

Density- A Property of Matter

Purpose- Learn and practice techniques and calculations for determining volume and density of a substance.

Procedure-

Part I: Solids

1. Get 10 pennies (Copper) and be sure to return the pennies at the end of class.
2. Weigh the pennies and record its mass to three places past the decimal.
3. Fill a 100ml-graduated cylinder with enough water (lets say up to 50ml) to cover the pennies but not so much that the 100ml mark is over-run with water. Record the initial volume.
4. Drop the pennies into the water in the cylinder until it is completely submerged. Read and record the NEW water level.
5. Repeat this process with zinc (Nickels).

Part II: Densities of Liquids at Room Temperature

1. Clean and dry your 100ml graduated cylinder.
2. Weigh the cylinder carefully and record its mass to the nearest thousandth.
3. Take the cylinder to the front table and measure out EXACTLY 50ml of ethanol (vitamin water). Record this volume on your data sheet.
4. Go back to your lab station and reweigh the cylinder and contents and record the mass to the nearest thousandth.
5. Repeat steps 1-4 with glycerin (Gatorade), Diet Coke and Regular Coke.
6. Clean and dry your graduated cylinder.
7. Record the mass of your empty cylinder to the nearest thousandth.

8. Fill the cylinder to the 50ml mark with the distilled water. Be sure to read the bottom of the meniscus. Record this volume of water on your data sheet.
9. Reweigh your cylinder and water and record this mass on your data sheet to the nearest thousandth.

Observations and Data:

Part I: Solids

Mass and water Displacement

	Mass	Original H ₂ O level	Final H ₂ O level
1. Zinc	<u>20.1g</u>	<u>50 ml</u>	<u>54 ml</u>
2. Copper	<u>23.2g</u>	<u>50 ml</u>	<u>54 ml</u>

Part II: Densities of Liquids at Room Temperature

	<u>Volume of sample</u>	<u>Mass of empty graduate</u>	<u>Mass of grad+ contents</u>
1. Ethanol	<u>50 ml</u>	<u>5.4g</u>	<u>66.2g</u>
2. Glycerin	<u>50 ml</u>	<u>5.4g</u>	<u>65.7g</u>
3. Water	<u>50 ml</u>	<u>5.4g</u>	<u>64.0g</u>
4. Earl	<u>50 ml</u>	<u>5.4g</u>	<u>67.0g</u>
5. Triangle	<u>50 ml</u>	<u>5.4g</u>	<u>63.4g</u>

Charts:

Solids	Mass	Volume	Density
	(g)	(ml)	g/ml or g/m ³
Zinc	20.1	54	20.1/54
Copper	23.2	54	23.2 /54

Liquids	Mass	Volume	Density
	(g)	(ml)	g/ml or g/m ³
Ethanol	60.8	50	60.8/50
Glycerin	60.3	50	60.3/50
Water	58.6	50	58.6/50
Earl (Regular Coke)	61.6	50	61.6/50
Triangle (Diet Coke)	58.0	50	58.0/50

Questions for Discussion:

1. One reason is that we did the lab differently. Second, we used different tools like using the 100ml-graduated cylinder instead of the 10ml and we did not use the piece of the glass rod. Third, each measurement is different from the “accepted values” because each person in the lab measured their results differently and that is why they vary from each group.
2. If a chemist wants to figure out the density of an object with an irregular shape they use the method of water displacement. The displacement in the water shows how dense the object is. Density is an important property of matter. By itself, or in conjunction with other properties, density can be used to identify substances. Density is defined as the quantity of matter in a given unit of volume.
3. I would make them go into a tub filled with water and measure the water displacement to see how much water has raised when they got in it and figure out the density of the member of my lab group.