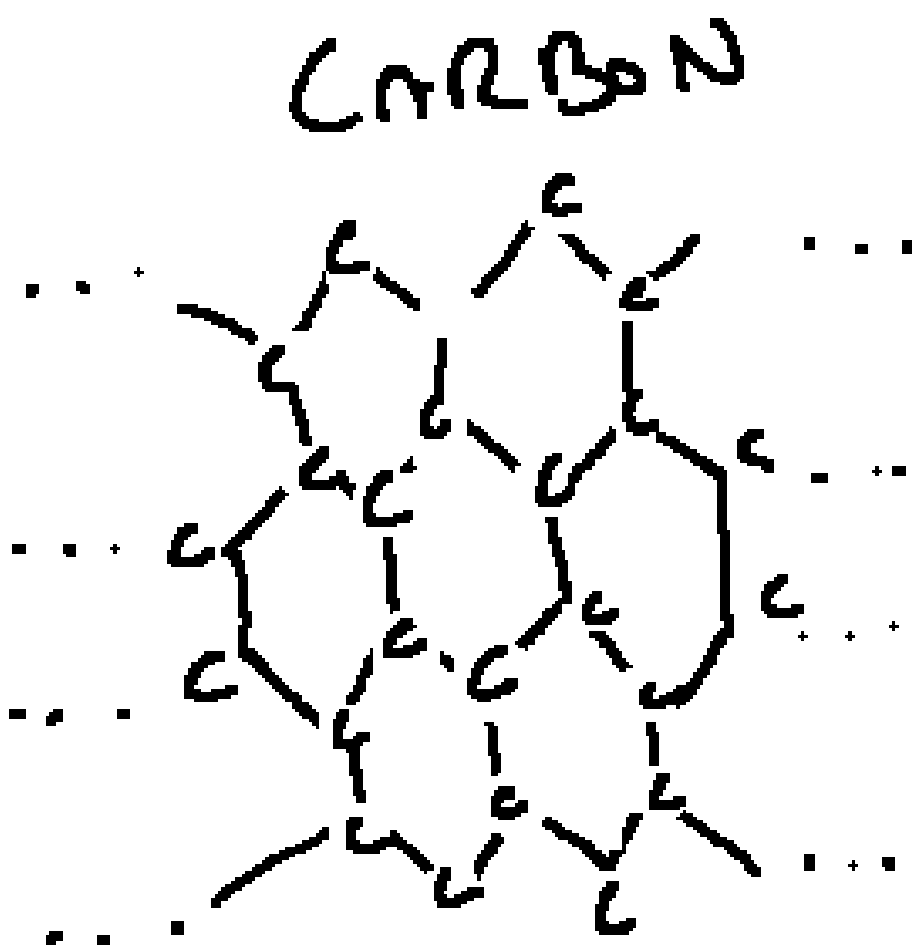
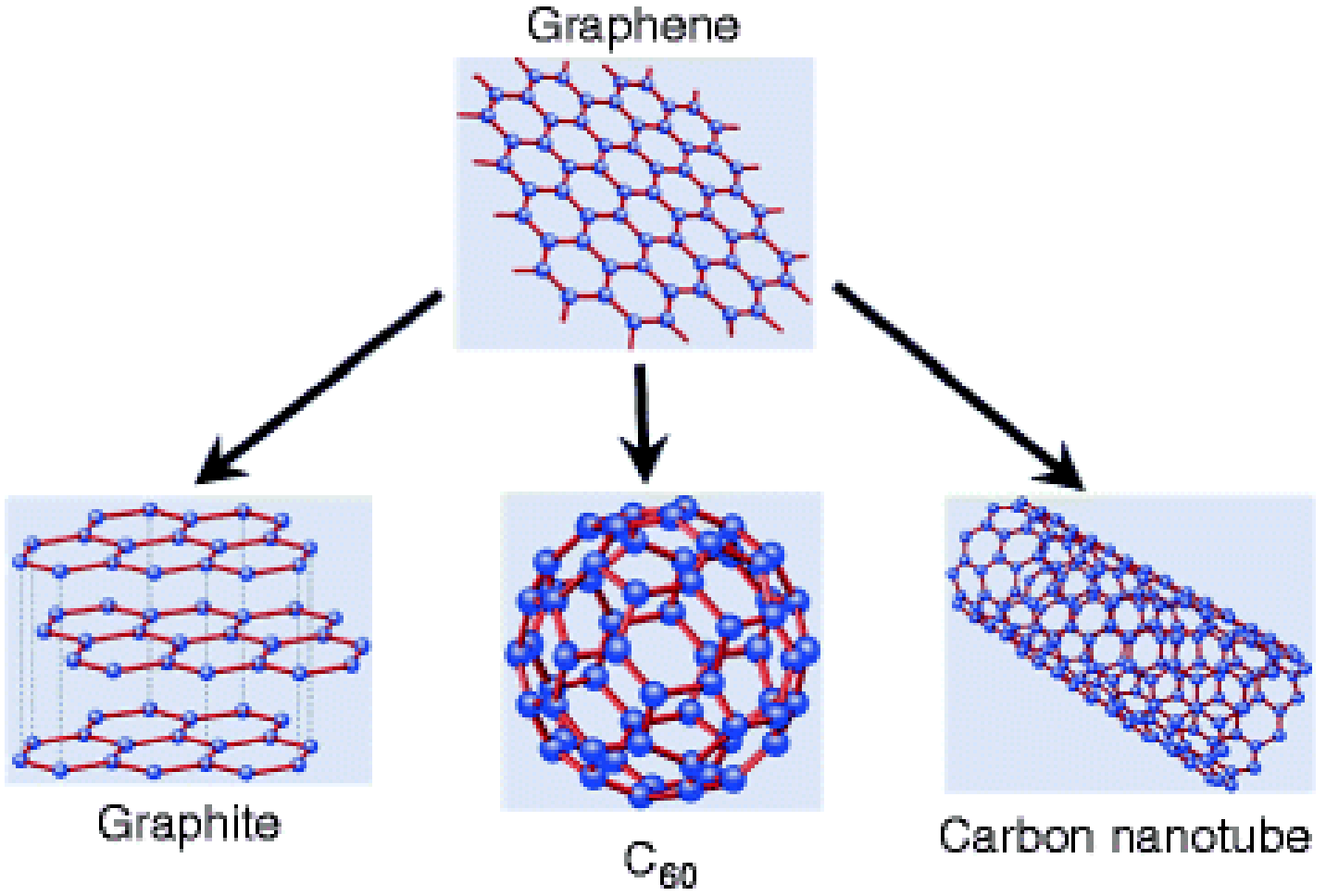
Stable Dispersion of Graphene Synthesis

Taj Johnson and Arjun Nepal

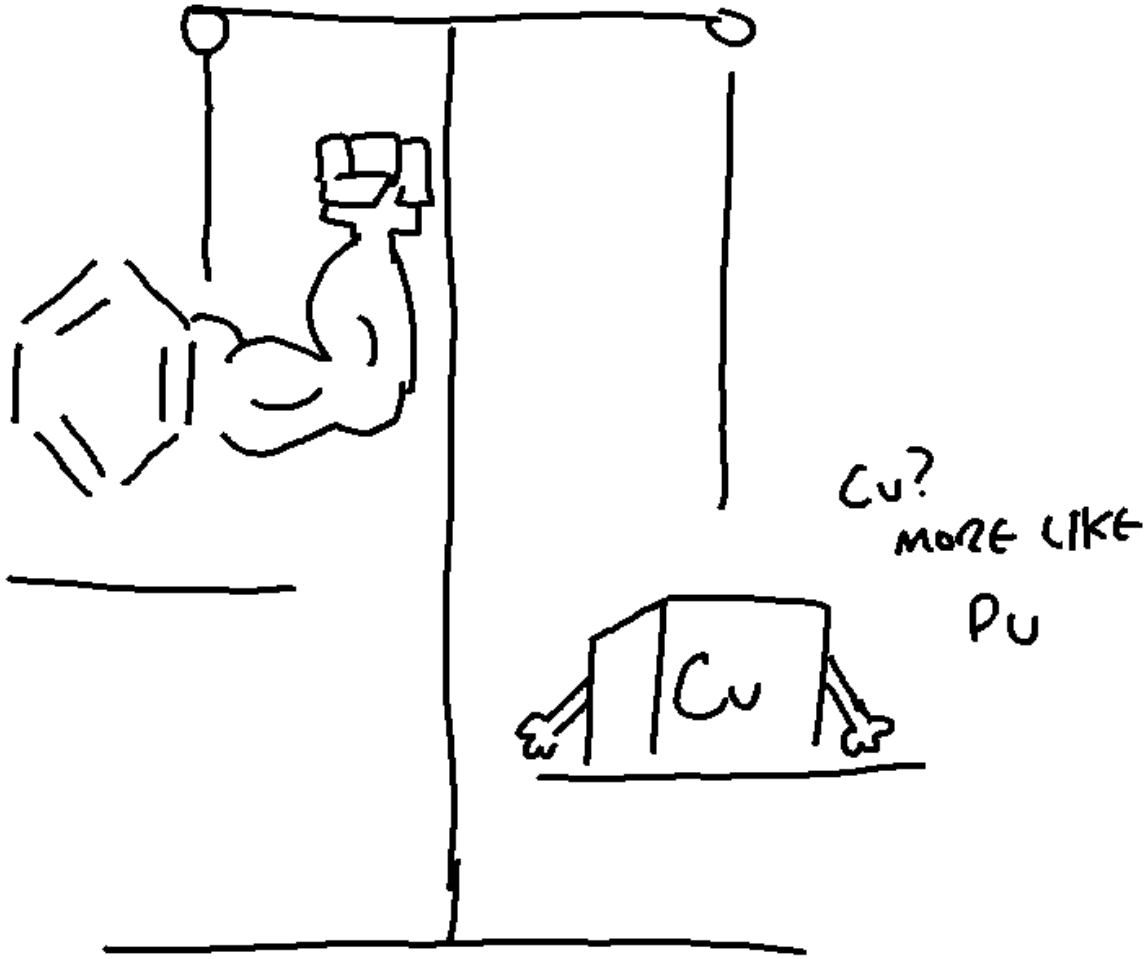
Hexagons are the Bestagons





Dinadayalane, T.C., Leszczynski, J. Handbook of Computational Chemistry (2012)

What does it do? A lot.



- Durable
- Light
- VERY thin
- Flexible
- Conductive
- Thermal Conductivity
- Magnetism
- Filtration
- Lubrication
- Waterproof
- And more

Wow, how do I get it?

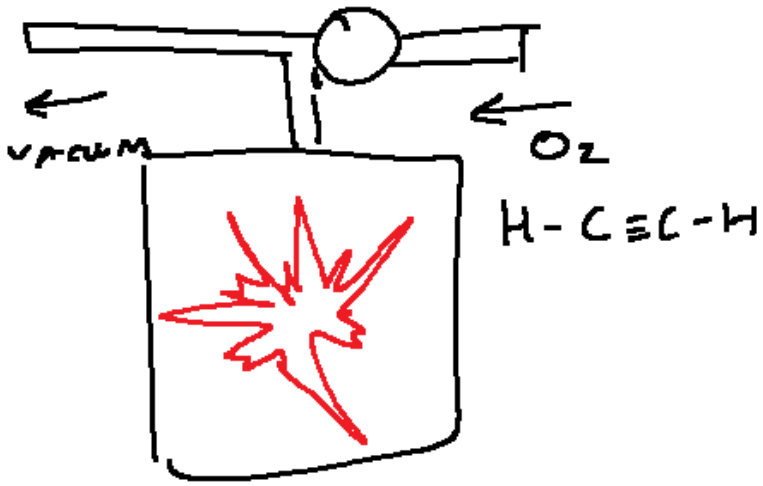
Top Down

Bottom up

The Easy Way

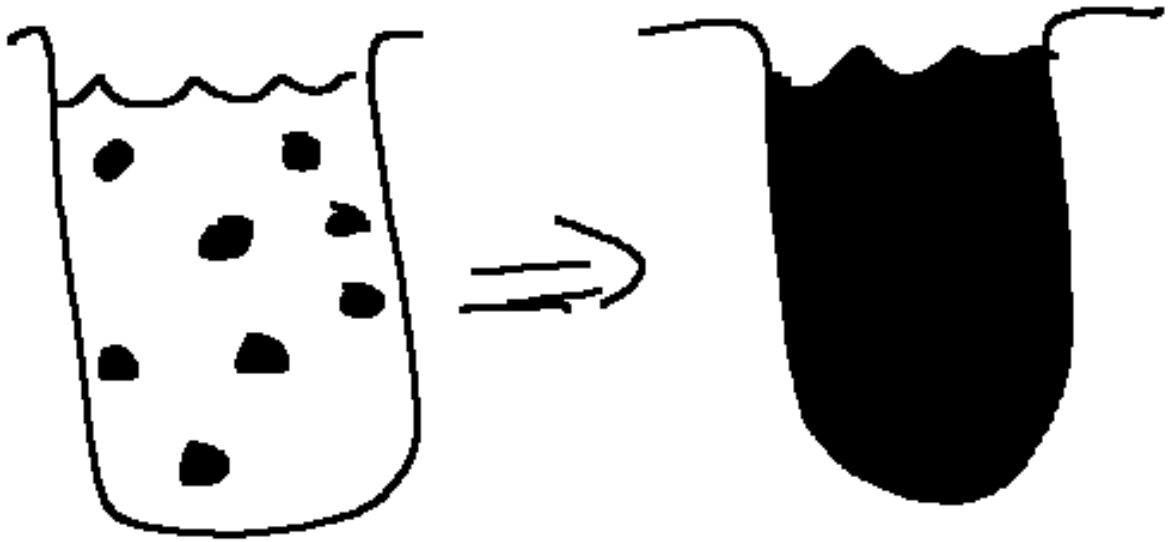
Controlled Hydrocarbon Detonation

- Oxygen +
  Acetylene =
  Graphene Dust +
  Water Vapor

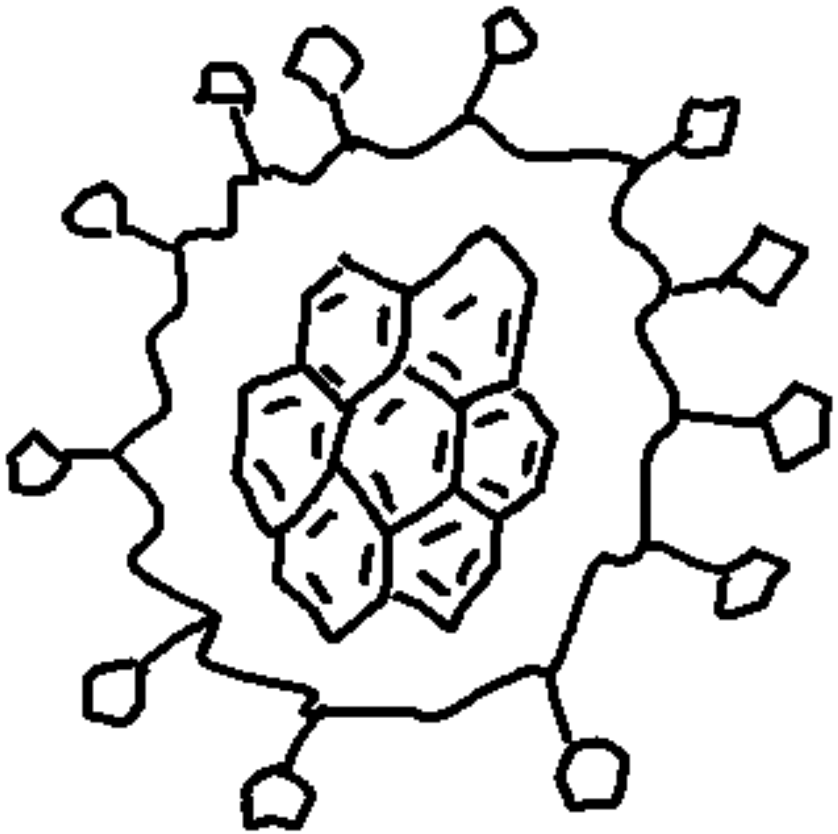


My Experiment

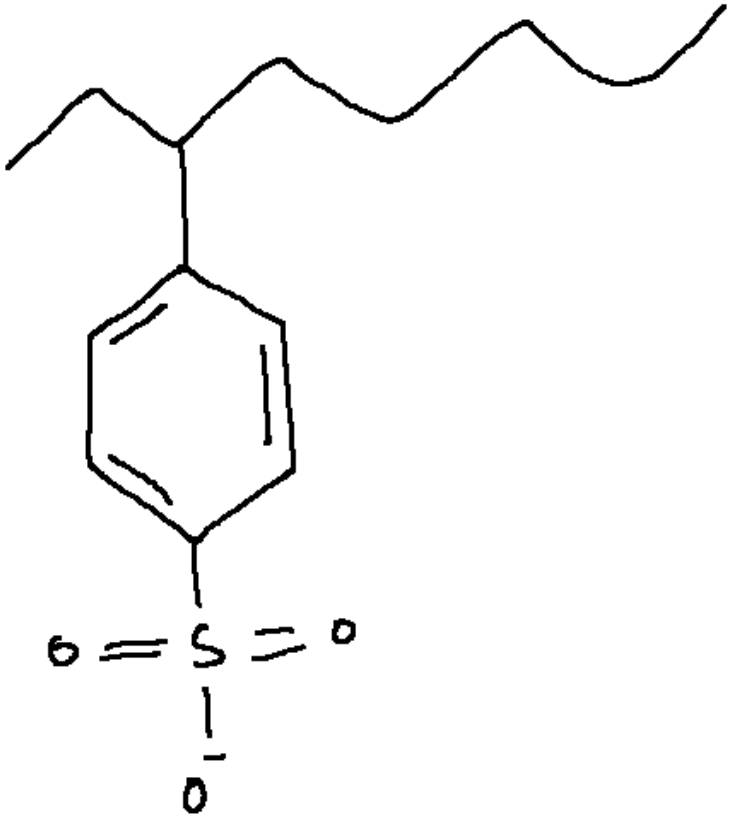
- Highest Concentration of Graphene
- Lowest Concentration of PSS



Graphene Dispersion

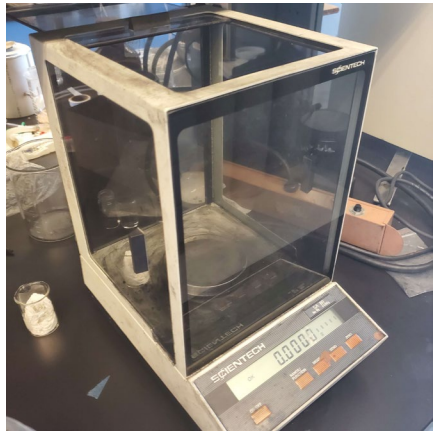


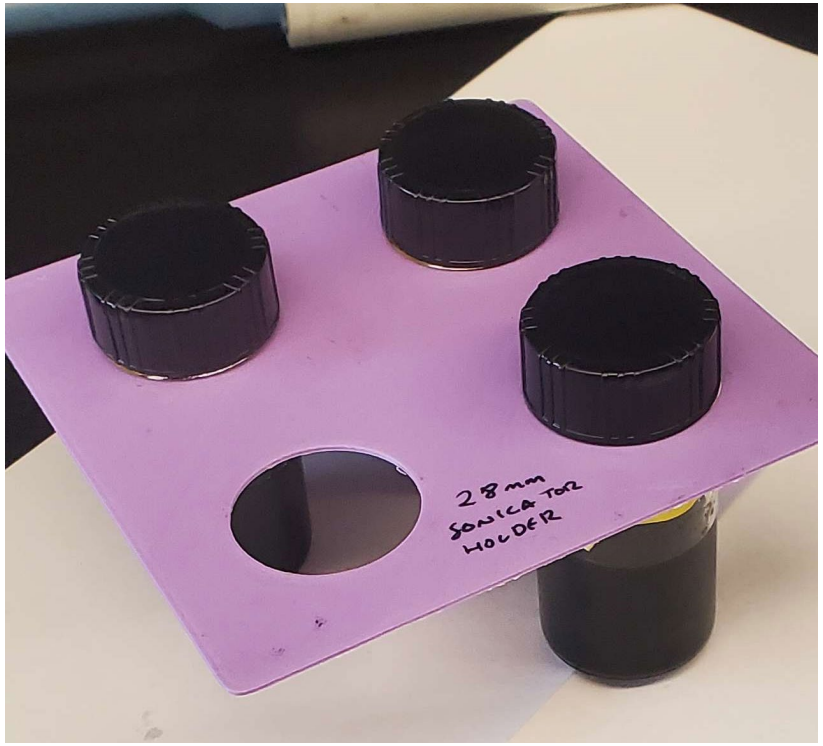
Polystyrene Sulfonate (PSS)



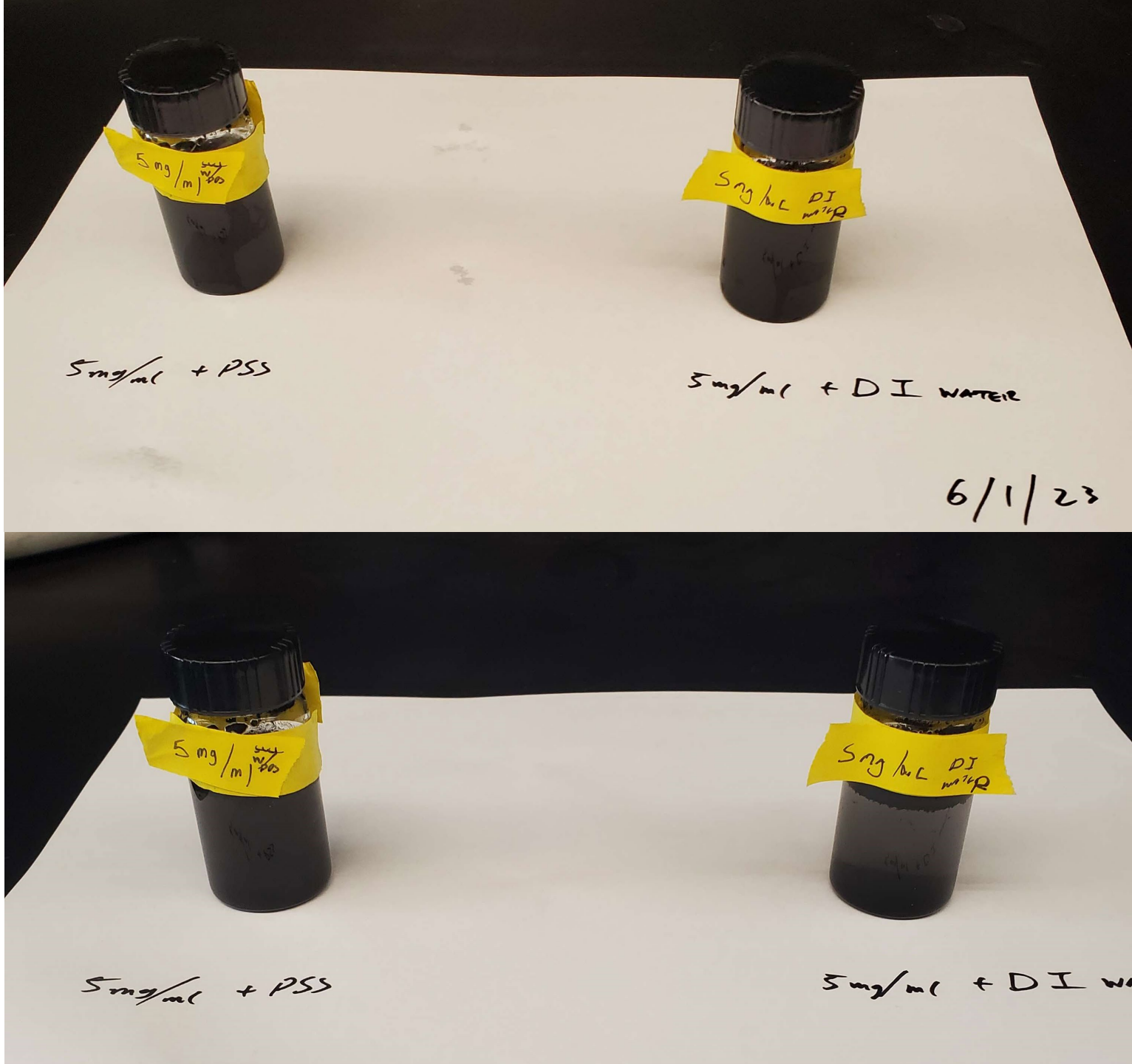
Procedure

- Measure
- Shake
- Wait
- Repeat

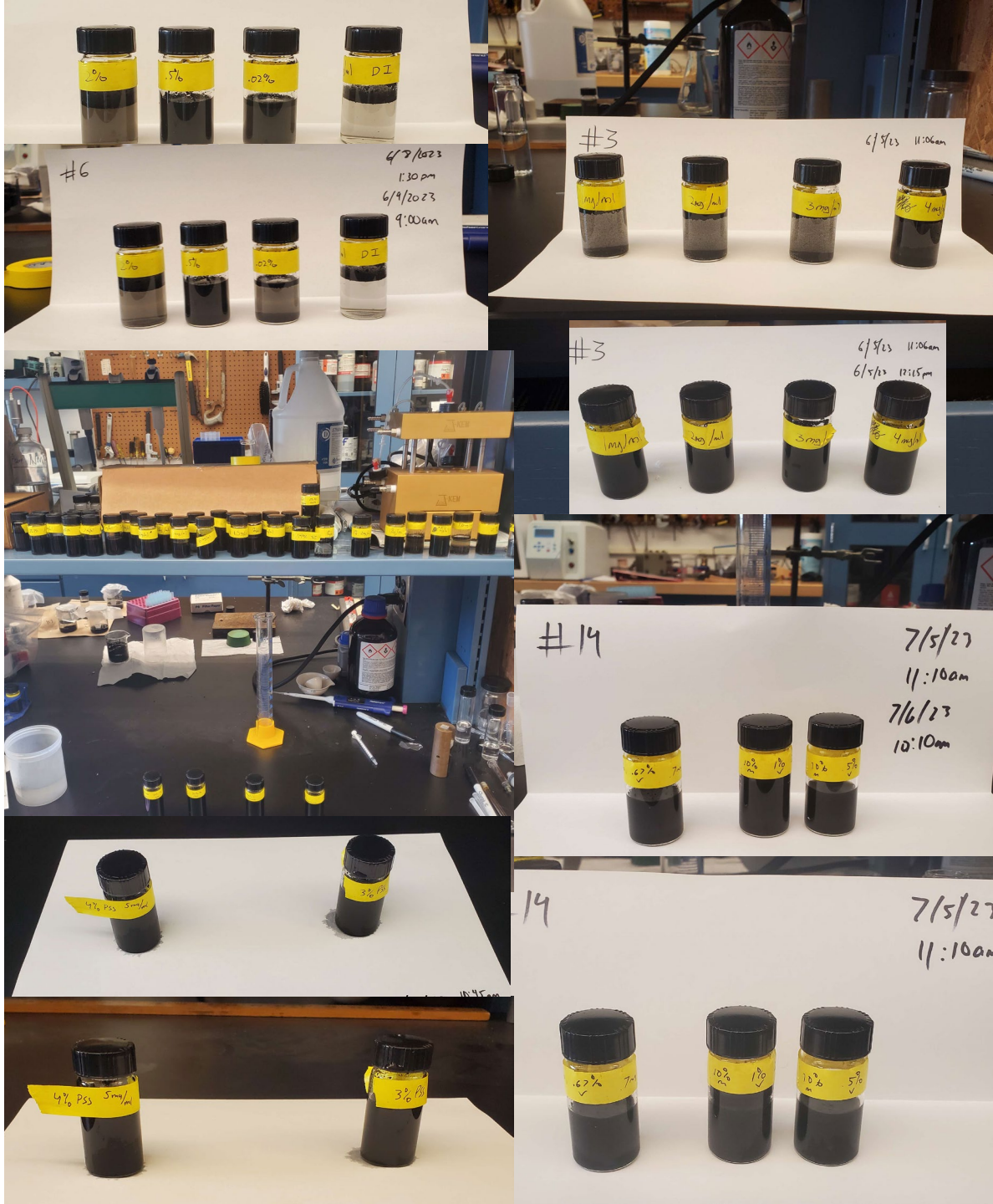




Experiment #1

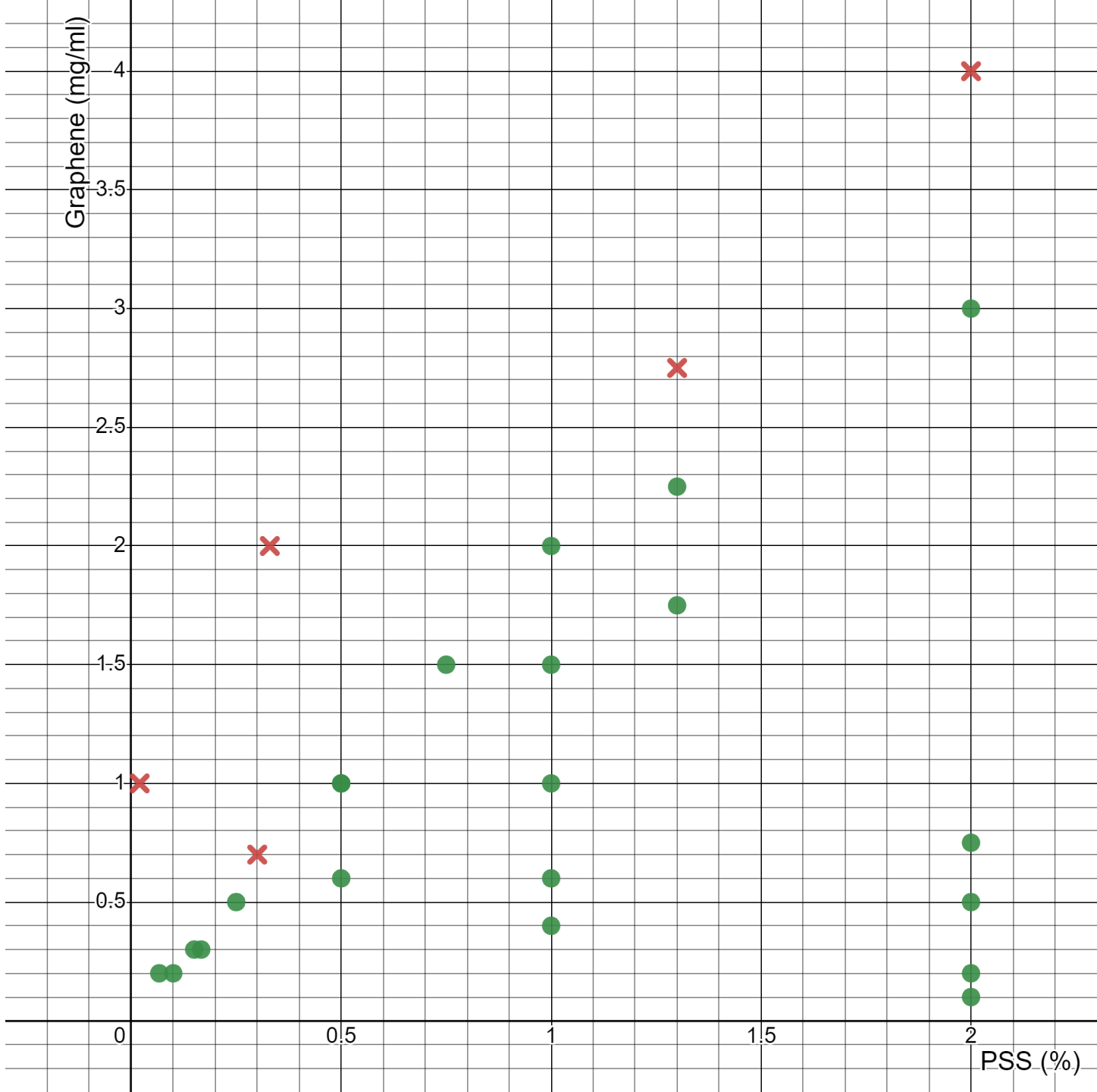


Experiment #2 - 14



All Data Plot

- Green: Dispersed
- Red: Settlement



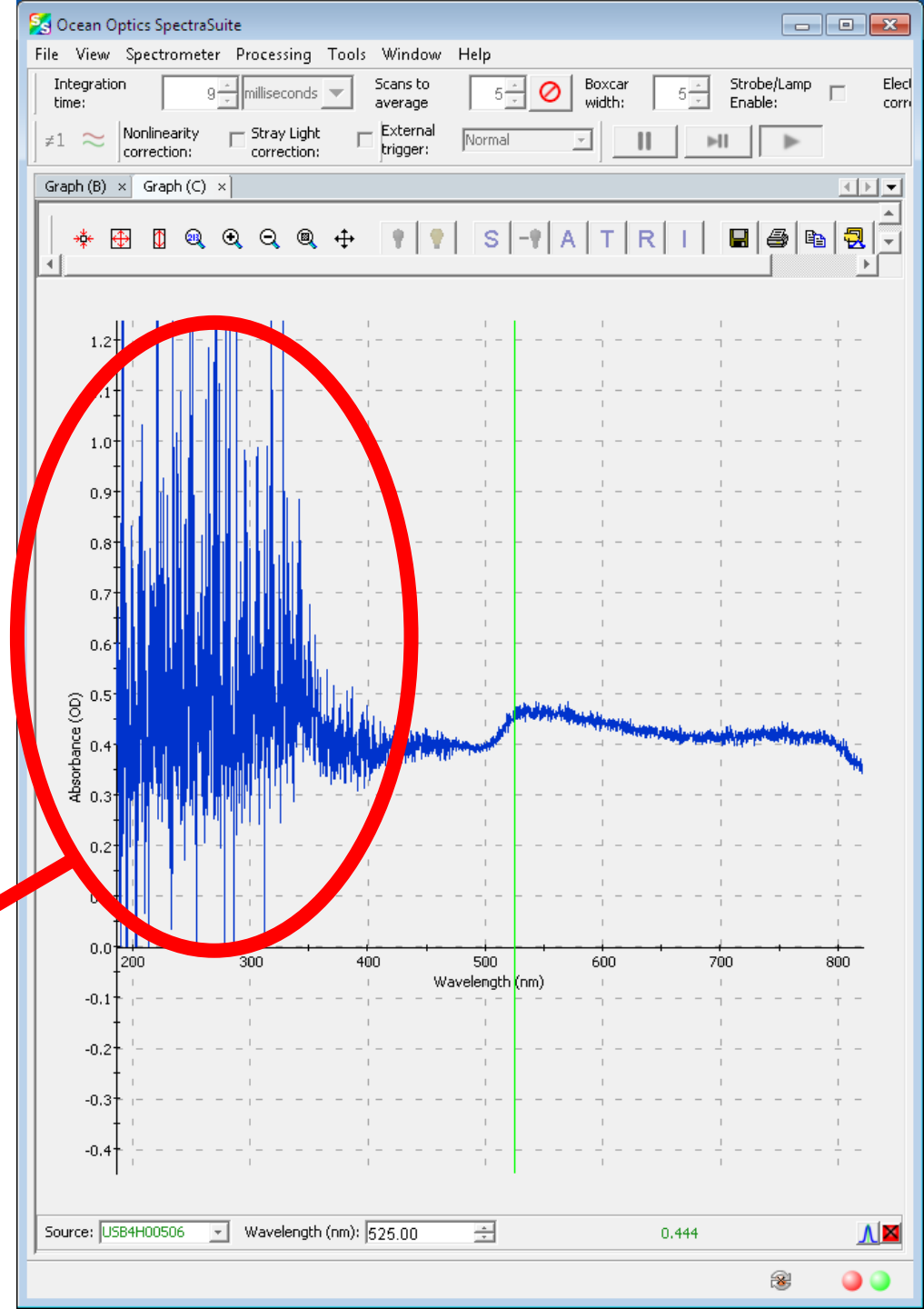
Results

- PSS : Graphene Ratio
  - 1% PSS per 2mg/ml

Further Research

- Maximum saturation
- More Precision
- Testing Physical Properties
- Using UV-Vis

Too Much Interference



Concentration Calculation Beer-Lambert

$$A = \varepsilon c l$$

$$A_1 = \varepsilon c_1 l$$

$$A_2 = \varepsilon c_2 l$$

$$\frac{A_1}{A_2} = \frac{c_1}{c_2}$$

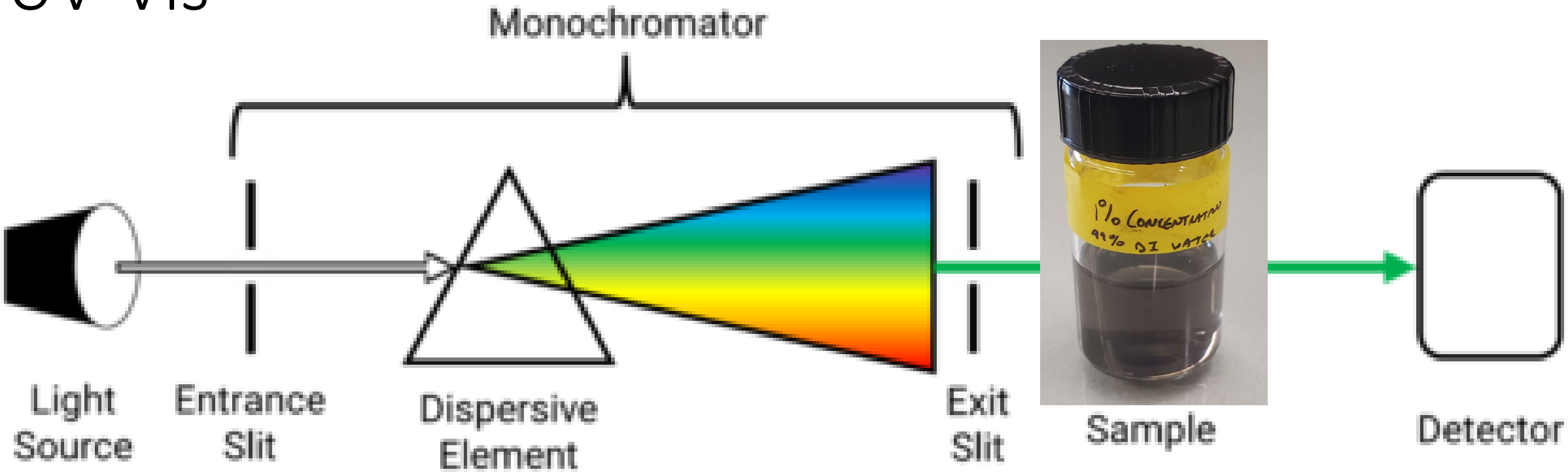
A = Absorbance

ε = Molar Absorption Coefficient

c = Molar Concentration

l = Optical Path Length

UV-Vis


Monochromator
Light Source
Entrance Slit
Dispersive Element
Exit Slit
Sample
Detector

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Questions?