

● See Chandru Grading Comments from 11/4/23 below

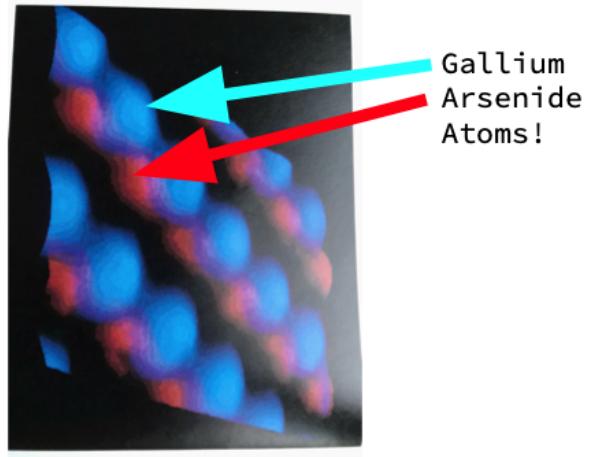
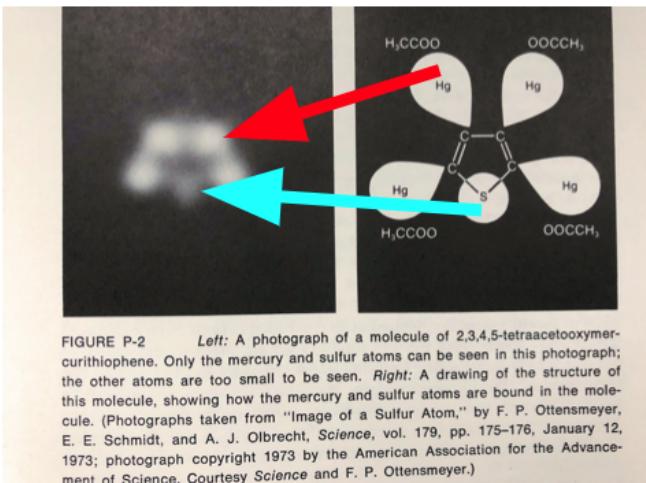
1. Nice work!

You have a 100% grade on this notebook

Correct Any Errors identified above for an improved grade

Add images to this cell!

## TODAYS LAB - MEASURE THE DIAMETER OF AN ATOM

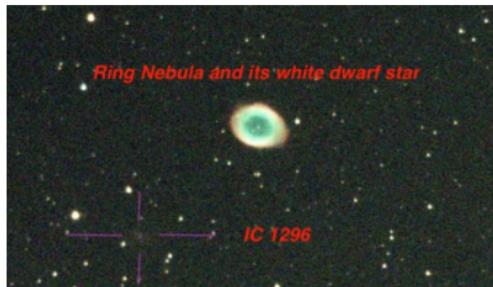


# OBSERVED COLORS OF STARS, NEBULAE AND OTHER OBJECTS!

<i>n</i>	Energy (J)	Energy (eV)
6	$-6.05 \times 10^{-20}$	-0.377
5	$-8.70 \times 10^{-20}$	-0.544
4	$-1.36 \times 10^{-19}$	-0.850
3	$-2.42 \times 10^{-19}$	-1.51
2	$-5.44 \times 10^{-19}$	-3.40
1	$-2.18 \times 10^{-18}$	-13.6

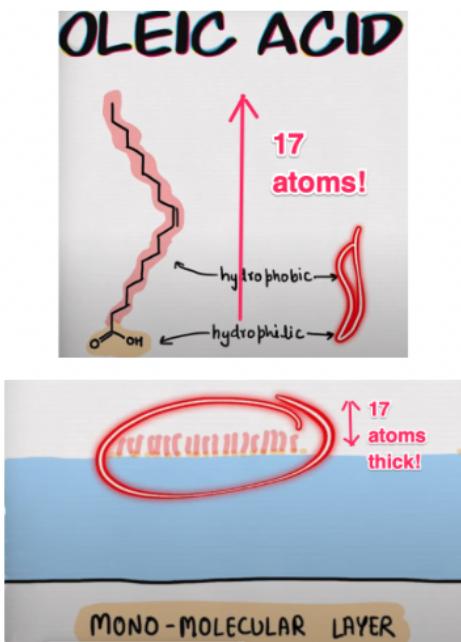
Color assignments:

- Violet ( $7.3 \times 10^{14}$  Hz)
- Violet ( $6.9 \times 10^{14}$  Hz)
- Blue-green ( $6.2 \times 10^{14}$  Hz)
- Red ( $4.6 \times 10^{14}$  Hz)



Add images to this cell!

## PROCESS TO MEASURE THE DIAMETER OF AN ATOM USING OLEIC ACID



- Oleic acid is a simple molecule with hydrophilic and hydrophobic parts!
- Prepare a 1/400 solution of Oleic acid in alcohol
- Calculate the volume of Oleic acid in droplet of the this solution
- Create a mono-molecular layer of this solution floating on water
- Measure its diameter and calculate its thickness knowing the volume of the Oleic acid in the droplet
- The thickness is the diameter of an atom!!

1. Make a 1/400 Dilute solution of Oleic Acid

amount\_of\_oleicacid\_in\_one\_mili\_liter\_of\_alchohol: 4.0984e-05 ml

## Add images to this cell!

- mono.png

diameter\_mono\_molecular\_layer: 1.100e-01 m

oleic\_acid\_in\_one\_drop\_of\_solution\_m\_cubed: 4.098e-11 m^3

### 4. Measure the Mono Molecular Layer!

### 5. Calculate the area of the Mono Molecular Layer Disk

area\_of\_mono\_molecular\_disk: 9.503e-03 m^2

### 6. Calculate the Thickness of the Mono Molecular Disk.

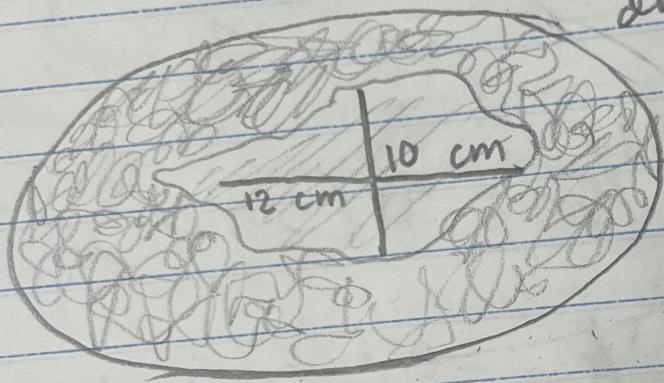
This is the Volume of the Oleic Acid in one droplet divided by the Area of the Mono Molecular Disk!

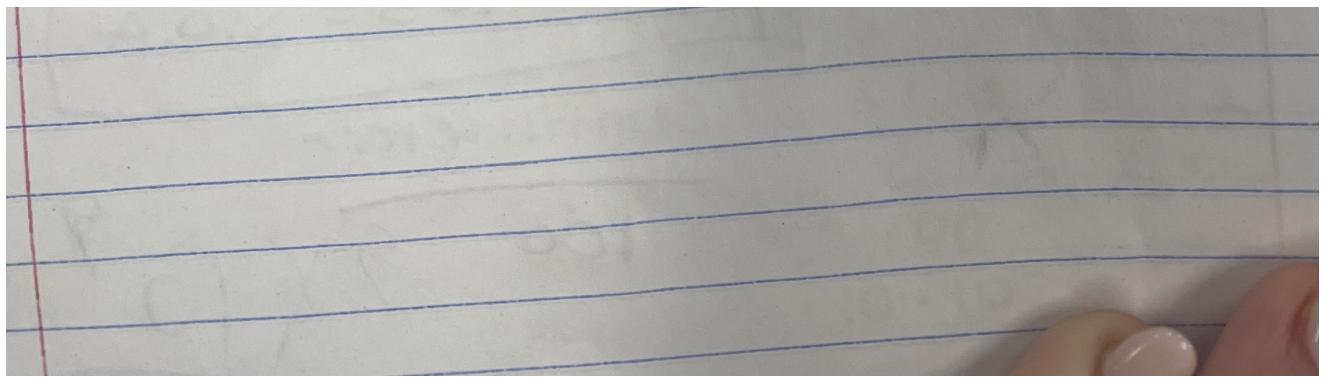
thickness\_of\_mono\_molecular\_layer: 4.313e-09 m

no\_of\_carbon\_atoms\_in\_a\_oleic\_acid\_molecule: 17

## Add images to this cell!

average diameter of the  
drop was 11 cm





## 7. Calculate the Diameter of Carbon Atom !!

diameter\_of\_a\_single\_carbon\_atom:  $2.537e-10 \text{ m}$

[Hyperphysics Carbon Atom Diameter](#) is  $0.22\text{nm}$  or

$$= 2.2 \times 10^{-10} \text{ m}$$

Error in experimental measurement of the diameter of a single carbon atom:  $-8.47e+01\%$

**REALLY ??? !!!**