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**POST LAB REPORT QUESTIONS (submit to instructor when mindtap report is due)**

1. **Calculations:**

**Part A:** Starting with your graph (attach it to this page) for the density of copper, set up calculations for:

* Unit Cell Volume:
* Unit Cell Mass:
* Atoms in the Unit Cell (explain how you arrived at your answer):

(8 corner atoms ) + (6 face atoms ) = 1 atom + 3 atoms = 4 atoms

**Part B:** Set up calculations for the following using your data:

* Volume of SA/hex. solution in the monolayer:

=

* Mass of SA in the monolayer:

=

* Volume of SA in the monolayer
* Thickness (h) of the SA monolayer =
* Avogadro’s number

=

Diameter of 1 carbon atom =

Volume of 1 carbon =

1. **Additional Questions:**
2. *Which of your calculated values for Avogadro’s number is more accurate?*

* Part A’s calculated value was a lot more accurate than part B because Avogadro’s number is and Part A’s value (is a lot closer than Part B’s value ().

1. *What are some of the experimental errors in Part A? What could you have done differently to get a more accurate value of Avogadro’s number?*

* Every mass and volume of Cu shot is different. Thus, the relationship with mass and volume will slightly change during the experiment. When using the top-loading balance to measure the mass of Cu shot, the value keeps changing and is not accurate and stable as the analytical balance.
* When reading the volume through the cylinder, the misreading and cursorily reading the graduation lines will occur.
* When calculating the mass of unit cell, we keep rounding up the results but I could have used the analytical balance, kept the significant figures as many as possible and read the meniscus of liquid level carefully.

1. *What are some of the experimental errors in Part B? What could you have done ­­differently to get a more accurate value of Avogadro’s number?*

* There are a total of 5 experimental errors in Part B:
  + Not covering the container (which stores the stearic acid/hexane solution) tightly with Parafilm and the evaporation of hexane occurs. That will lead to a major change in the concentration of the solution and create a higher percentage of error.
  + Not looking at the right measurement on the ruler (mistaken cm for inches) when measuring the diameter of the watch glass with the ruler.
  + Not using a clean glass Pasteur pipet which will lead to wrong calculations and measurements.
  + Since the last drop of stearic acid will persist for 20 – 30 seconds before the hexane evaporates, we would not have closely observed the phenomena to record the exact drops.
  + Not counting or miscounting the number of drops of stearic acid/hexane solution during the experiment.
* To get a more accurate value of Avogadro’s number, I suggest we should read the manual and the procedure guidance carefully before the experiment to avoid making the above mistakes. At the same time, we should also keep track of the number of drops of the solution onto the water surface and measure the diameter with a more precise ruler that gives us the most accurate value with more significant figures.

1. *Suppose 1.00 mole of pennies (each penny is 0.0598 inch thick) is stacked one atop another to make a very tall pile. Starting from the bottom of the pile in a spacecraft traveling at the speed of light (3.00×108 m/s), how many years will it take to reach the top of the pile of pennies? Show all your work.*

1 mole of pennies = number of pennies

1 penny = 0.0598 inch thick

pennies x 0.0598 inch thick = inch thick

1 inch = 0.0254 m

() x 0.0254 = m

m = distance the spacecraft must reach to the top of the pile

Time (s) = distance (m) / speed of light

m / s

s x years = 96397 years