21600 ≤ Scan time < 43200	1.0
43200 ≤ Scan time < 86400	2.0

<U-5100>

Scan Time (s)	Sampling Interval (s)
60 ≤ Scan time < 350	1
350 ≤ Scan time < 1000	2
1000 ≤ Scan time < 5000	5
5000 ≤ Scan time < 10000	10
10000 ≤ Scan time < 99999	100

# APPENDIX I    PARAMETER SETTING RANGES FOR OPTIONS WINDOW

## I.1 Display Tab

Parameter Name	Setting Range
Show trace display	ON, OFF
Show gridlines with increment	ON, OFF In case of "ON", select a gridline width from the following: Major tics only, Major + half tics and Major + tent tics.
Display item selection: Wavelength scan	Show graph only, Show graph plus peak table, Spectrum plus wavelength data table
Display item selection: Time scan	Show graph only, Show graph plus kinetic data, Show graph plus peak table
Significant Digits: Abs/O.D. values	3 to 7
Significant Digits: %T values	1 to 7 Effective also as the number of display digits for E(S), E(R) and %R.

## I.2 Processing Tab

Parameter Name	Setting Range
Area Integration method	Rectangular, Trapezoid, Romberg
Calibration	Abs/O.D. = f(Conc), Conc = f(Abs/O.D.)
Peak table: Calculate peak area (output of peak area calculation result to peak table)	ON, OFF
Smooth: Function type	Savitsky-Golay, Mean, Median, Gaussian
Smooth: Smoothing order	2 to 4
Smooth: Number of points	5 to 101
Derivative: Smoothing order	2 to 4
Derivative: Number of points	5 to 101

## I.3 Integration Time Tab

Parameter Name	Setting Range
Integration time for current data (for U-3900/3900H)	0.5 to 10.0 s

## APPENDIX J ERROR MESSAGE LIST

Error Message	Possible Cause	Countermeasure
D2 LAMP!	The D <sub>2</sub> lamp has burnt out.	Replace the D <sub>2</sub> lamp.
WI LAMP!	The WI lamp has burnt out.	Replace the WI lamp.
Xe LAMP!	The Xe flash lamp fails to come on.	Retry and if this error message reappears, then contact our service office.
WAVELENGTH INITIALIZE error	An abnormality has been detected in wavelength initialization.	Retry and if this error message reappears, then contact our service office.
HARDWARE!	An abnormality has been detected in operation of an accessory device connected to the spectrophotometer.	Check the accessory device. If the cause of trouble is not located, then contact our service office.
SIGNAL! (sector/chopper)	An abnormality has been detected in rotation of the sector mirror.	Retry and if this error message reappear, then contact our service office.
POSITIONER!	For the cell positioner or 6-cell turret, an initialize error has been detected.	Check if the cell positioner or 6-cell turret is normally mounted to the instrument.
SIGNAL error!	An abnormality has been detected in rotation of the sector mirror.	Retry and if this error message reappears, then contact our service office.
Calibrate!	Wavelength calibration has not been accomplished properly.	Check that there is no sample in the sample compartment and retry wavelength calibration.
ACC OPERATION error!	An abnormality has been detected in operation of an accessory device connected to the spectrophotometer.	Check the accessory device. If the cause of trouble is not located, then contact our service office.
MOMENTARY POWER FAILURE!	The spectrophotometer main unit has been powered off.	Restart the spectrophotometer main unit and carry out initialization.
Attenuate!	Attenuation rate measurement has not been executed.	Carry out attenuation rate measurement.
Battery!	The backup battery voltage has dropped.	The backup battery needs to be replaced. Contact our service office.
WAVELENGTH DRIVE!	An abnormality has been detected in the wavelength drive system.	Retry and if this error message reappear, then contact our service office.
CAPACITOR CAPACITY!	An abnormality has been detected in setting of the capacitor.	Retry and if this error message reappears, then contact our service office.
DATA FILE SUM error	An abnormality has been detected in the Backup RAM.	Retry and if this error message reappears, then contact our service office.
METHOD FILE SUM error	An abnormality has been detected in the Backup RAM.	Retry and if this error message reappears, then contact our service office.

Error Message	Possible Cause	Countermeasure
BACKUP RAM SUM error	An abnormality has been detected in the Backup RAM.	Retry and if this error message reappears, then contact our service office.
BATTERY VOLTAGE DROP	The backup battery voltage has dropped.	Retry and if this error message reappears, then contact our service office.
ROM STATUS error	An abnormality has been detected in the ROM.	Retry and if this error message reappears, then contact our service office.
RAM STATUS error	An abnormality has been detected in the RAM.	Retry and if this error message reappears, then contact our service office.
sum error	A sum error has been detected.	Retry and if this error message reappears, then contact our service office.
WAVELENGTH CALIBRATION SUM error	An abnormality has been detected in wavelength calibration or correction data.	Retry and if this error message reappears, then contact our service office.
SYSTEM DATA SUM error	An abnormality has been detected in system data of the instrument.	Retry and if this error message reappears, then contact our service office.
LAMP ON DATA SUM error	An abnormality has been detected in lamp turn-on data.	Retry and if this error message reappears, then contact our service office.
SERIAL NO. SUM error	An abnormality has been detected in serial no. data.	Retry and if this error message reappears, then contact our service office.
PARAMETER INITIALIZE SUM error	An abnormality has been detected in data on parameter initialization.	Retry and if this error message reappears, then contact our service office.
COMMAND SIGNAL error (failure in sector & chopper rotation mechanism)	An abnormality has been detected in rotation of the sector mirror.	Retry and if this error message reappears, then contact our service office.
VIS/NIR CAM CHANGE INITIALIZE error	An abnormality has been detected in changeover between the visible and near infrared regions.	Retry and if this error message reappears, then contact our service office.
LIGHT INTENSITY CONTROL MOTOR INITIALIZE error	An abnormality has been detected in the light intensity control motor.	Retry and if this error message reappears, then contact our service office.
SLIT INITIALIZE error	The slit initialization position cannot be detected.	Retry and if this error message reappears, then contact our service office.
FILTER INITIALIZE error	The filter initialization position cannot be detected.	Retry and if this error message reappears, then contact our service office.
EEPROM SUM error (1)	An abnormality has been detected in wavelength calibration value data, RS reversal state data or HV zero adjustment correction value data stored in the EEPROM.	The default value is set. Execute the following. (1) Wavelength calibration (2) R/S reverse (3) Detector zero correction

Error Message	Possible Cause	Countermeasure
EEPROM SUM error (2)	An abnormality has been detected in system baseline data stored in the EEPROM.	The default value is set. Execute system baseline measurement.
EEPROM SUM error (3)	An abnormality has been detected in lamp turn-on time data stored in the EEPROM.	“0” is set. The previous value is recorded in the event log. For control, use this time data for summation.
EEPROM SUM error (4)	An abnormality has been detected in serial number data or spectrophotometer type data stored in the EEPROM.	The default value is set. Contact our service office.
MAIN CPU ROM STATUS error	An error has occurred in the main CPU ROM.	Retry and if this error message reappears, then contact our service office.
MAIN CPU RAM STATUS error	An error has occurred in the main CPU RAM.	Retry and if this error message reappears, then contact our service office.
SUB CPU ROM STATUS error	An error has occurred in the sub CPU ROM.	Contact our service office.
SUB CPU RAM STATUS error	An error has occurred in the sub CPU RAM.	Contact our service office.
SUB CPU VERSION inconsistent	The sub CPU program version is inconsistent with the main CPU program version.	Contact our service office.
WL MOTOR CONTROL error	An error has been detected in wavelength motor control.	Contact our service office.
SECTOR MOTOR control error	An error has been detected in sector motor control.	Contact our service office.

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