🟣 **See Chandru Grading Comments from 11/4/23 below**

1. Nice work!

✅ **You have a 100% grade on this notebook**

✅ **Correct Any Errors identfied above for an improved grade**

Todays lab - Measure the diameter of an atom

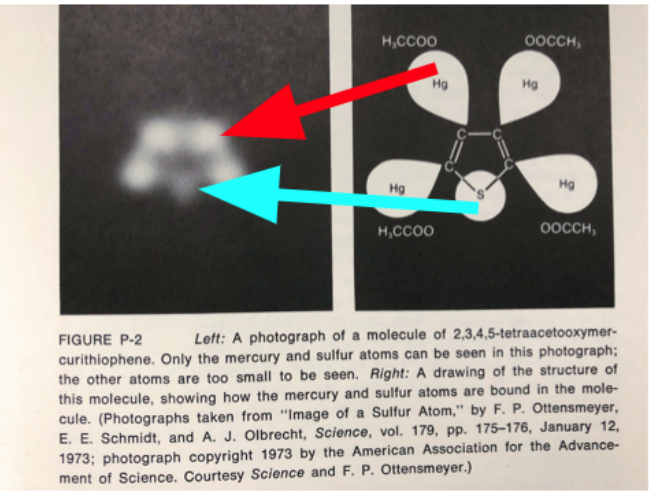
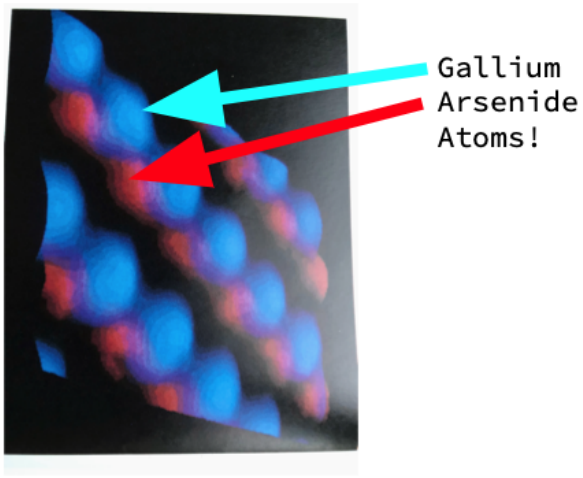
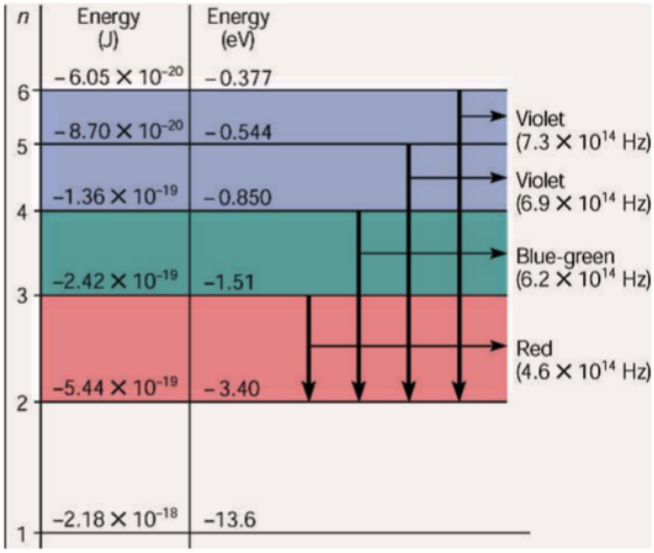
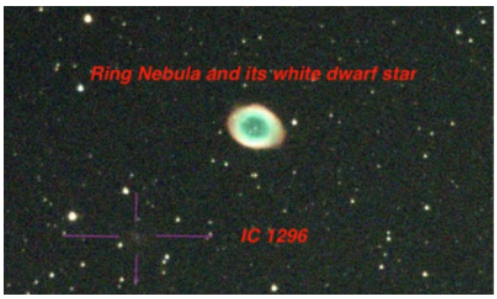


FIGURE P-2 *Left:* A photograph of a molecule of 2,3,4,5-tetraacetooxymercurithiophene. Only the mercury and sulfur atoms can be seen in this photograph; the other atoms are too small to be seen. *Right:* A drawing of the structure of this molecule, showing how the mercury and sulfur atoms are bound in the molecule. (Photographs taken from "Image of a Sulfur Atom," by F. P. Ottensmeyer, E. E. Schmidt, and A. J. Olbrecht, *Science*, vol. 179, pp. 175–176, January 12, 1973; photograph copyright 1973 by the American Association for the Advancement of Science. Courtesy *Science* and F. P. Ottensmeyer.)

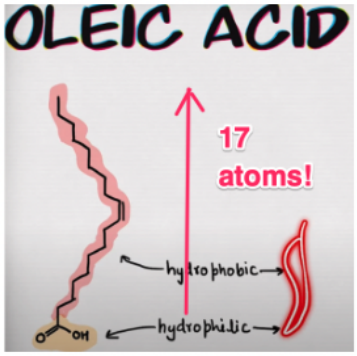


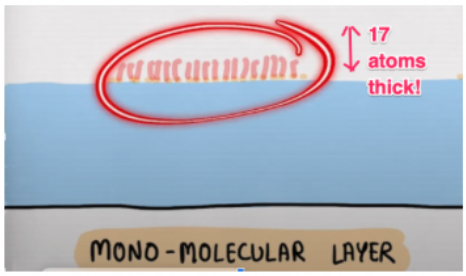
Observed Colors of Stars, Nebulae and other objects!





Process to MEASURE THE Diameter of an Atom using Oleic Acid





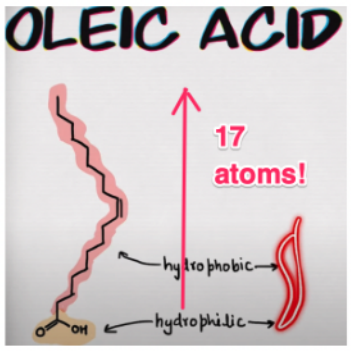
- Oleic acid is a simple molecule with hydrophilic and hydrophobic parts!
- Prepare a 1/400 solution of Oleic acid in alcohol
- Calculate the volume of Oleic acid in droplet of the this solution
- Create a mono-molecular layer of this solution floating on water
- Measure its diameter and calculate its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

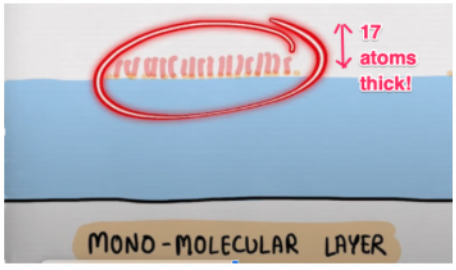
1. Make a 1/400 Dilute solution of Oleic Acid

picture of your scetch and # of drops

amount_of_oleicacid_in_one_drop_of_soln: 4.6296e-05 ml

Process to MEASURE THE Diameter of an Atom using Oleic Acid





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diameter_mono_molecular_layer: 1.800e-01 m

```
oleic_acid_in_one_drop_of_solution: 4.630e-05 ml
oleic_acid_in_one_drop_of_solution: 4.630e-11 m^3
```

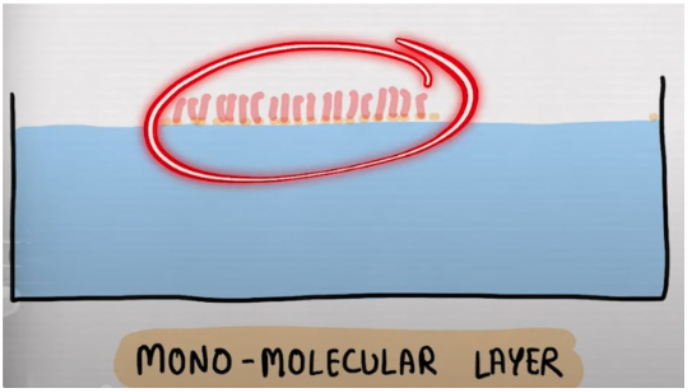
2. Calculate the area of the Mono Molecular Layer Disk

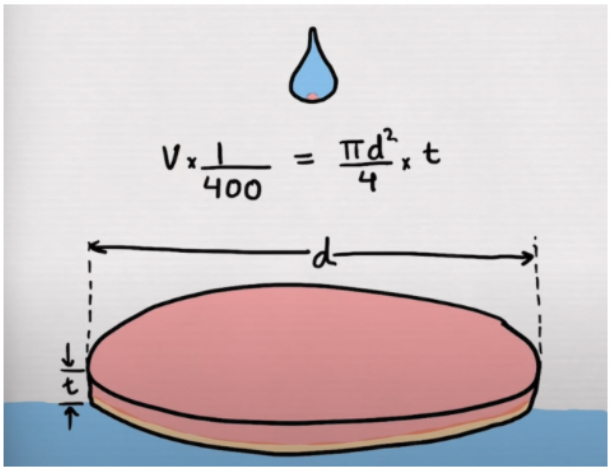
```
area_of_mono_molecular_disk: 2.545e-02 m^2
```

3. 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: 1.819e-09 m
no_of_carbon_atoms_in_a_oleic_acid_molecule: 17
```





7. Calculate the Diameter of Carbon Atom !!

```
diameter_of_a_single_carbon_atom: 1.070e-10 m
```

Hyperphysics Carbon Atom Diameter is 0.22nm or

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

```
Error in experimental measurement of the diameter of a single carbon atom: 51.35%
```

REALLY ??? ! !!