

Part 1: Density; Be able to solve for density, mass, and volume using the density formula. In addition, be able to predict whether something will sink or float in another fluid.

Example problems:

1) The mass of a sample of a substance is determined to be 27.98 g, and the volume is measured to be 54.37 cm³. What is the density of this substance?

$$D = \frac{m}{V} = \frac{27.98}{54.37} = 0.5146 \text{ g/cm}^3 \text{ (4 sig figs)}$$

2) An aluminum ball has a mass of 8.7 g and displaces 3.2 mL of water. What is its density?

$$D = \frac{8.7}{3.2} = 2.7 \text{ g/mL (2 sig figs)}$$

3) If a sample of substance 'X' has a mass of 60.00 g and a density of 10.00 g/cm³, what would its volume be?

$$V = \frac{m}{D} = \frac{60}{10} = 6.00 \text{ cm}^3 \text{ (3 sig figs)}$$

4) If a student pulled a piece of exactly 5 cm³ of the substance in problem 3, what would the mass of this piece be?

$$m = D V = (10.00)(5) = 50 \text{ g (2 sig fig)}$$

5) An object is 12cm X 14cm X 20.1 cm and has a mass of 80.25 kg. What is its density?

$$V = 12 \times 14 \times 20.1 = 3376.8 \text{ cm}^3 \quad D = \frac{m}{V} = \frac{8.25}{3376.8} = 0.0024 \frac{\text{kg}}{\text{cm}^3}$$

6) An object has a density of 14.3 g/ml. If you have 100.1 grams of the object, what volume would it contain?

$$V = \frac{m}{D} = \frac{100.1}{14.3} = 7.00 \text{ ml (3 sig figs)}$$

5) An object is placed into 50.0 ml of water and the water level rises to 73.4 ml. The object is then massed and the reading on the balance is 138.45g. What is the density of the object?

$$V = 73.4 - 50 = 23.4 \text{ mL}$$

$$D = \frac{138.45}{23.4} = 5.92 \text{ g/mL (3 sig figs)}$$

6) What volume will 6 kg of a substance have if the density is 25.0 g/ml?

Convert 6kg to g. $V = \frac{m}{D} = \frac{6000}{25} = 240 \text{ (but in only 1 sig fig)} \approx 200 \text{ mL}$

7) The following substances are placed in a container. List the order from top to bottom they will become:

Oak – 0.8; Vegetable oil – 0.9, Cork – 0.2; Water – 1.0; Alcohol – 0.79; Dishwashing liquid – 1.03

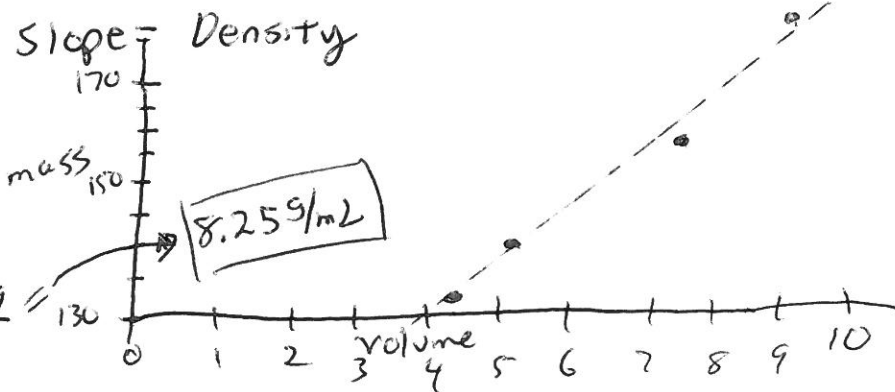
3 4 1 5 2 6

8) The following data was obtained from dropping pieces of copper into a graduated cylinder. Graph the following data and calculate the density of the material.

Mass _____ Volume _____

131.54 g	4.21 mL
138.07 g	5.00 mL
158.12 g	7.38 mL
173.56 g	9.30 mL

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{173.56 - 138.07}{9.30 - 5.00} = \frac{35.49}{4.3} = 8.25$$



Part 2: Classification of matter; Be able to classify matter into one of the following categories: element, compound, heterogeneous mixture, homogenous mixture.

Classify each of the following as an element, compound, heterogeneous mixture, or homogenous mixture.

9. Water C

10. Carbon (C) E

11. Air Homo.

12. Table salt, NaCl C

13. Sugar dissolved in water Homo...

14. Granite Hetero...

15. Sand in water Hetero...

16. Oxygen E

Part 3: Chemical and Physical Properties; Be able to distinguish a chemical property from a physical property; In addition, be able to distinguish qualitative from quantitative descriptions.

Classify each of properties listed below as extensive physical, intensive physical, or chemical.

- | | | | |
|--------------------|----------|-------------------------|----------|
| 17. Color | <u>P</u> | 18. reactivity | <u>C</u> |
| 19. Combustibility | <u>C</u> | 20. Unreactive | <u>C</u> |
| 21. Hardness | <u>P</u> | 22. Odor | <u>P</u> |
| 23. Density | <u>P</u> | 24. stability | <u>C</u> |
| 25. Solubility | <u>C</u> | 26. Malleability | <u>P</u> |
| 27. Melting point | <u>P</u> | 28. Tendency to corrode | <u>C</u> |
| 29. Ductility | <u>P</u> | 30. reacts with water | <u>C</u> |
| 31. Volume | <u>P</u> | 32. Weight | <u>P</u> |

Part 4: Chemical and Physical Changes; Be able to distinguish a chemical change from a physical change.

Classify each of the following as chemical or physical changes:

- | | | | |
|--|----------|---|----------|
| 33. growth of plant | <u>C</u> | 34. Fading of dye in cloth | <u>C</u> |
| 35. melting of ice | <u>P</u> | 36. Digestion of food | <u>C</u> |
| 37. formation of solid from clear liquids | <u>C</u> | 38. Production of light from glow stick | <u>C</u> |
| 39. creating rock candy by evaporating water | <u>P</u> | 40. Burning coal | <u>C</u> |
| 41. digging soil | <u>P</u> | 42. Exploding firecracker | <u>C</u> |

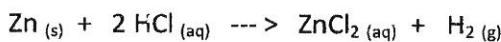
Part 5: The Law of Conservation of Mass: Be able to calculate the mass of products and/or reactants in order to conserve the mass.

Reaction	Reactant(s)		Product(s)	
43)	H ₂	O ₂	H ₂ O	
Mass	5.4g	8.0g	13.4g	
44)	CH ₄	O ₂	CO ₂	H ₂ O
Mass	12.2g	18g	20.2g	10.0g

45) When 72.9g of magnesium is reacted with 28.0 g of nitrogen gas, no magnesium or nitrogen are left over. How much magnesium nitride is produced?

$$72.9 + 28 = \boxed{100.9g}$$

46) If 46.5 grams of reactants are used in the following reaction, what will be the mass of the products?



reactants = products
so $\boxed{46.5g}$

47) A 20.0-g sample of sucrose contains 8.4 g of carbon. What is the mass percentage of carbon in sucrose?

$$\frac{8.4}{20} \times 100 = 42\%$$

48) Sucrose is 51.50% oxygen. How many grams of oxygen are in 20.0 g of sucrose?

$$\frac{x}{20} \times 100 = 51.50 \quad \text{so} \quad \boxed{x = 10.3g}$$

49) Two unknown compounds are tested. Compound I contains 15.0 g of hydrogen and 120.0 g of oxygen. Compound II contains 2.0 g of hydrogen and 32.0 g of oxygen. Are the compounds the same?

check the elements mass percent and see if they match.

Compound 1

$$\frac{15}{135} \times 100 = 11.1\%$$

Compound 2

$$\frac{2}{34} \times 100 = 6.9\%$$

They are not the same