Concentration calculations

Teacher / technician

YEAR 10 / LESSON 45 / CHEMISTRY ONLY

Staff preparation and answer guidance. Keep separate from student sheets. Chemistry-only calculation workshop. All numerical cases are invented practice data.

Coverage and delivery

Chemistry only: 1.34C calculations involving amount, solution volume and concentration in mol dm^{-3}; mass concentration supports the school objectives.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Calculator / periodic table	1 calculator each; table per pair	30 calculators; 15 tables

Immediate safety

Desk activity only; no chemicals or heating.

Preparation and delivery

Read alongside the student method

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1. Supply 30 booklets/calculators and 15 periodic tables. No acid, alkali, glassware or chemical preparation is required.

2. Model the unit conversion once, then require pupils to write units at every stage. Separate M for molar mass from the table shorthand M for mol dm^{-3}.

3. Use the original examples here; the duplicated, broken legacy acid/base text is replaced. The reacting-volume example uses a 1:2 mole ratio, not a 1:1 volume assumption.

4. Allow 10 minutes modelling, 20 table work, 20 applications and 10 checking. Use corrections to diagnose factor-of-1000 errors.

Close of lesson

• Keep your workings and corrections; return shared materials.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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• NaCl: n = 5.85/58.5 = 0.100 mol; V = 0.250 dm^3; c = 0.400 mol dm^{-3}. Row 2: 0.0750/0.150 = 0.500 mol dm^{-3}. Row 3: 0.0300/1.20 = 0.0250 dm^3 = 25.0 cm^3. Row 4: 0.200 × 0.500 = 0.100 mol.

• 5.85/0.250 = 23.4 g dm^{-3}.

• 0.250 × 40 = 10.0 g dm^{-3}.

• n(H_2SO_4) = 0.200 × 0.0200 = 0.00400 mol; n(NaOH) = 0.00800 mol; V = 0.00800/0.400 = 0.0200 dm^3 = 20.0 cm^3.

• Use 0.250 dm^3: 0.100/0.250 = 0.400 mol dm^{-3}. The quoted number has not converted the volume.

• Dissolving changes the volume; concentration uses measured final solution volume. This desk activity does not instruct pupils to prepare solutions.

References and provenance

Pearson Chemistry specification

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.