Your notes

GCSE Chemistry: revision notes

Concentration and titrations

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Concentration in g/dm³

- Many reactions happen in **solutions**. The **concentration** of a **solution** can be measured in mass per given volume.
- **Concentration** (g/dm³) = mass of **solute** (g) ÷ volume of **solution** (dm³).
- 1 dm³ = 1000 cm³, so divide a volume in cm³ by 1000 to get dm³.
- Example: 10 g of salt dissolved to make 250 cm³ of **solution**: 10 ÷ 0.25 = 40 g/dm³.
- (Higher) Using more **solute** in the same volume, or the same **solute** in a smaller volume, gives a higher **concentration**.

Concentration in mol/dm³ (Higher, separate sciences)

- **Concentration** (mol/dm³) = moles of **solute** ÷ volume of **solution** (dm³).
- To convert mol/dm³ into g/dm³, multiply by the Mr of the **solute**.
- Example: 0.1 mol dissolved in 500 cm³ gives 0.1 ÷ 0.5 = 0.2 mol/dm³.

Titrations (separate sciences)

- A **titration** finds the exact volume of one **solution** needed to react with a known volume of another, for example an acid and an alkali.
- Use a **pipette** to put a measured volume (such as 25.0 cm³) of alkali in a conical flask, and add a few drops of indicator such as phenolphthalein or methyl orange.
- Add acid from a **burette**, swirling, until the indicator just changes colour (the **end point**). Add acid drop by drop near the end.
- Record the volume used (the **titre**). Repeat until you have **concordant results** (within 0.10 cm³ of each other) and calculate the mean.

Titration calculations (Higher, separate sciences)

- Find moles of the **solution** with known **concentration**: moles = **concentration** × volume (dm^3).
- Use the equation to find moles of the other substance, then divide by its volume in dm^3.
- Example: 20.0 cm^3 of 0.10 mol/dm^3 HCl neutralises 25.0 cm^3 of NaOH. Moles of HCl = 0.10 × 0.0200 = 0.00200 mol, so moles of NaOH = 0.00200 mol and its **concentration** = 0.00200 ÷ 0.0250 = 0.080 mol/dm^3.

Worked examples

10 g of salt is dissolved to make 250 cm^3 of solution. Find its concentration in g/dm^3.

Change the volume to dm^3 (divide by 1000). **250 ÷ 1000 = 0.25 dm^3**

Use concentration = mass ÷ volume. **10 ÷ 0.25**

Answer: 40 g/dm^3

Key terms

Solute	The substance that dissolves in a solvent.
Solution	A mixture formed when a solute dissolves in a solvent.
Concentration	The amount of solute in a given volume of solution.
dm^3	A cubic decimetre, equal to 1000 cm^3 or one litre.
Titration	A method for finding the exact volume of one solution that reacts with another.
Burette	A long, graduated tube with a tap used to add a solution accurately.
Pipette	Apparatus used to measure a fixed volume of liquid accurately.
End point	The point in a titration when the indicator changes colour.
Titre	The volume of solution added from the burette to reach the end point.
Concordant results	Titres that are within 0.10 cm^3 of each other.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. How many cm^3 are in 1 dm^3?
2. What is the concentration of 20 g of solute in 2 dm^3 of solution?
3. What is the concentration of 5 g of solute in 250 cm^3 of solution?
4. What mass of solute is in 500 cm^3 of a 30 g/dm^3 solution?

Your notes

5. What is used to add acid accurately in a titration?
6. What are concordant results in a titration?
7. Why do you swirl the flask during a titration?
8. What is the concentration of 0.5 mol in 250 cm^3? (Higher)

Answers

1. 1000
2. 10 g/dm^3
3. 20 g/dm^3
4. 15 g
5. A burette
6. Titres within 0.10 cm^3 of each other
7. To mix the solutions so they react fully
8. 2 mol/dm^3

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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