



TRAINING PROGRAM



BASIC SPECTROSCOPY TECHNIQUES (UV, IR, NMR(UV, IR, NMR & MS) & MOLECULE IDENTIFYING

Description:

Spectroscopy has become an important tool in chemical analysis to identify unknown molecules. This course will serve as an introduction to UV, IR, NMR and MS-spectroscopy and their applications in industry and academic work. It is aimed at chemists and engineers who need a practical understanding of spectroscopy. Numerous example applications will be described including basic knowledge of instruments, instrument operation and spectrum identification. The course also covers instrument and spectrum troubleshooting. The course material is a combination of presentations, documents, software training and instrumental demonstrations as well as case studies.

Who Should Attend?

The course is designed for chemists, lab technicians, chemical engineers, instrument engineers and lab supervisors.

Course Objectives:

By the end of this course delegates will be able to:

- To familiarize participants with the tools and techniques used in spectroscopy analysis and qualitative and quantitative methods.
- To provide the skills, knowledge and understanding of principles and practices of spectroscopy analysis.
- To understand the recent molecule identification methods.
- To provide all the necessary tools for users to expand their knowledge of analysis using spectroscopy technology.
- To solve instrumental and molecular identifying problems.

Practical Session:

- The course includes a practical segment where spectroscopy components are demonstrated for maintenance methods. Practical exercises are also studied.

Other Information:

- Course document is about 150 pages.
- Course presentation power point material is about 350 pages.
- Practical training for each participant will be arranged during the course.
- Exercises and discussions will be conducted at the end of the course.
- Videos of maintenance method for different components are available throughout the course.
- USB with the course document, power point presentation, video films, articles and exercises will be offered to participants.

Course Outline:

Molecular properties, the structure and bonding nature of organic compounds

Ultraviolet Spectroscopy:

- The nature of electronic excitations
- Principles of absorption spectroscopy
- Ultraviolet spectrum
- Solvent effect
- Effect of conformation and geometry
- Fieser-Kuhn rules for polyenes

Infrared Spectroscopy (IR):

- Mode of vibration and bending
- Bond properties and absorption trends
- IR spectrometer
- Reading of the spectra
- A survey of the important functional groups with examples
- Nuclear magnetic resonance spectroscopy:
- Nuclear spin states and magnetic moments
- Mechanism of energy absorption (resonance)
- The chemical shift and shielding
- Chemical equivalence integrals
- NMR spectrometer
- The ^1H and ^{13}C NMR spectra of important molecules
- Two-dimensional NMR spectra

Mass Spectroscopy (MS):

- Molecular formulas from isotope ratio data
- Some fragmentation patterns
- The mass spectrum
- Mass spectrometer
- Spectrum of many examples
- Problems and troubleshooting
- Exercises and discussion

More details of the course outline can be provided on request