

Name _____ Period _____

Lab 2 – Density of a Solid and a Liquid

40 Points

Introduction

In this lab we will be solving for density, the mass (weight) of an object based on the object's volume (*size*). To solve for density we need to measure the volume and mass of the sample using basic laboratory techniques.

Density is found using the density equation:

$$D = m / v, \text{ where } D = \text{Density (g/mL)}, m = \text{mass (g)}, \text{ and } v = \text{volume (mL)}$$

Volume by Water Displacement

The volume of a solid can also be found using the displacement method. To use the displacement method the initial volume (*initial, without solid*) and final volume (*with solid*) using the equation below:

$$V_{\text{solid}} = V_{\text{after}} - V_{\text{start}}$$

Density Tables for Metals

Element	Aluminum	Brass	Copper	Gold	Iron	Lead	Nickle
Density	2.60g/mL	8.50g/mL	8.96g/mL	19.3g/mL	7.87g/mL	11.3g/mL	8.90g/mL
Element	Platinum	Silver	Steel	Tin	Tungsten	Vanadium	Zinc
Density	21.5g/mL	10.5g/mL	7.86g/mL	7.26g/mL	4.51g/mL	6.0g/mL	7.14g/mL

Lab Procedure

Density of a Solid

Volume by Displacement

1. Add water to the halfway mark on a graduated cylinder (*record volume*)
2. Add metal and record new volume (*record volume*)
3. Subtract new volume from original volume
4. Use volume and mass above to solve for density
5. Determine metal based on chart above/properties

Data Table with Initial Calculations (V_{metal} and Radius)

Metal	V_{start} (mL)	V_{after} (mL)	V_{metal} ($V_{\text{after}} - V_{\text{start}}$)	Mass (g)
Silver (Shiny)	35.0mL	43.1mL		59.1g
Silver (Not Shiny)	35.0mL	42.9mL		20.3g
Gold	35.0mL	42.9mL		79.28g

Dark
Silver

Light
Silver

yellow
orange

Calculations

$$D = \text{Mass (m)} / V_{\text{metal}}$$

Density (*Solid Measurements*)

Silver (<i>Shiny</i>)
D = _____
D = _____

Silver (<i>Not Shiny</i>)
D = _____
D = _____

Gold
D = _____
D = _____

Results

What were the metals for each metal cylinder?

Compare results from each density calculations to chart on front of lab document

Cylinder	Silver (<i>Shiny</i>)	Silver (<i>Not Shiny</i>)	Gold
Metal			