PHYS LAB Measurement of density

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Time:\_\_\_\_\_\_\_\_\_\_\_\_

Partner(s):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
  
**Purpose: To determine the densities of various regularly shaped solids and liquids.**

A. Rectangular Solids

Apparatus: Electronic balance, foot ruler, vernier caliper, micrometer,   
rectangular solid metals- Al, Cu, Brass, and Fe; sheet metal, and acrylic block.

Theory:            

Data: Rectangular Solids [To convert mm 🡪 cm, divide by 10, since 1 cm = 10 mm]

Create a data table as shown below in Excel spread sheet. Measure and enter the mass, length, width, and height values for the rectangular solids. Add 4 more columns and use Excel to calculate the volumes and densities. Also enter the accepted densities and calculate the %Error using Excel. Use proper significant figures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mass (g) | Length (cm) | Width (cm) | Height (cm) |
| Al |  |  |  |  |
| Cu |  |  |  |  |
| Fe |  |  |  |  |
| Brass |  |  |  |  |
| Sheet metal |  |  |  |  |
| Acrylic block |  |  |  |  |

If the %Errors are high, check your measurements. Insert your data table.   
  
Accepted densities (in g/cm3):   
Aluminum = 2.70    Copper   = 8.90     Iron     = 7.85        Brass    = 8.40   
Steel    = 7.80        Gold       =19.30     Lead     =11.30     Nickel   = 8.75   
Platinum = 21.54    Silver      =10.5       Zinc      = 7.10        water    = 1.00   
Wood = 0.64        Acrylic    = 1.2    
  
For Al, calculate the %uncertainty in density = =) x 100

B. Cylinders

Apparatus: Metal cylinders: Cu, Fe, Steel, Brass, and Al; wood, acrylic cylinder, length of Cu wire, electronic balance, foot ruler, vernier caliper, and micrometer.   
 Theory: ,       ; d = diameter, h = height.   
  
Data: Cylinders   
Create a data table as shown below in Excel spread sheet. Measure and enter the mass, height, and diameter values for the cylinders. Add 4 more columns and use Excel to calculate the volumes and densities. Also enter the accepted densities and calculate the %Error using Excel. Use proper significant figures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cylinder | | Mass (g) | Height, h (cm) | Diameter, d (cm) |
| Al | |  |  |  |
| Steel | |  |  |  |
| Cu | |  |  |  |
| Brass | |  |  |  |
| Fe | |  |  |  |
| Wood | |  |  |  |
| Acrylic | |  |  |  |
| Cu wire | |  |  |  |
| Penny | Year: |  |  |  |

Use this [penny composition](https://en.wikipedia.org/wiki/Penny_(United_States_coin)) website to calculate an accepted density for your penny. Show your work below:

If the %Errors are high, check your measurements. Insert your data table.

C. Density of H2O and CuSO4   
Apparatus: Graduated cylinder, electronic balance, water, and CuSO4.  
Procedure:   
1. Collect 10 sets of mass & volume data for water, plot a linear scatter plot, and obtain the average density from the slope.   
2. Repeat the above procedure for CuSo4.  
3. Insert your data table and graph.   
  
Average Density of Water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and CuSO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from graph.

D. Write a conclusion for the purpose and upload a digital copy of the lab report in BB, lab page, before the start of the next lab period. Turn this paper copy in lab next week.