


$$C_1 V_1 = C_2 V_2$$

Concentration, Dilution Mixed-Bag!

$$C = \frac{m}{V}$$

$$m = C \cdot V$$

$$V = \frac{m}{C}$$


Show all Formulas, Work and Units!

($C = m/V$, where C: concentration, m: mass of solute and V: volume of solution)

1. If Leah dissolves 16 g of copper sulphate to make 250 ml of solution, what would the concentration of her solution be in g/L? (4 marks)

$$\rightarrow \div 1000 = 0.25 L$$

$$C = \frac{m}{V}$$

$$= \frac{16g}{0.25L}$$

$$C = 64g/L$$

2. Calculate the mass needed for Daniel to produce 250 ml of an aqueous solution of sodium hydroxide (NaOH) with a concentration of 24 g/L. (4 marks)

$$250 mL = \frac{0.25 L}{\div 1000}$$

$$m = C \cdot V$$

$$= 24 \times 0.25$$

$$m = 6g$$

3. What volume of lemonade with a concentration of 75 g/L could be produced from 500 ml of concentrated lemonade with a sugar concentration of 1500 g/L? (4 marks)

Include the volume of water required to add. (2 marks)

$C_1 V_1 = C_2 V_2$, where C is concentration and V is volume of solution, 1 before dilution and 2 after.

$$V_2 = V_1 + H_2O$$

$$500 mL = \frac{0.5 L}{\div 1000}$$

$C_1 V_1 = C_2 V_2$
starts with wants to get

$$C_1 V_1 = C_2 V_2$$

$$\frac{1500g/L \times 0.5L}{75g/L} = \frac{75g/L \times V_2}{75g/L}$$

$$10L = V_2$$

$$V_2 = V_1 + H_2O \text{ added}$$

$$V_2 - V_1 = H_2O \text{ added}$$

$$10 - 0.5 = 9.5L \text{ added}$$

* Find the *
Volume difference

4. Alicia prepares salt solutions at the hospital as a nurse's aid. If Alicia needs to make 750 ml of salt solution that has a concentration of 9% (m/v) what mass of salt does she need? (4 marks)

Hint: convert % m/v to g/L

$$9g/100mL$$

$$\frac{9g}{100mL} = \frac{?}{750mL}$$

$$? = 67.5g$$

cross multiply and divide
 $9 \times 750 \div 100 = 67.5$

$$\frac{\text{Vol}}{1000} \rightarrow 0.25\text{L}$$

5. Give all the steps to produce 250 ml of an aqueous solution of sodium hydroxide (NaCl) with a concentration of 24 g/L. ($C = m/V$, where C: concentration, m: mass of solute and V: volume of solution) (5 marks)

Materials include a scale, a 200 ml graduated cylinder, 500 g of sodium hydroxide, a 250 ml volumetric flask and 300 ml of water.

STEP 1
calculations

$$C = \frac{m}{V} \rightarrow \text{need mass}$$

$$\frac{m}{C \cdot V}$$

$$m = C \cdot V \\ = 24\text{g/L} \cdot 0.25\text{L} \\ m = 6\text{g}$$

STEP 4
add the 6g of NaCl to the 250ml of water and stir.

STEP 2

Fill the volumetric flask to the 250ml mark with water

STEP 3 weigh 6g of NaCl on the scale

6. Brandon dissolves 36 g of potassium nitrate in enough water to produce 750 ml of solution. What is the concentration of the solution expressed in g/L? (4 marks)

The 36g will dissolve, and will not increase the 750ml volume.

$$\div 1000 = 0.75\text{L}$$

$$C = \frac{m}{V} \\ = \frac{36}{0.75}$$

$$C = 48\text{g/L}$$

7. Maple syrup has a sugar concentration of 480 g/L and Maple sap has a concentration of 12 g/L. $C_1V_1 = C_2V_2$

a. How much Maple syrup can be produced from 120 L of Maple sap? (4 marks)

$$C_1V_1 = C_2V_2 \quad C_2 = 480\text{g/L} \quad V_2 = ? \quad V_1 = 120\text{L} \quad C_1 = 12\text{g/L}$$

$$\frac{12\text{g/L} \cdot 120\text{L}}{480\text{g/L}} = \frac{480\text{g/L} \cdot V_2}{480\text{g/L}} \rightarrow 3\text{L} = V_2 \quad \text{OR} \quad V_2 = \frac{C_1V_1}{C_2} = \frac{12\text{g/L} \cdot 120\text{L}}{480\text{g/L}} = 3\text{L}$$

b. How much water would have to be boiled off the 120 L of sap to make the syrup? (2 marks)

$$120\text{L} - 3\text{L} = 117\text{L} \quad \text{OR} \quad V_2 = V_1 + H_2O \quad 117\text{L}$$

$$V_1 - V_2 =$$

$$V_2 - V_1 = H_2O \rightarrow 3\text{L} - 120\text{L} = -117\text{L}$$

(-) because its

c. How much Maple sugar could be produced if all the water were boiled off? (3 marks)

mass of solute

$C = 480\text{g/L}$... we have 3L of this solution

$$\frac{480\text{g}}{1\text{L}} = \frac{? \text{g}}{3\text{L}}$$

cross multiply and divide
 $480 \times 3 \div 1 = 1440$

$$? = 1440\text{g}$$