Paper 6 is mostly observation, tables, graphs and one planning question. It rewards writing down what you would SEE and doing the routine properly – not extra chemistry. 实验替代卷考的是观察记录与实验规范。

Writing an observation

Record what you see, not what it means. 'Blue precipitate' is an observation; 'copper is present' is a deduction. The two are marked separately and swapping them loses both.

Always give the colour AND the state: 'white precipitate', 'colourless gas', 'green solution'. 'A precipitate forms' with no colour scores nothing.

'No visible change' is a real observation and often carries a mark. Never leave a results box empty.

Say whether a precipitate dissolves in excess – that is usually the mark that separates two possible ions.

Effervescence means bubbles; name the gas only if you tested it.

The tests you must know

Carbon dioxide 二氧化碳 — bubble through limewater – it turns milky (a white precipitate forms)

Hydrogen 氢气 — a lit splint gives a squeaky pop

Oxygen 氧气 — a glowing splint relights

Ammonia 氨气 — turns damp red litmus paper blue; it also smells sharp

Chlorine 氯气 — bleaches damp litmus paper white

Water 水 — anhydrous copper(II) sulfate turns white to blue, or cobalt chloride paper turns blue to pink – for PURE water you also need a boiling point of 100 °C

Sodium hydroxide on a cation 氢氧化钠检验阳离子 — white ppt dissolving in excess = Al^{3} or Zn^{2} ; white ppt not dissolving = Ca^{2} ; light blue = Cu^{2} ; green = Fe^{2} ; red-brown = Fe^{3} ; warming with NH gives ammonia gas

Halide with silver nitrate 卤化物检验 — acidify with dilute nitric acid first, then add silver nitrate: white = chloride, cream = bromide, yellow = iodide

Sulfate and carbonate 硫酸盐与碳酸盐 — sulfate: acidify with dilute nitric acid then barium nitrate gives a white ppt. Carbonate: dilute acid gives effervescence and the gas turns limewater milky

Acidify BEFORE adding silver nitrate or barium nitrate – otherwise a carbonate gives a white precipitate too and the test proves nothing. The reason is itself an exam question.

Apparatus and technique

Name apparatus precisely: 'burette', 'pipette', 'measuring cylinder', 'conical flask'. 'A container' scores nothing.

A burette or pipette is used when the volume must be accurate; a measuring cylinder is for approximate volumes. Choosing the right one is a mark.

Filtration separates an insoluble solid from a liquid – the residue stays in the paper, the filtrate passes through. Use both words correctly.

To get pure dry crystals from a solution: heat to concentrate, leave to crystallise, filter, wash with a little cold distilled water, dry between filter papers or in a warm oven.

In a titration, rinse the burette with the solution it will hold and the conical flask with distilled water only, record readings to 0.05 cm^3, and average only titres within 0.10 cm^3 of each other.

Heat a solid in a crucible or boiling tube, not an open evaporating basin, when a gas must be collected. Draw the delivery tube correctly – a gas cannot flow out of a sealed apparatus.

Tables, graphs and calculations

Head every column with the quantity and its unit as a ratio: 'time / s', 'volume of gas / cm^3'.

Keep the same number of decimal places down a column of raw readings.

Plot with a scale filling over half the grid, label both axes, plot small crosses, and draw a single smooth best-fit curve or line.

Mark an anomalous point with a circle, ignore it when drawing the curve, and say you would repeat that measurement.

Rate from a graph is the gradient: steepest at the start, falling to zero when a reactant runs out. A question asking 'compare the rates' wants both the shape and the reason.

Convert cm^3 to dm^3 by dividing by 1000 before using concentration = moles ÷ volume. This one conversion causes more lost marks than any other calculation step.

Planning and improving

State what you change, what you measure, and at least two things you keep the same – and for a rate experiment, keep the TOTAL volume constant by adding water so only one variable changes.

Give workable quantities: '25.0 cm^3 of 1.0 mol/dm^3 hydrochloric acid', not 'some acid'.

Name a specific hazard from the chemicals in THIS experiment and match a precaution to it: 'dilute acid is irritant – wear eye protection'.

Improvements must fix an error you named: heat loss → insulate and use a lid; gas escaping → check the bung is tight; reading too fast → use a gas syringe rather than counting bubbles.

'Repeat and take an average' improves reliability only. It cannot correct a systematic error such as an unclean burette or a mis-set balance.