

## Concentration Calculations

Answer the following questions. Show your working

Remember:  $1 \text{ dm}^3 = 1\,000 \text{ cm}^3$

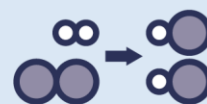
1. State the formula used to calculate concentration using mass and volume.

**Concentration = mass  $\div$  volume**

2. Calculate the concentration (in  $\text{g/dm}^3$ ) of:
  - a. 40 g solute in  $350 \text{ dm}^3$   **$0.11 \text{ g/dm}^3$**
  - b. 100 g solute in  $77 \text{ dm}^3$   **$1.29 \text{ g/dm}^3$**
  - c. 0.08 g solute in  $20 \text{ cm}^3$   **$4 \text{ g/dm}^3$**
  - d. 90g solute in  $780 \text{ cm}^3$   **$115.38 \text{ g/dm}^3$**
3. The mass of  $\text{H}_2\text{SO}_4$  is 32.5 g and the volume of the solution is  $0.400 \text{ dm}^3$ . Calculate the concentration of the solution formed in  $\text{g/dm}^3$ .  **$81.25 \text{ dm}^3$**
4. Explain what would happen to the concentration in question 2 if more water was added to the solution. **The concentration would decrease, because the volume of the solution would increase but the mass of solute would stay the same.**
5. A  $750 \text{ cm}^3$  solution of sodium chloride contains 25 g of solute. Calculate the concentration of the solution.  **$33.33 \text{ g/dm}^3$**
6. What is the concentration of 2 g of copper chloride in  $1.5 \text{ dm}^3$  of solution?  **$1.33 \text{ g/dm}^3$**
7. State the formula used to calculate mass using concentration and volume.

**Mass = concentration  $\times$  volume**

8. Calculate the mass of solute in:
  - a.  $25 \text{ cm}^3$  of a  $2.3 \text{ g/dm}^3$  solution (remember to convert to  $\text{dm}^3$ )  **$0.058 \text{ g}$**
  - b.  $250 \text{ cm}^3$  of a  $71 \text{ g/dm}^3$  solution  **$17.75 \text{ g}$**
  - c.  $2.3 \text{ dm}^3$  of a  $61 \text{ g/dm}^3$  solution  **$140.3 \text{ g}$**
9. A solution of sodium chloride has a concentration of  $400 \text{ g/dm}^3$ . Calculate the mass of sodium chloride in  $0.8 \text{ dm}^3$  of solution.  **$320 \text{ g}$**
10. Explain what would happen to the mass of solute in question 6 if more water was added to the solution. **It would not change, because more water does not affect the total mass of any particles in the solution, it will only affect the concentration.**





11. A solution of sodium chloride has a concentration of  $400 \text{ g/dm}^3$ . Calculate the mass of sodium chloride in  $400 \text{ cm}^3$  of solution. **160 g**
12. A student pours  $0.2 \text{ dm}^3$  of hydrochloric acid into a beaker. The acid had a concentration of  $75 \text{ g/dm}^3$ . Calculate the mass of hydrochloric acid in the solution. **15 g**
13. Using 83 g of solute, how much water is needed to:
- Make a  $34 \text{ g/dm}^3$  solution?  **$2.44 \text{ dm}^3$**
  - Make a  $0.1 \text{ g/dm}^3$  solution?  **$830 \text{ dm}^3$**
  - Make a  $83 \text{ g/dm}^3$  solution?  **$1 \text{ dm}^3$**
  - Make a  $79 \text{ g/dm}^3$  solution?  **$1.05 \text{ dm}^3$**

