

Exp. No. 10	Experiment/Subject Solvatochromatic Dyes	Date 11/13/2023	Course & Section No. 213 203
Name Enmerikibuh	Lab Partner	Locker/Desk No. 30	

## Solvatochromatic Dyes

Reference: "An Experiment in Thinking of Scientifically", D. J.

Sardella Chem Ed. 69:333 (1992)

3 Purpose: Use Greney's spectrometer to determine the wavelength

of maximum absorption of the solutions.

4 Material: Spectrophotometer,

5 Procedure: Warm the instrument for 20 minutes.

Use the wavelength T and  $\downarrow$  button to adjust to the wavelength

to the experiment. Use the cuvette that  $\frac{1}{2}$  full with your "blank" solution

into the instrument. Press the "0 ABS/100% T Button

it is calibrated.

Press the "A/T/C" Button to select the proper data output for the experiment.

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## Taking an Absorbance reading

- ① Obtain 5 cuvettes, each containing merocyanine dissolved in one of solvent.
- ② Observe the color of each solution and determine the relative polarity of each solvent.
- ③ Use the UV-Vis spectrophotometer to determine wavelength of Max absorb of each solution: 400 nm to 700 nm.
- ④ Set to 400 nm, Zero the spectrometer using.
- ⑤ Measure the absorbance of each merocyanine.
- ⑥ Increase the wavelength by 25 nm and repeat absorb reading.
- ⑦ Continue increase the length by 25 nm and take the reading until it reach 700 nm.

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Table observed color and polarity

Solvent	Observed Color	Color absorbed	Relative Polarity
Methanol $\text{CH}_3\text{OH}$	Yellow	Purple	
1-propanol $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$	dark pink	light green	
2-propanol $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$	light red	green orange yellow	
Acetone $\text{CH}_3\text{COCH}_3$	purple	purple	
Acetone $\text{CH}_3\text{COCH}_3$	light yellow	purple	
Water	light yellow	purple	

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Methanol  
CH3OH

1-propanol  
CH3CH2CH2OH

2-propanol  
CH3CHOHCH3

Acetone  
CH3COCH3

Acetone  
CH3COCH3

350 2.366 1.372  
400 2.126 3.102

425 0.626 1.714

Purple

0.183

450 0.168 0.386 0.836 1.941 0.107 0.089

475 0.088 0.207 1.040 2.766 0.220 0.093

500 0.031 0.190 1.789 3.240 0.553 0.199

525 -0.001 0.105 2.323 3.250 1.289 0.434

550 -0.005 0.037 1.903 2.761 2.188 0.9343

575 -0.004 0.002 0.862 1.032 2.199 1.397

600 -0.003 -0.002 0.171 0.178 1.076 1.278

625 -0.003 0.012 0.015 0.132 0.243

650 -0.007 0.002 0.004 0.005 0.011

675 0.039 -0.004 -0.007

700 0.004 -0.002 -0.006

375 0.005 2.875

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Table 3

Solvent	$\lambda_{max}$	$\epsilon_r$ (kJ/mol)	Relative solvent polarity (1-5)
Methanol $CH_3OH$	<del>375</del> 400	299.26	2
1 propanol	525	228.01	3
$CH_3CH_2CH_2OH$	<del>525</del>	228.01	4
2 propanol	525		
$CH_3CH(OH)CH_3$	<del>575</del>	208.18	6
Acetonitrile $CH_3CN$	575	208.18	5
Acetone $CH_3COCH_3$	575		
Water	375 <del>575</del>	319.24	1

375 2895



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## Observation

the propanol 1 and 2 are only solution that does give negative number when its near 700 wavelength.

most of solution have negative number when its near to 700 wavelength.

~~solution~~ solution that absorbed purple & doesn't reflect any wavelength below 700

$$\frac{(6.02 \times 10^{23}) (6.26 \times 10^{-34}) (300 \times 10^8)}{400 \times 10^{-9}} = 29926$$

1000

$$\frac{(6.02 \times 10^{23}) (6.26 \times 10^{-34}) (300 \times 10^8)}{525 \times 10^{-9}} = 22801$$

1000

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$$6.023 \times 10^{23}$$

$$(6.023 \times 10^{-34}) / (3.00 \times 10^8)$$

$$= 2.008 \times 10^{-16}$$

$$575 \times 10^{-9}$$

$$1.000$$

$$6.023 \times 10^{23}$$

$$(6.023 \times 10^{-34}) / (3.00 \times 10^8)$$

$$= 2.008 \times 10^{-16}$$

$$375 \times 10^{-9}$$

$$1.000$$