

## Measurements II: Density of a Solid

Prelab 3

Jaqueline Martinez

Name

1:00 pm

Time

M T (W) R F

A student obtained a clean flask. She weighed the flask and stopper on an analytical balance and found the total mass to be 34.232 g. She then filled the flask with water and found the new mass to be 60.167 g. The temperature of the water was measured to be 21°C. Use this data to find the internal volume of the stoppered flask. The density of water at various temperatures is given in Appendix H. Show all calculations necessary to answer the following questions.

First calculate the mass of the water in the flask:

Mass of water = mass of filled flask – mass of empty flask

1. Mass of water = 60.167 g – 34.232 g

Mass of water → 25.947g

Use the density to determine the volume of water. Density = mass/volume, or

Volume = mass/density

2. Volume of water = internal volume of flask = 25.998 cm<sup>3</sup>

total mass : 34.232g

total mass + water : 60.167

temp : 21°C

Mass : 25.947g

temp : 21°C

↳ Density : 0.9980

■ Measurements II: Density of a Solid

To the empty flask she added pieces of the metal until the flask was about half full. She weighed the stoppered flask and its contents and found the mass to be 152.445 g. She then filled the flask with water and stoppered it. She obtained a total mass of 164.724 g for the flask, stopper, metal, and water. Find the density of the metal. Make sure you are using the proper number of significant figures (see Appendix E).

Next, determine the mass of the metal:

3. Mass of metal = 152.445 g - 34.232 g = 118.213 g

flask + metal : 152.445 g

flask + metal + water : 164.724 g

flask : 34.232 g

Next, determine the mass of water (from which we will calculate the volume of water):

Mass of water = (mass of flask + stopper + metal + water) - (mass of flask + stopper + metal)

4. Mass of water = 164.724 g - 152.445 g = 12.279 g

From this value we can now calculate the volume of water from volume = mass/density

5. Volume of water = 12.303 cm<sup>3</sup>

$$\frac{12.279}{0.9980}$$

From the volume of water we can calculate the volume of metal:

Volume of metal = volume of flask - volume of water

Volume of metal : 13.695

mass : 118.213

6. Volume of metal = 25.998 cm<sup>3</sup> - 12.303 cm<sup>3</sup> = 13.695 cm<sup>3</sup>

Finally, we can calculate the density using Density = mass/volume

7. Density of Metal = 8.631 g/cm<sup>3</sup>