Solution concentrations

AQA 8462 Separate Chemistry · Foundation and Higher

Answer on your own paper. Show your working where needed.

Questions 1 to 3 suit both tiers. Questions 4 to 9 are Higher. Show your working and give units.

1. A bottle of salt solution

A bottle holds 320 cm^3 of sodium chloride solution with a concentration of 25.0 g dm^{-3}. Calculate the mass of dissolved sodium chloride in the bottle.

2. Compare two bottles

Bottle A holds 125 cm^3 of sugar solution at 16.0 g dm^{-3}. Bottle B holds 300 cm^3 of sugar solution at 9.0 g dm^{-3}. Which bottle contains the greater mass of sugar? Show both calculations.

3. Check a dry residue

A label says a sodium chloride solution has a concentration of 12.0 g dm^{-3}. A student evaporates the water from 250 cm^3 of the solution and recovers 2.40 g of dry salt. Calculate the difference between the recovered mass and the mass expected from the label.

4. Concentration from measurements (Higher)

A student dissolves 7.20 g of potassium chloride and makes 240 cm^3 of solution. Calculate the concentration in g dm^{-3}.

5. Two labels for the same solute (Higher)

Solution A contains 24.0 g dm^{-3} of magnesium sulfate. Solution B contains 0.125 mol dm^{-3} of magnesium sulfate. Give the concentration of A in mol dm^{-3} and of B in g dm^{-3}. $M_r(MgSO_4)$ = 120.

6. Prepare a solution (Higher)

A student needs 250 cm^3 of 0.240 mol dm^{-3} potassium nitrate solution. Calculate the mass of potassium nitrate needed. $M_r(KNO_3)$ = 101.

7. Add water to a solution (Higher)

A student adds water to 80.0 cm^3 of 0.500 mol dm^{-3} copper sulfate solution. The final volume is 200 cm^3 and no copper sulfate is lost. Calculate the new concentration in mol dm^{-3} and in g dm^{-3}. $M_r(CuSO_4)$ = 159.6.

8. Compare concentrations (Higher)

Solution X contains 8.08 g dm^{-3} of potassium nitrate. Solution Y contains 7.02 g dm^{-3} of sodium chloride. A student says X must have the greater concentration in mol dm^{-3}. Test the claim with calculations. $M_r(KNO_3)$ = 101 and $M_r(NaCl)$ = 58.5.

9. Extra challenge · Two portions in one flask (Higher)

Mix 150 cm^3 of 0.200 mol dm^{-3} sodium chloride solution and 100 cm^3 of 0.350 mol dm^{-3} sodium chloride solution. The volumes add. Find the concentration of the mixture in mol dm^{-3} and g dm^{-3}. $M_r(NaCl)$ = 58.5.

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