Neutralisation: following the pH change

Teacher / technician

YEAR 10 / LESSON 51 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Small-volume neutralisation with approximate pH; not a quantitative titration. No calcium hydroxide powder.

Coverage and delivery

Shared core: 2.32, supported by 2.31 and the school ionic-equation objective. The example uses HCl and NaOH; do not generalise that every salt solution is neutral.

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
Beaker / tile / stirring and sampling rods	1 set per pair	15 sets
Needle-free measuring syringes	1 acid; 1 graduated alkali	15 of each
Eye protection / paper and charts	1 protector each; 24 strips/pair	30 protectors; 450 strips
Dilute HCl / NaOH	10 / up to 14 cm^3 per pair	200 / 300 cm^3 incl. spare

Immediate safety

Wear eye protection; avoid splashes and report contact or spills. Use labelled needle-free syringes only for measuring, never squirting towards anyone. No heating or mixing with other chemicals.

Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 51 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

1. For 15 pairs and two runs, issue 150 cm^3 0.010 M HCl and up to 210 cm^3 0.010 M NaOH; provide 200 and 300 cm^3 respectively including spare. Staff prepare/verify dilute solutions; no calcium hydroxide powder is used.

2. Provide 15 beakers, 15 dedicated acid syringes, 15 graduated 1 cm^3 alkali syringes (no needles), rods and tiles; 30 eye protectors. Supply 24 strips per pair plus spare: 450 strips total.

3. Trial the volume graduations and indicator range. Use fresh, appropriately stored dilute NaOH; absorbed CO_2 changes its effective concentration. The activity estimates a transition, not an unknown concentration.

4. Demonstrate cumulative-volume recording and small consistent test drops. The 1 cm^3 syringe is refilled as needed from a labelled aliquot; never exchange acid/alkali syringes.

5. Allow 10 minutes setup, 25 collection, 15 graphs and 10 cleanup. If pH 7 is missed, retain the honest interval. No heating, flame or skin testing.

Close of lesson

- Staff direct disposal of the final dilute mixtures; rinse apparatus, return separate syringes and wash hands.

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

YEAR 10 / LESSON 51 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

• Use actual data. Expect an increase through a narrow transition near the nominal 5 cm^3, then an alkaline region. Do not supply a fabricated curve.

• Hydrochloric acid + sodium hydroxide → sodium chloride + water. HCl(aq) + NaOH(aq) → NaCl(aq) + H_2O(l).

• H^+(aq) + OH^-(aq) → H_2O(l). Na^+(aq) and Cl^-(aq) remain in solution and cancel from the ionic equation.

• After acid is consumed, excess added OH^- remains; pH rises above neutral.

• Finite addition size, paper colour intervals, sampling losses, contamination and altered NaOH concentration can obscure the neutral point.

• No. Some dissolved salts give acidic or alkaline solutions. This strong-acid/strong-base example is approximately neutral at equivalence at room temperature.

References and provenance

Pearson Chemistry specification

RSC microscale acid–base teaching

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.