8.2 Identification of common gases

Name: _____ Class: _____ Date: _____ **Total: 18 marks**

KEY WORDS limewater • glowing splint

Objective

Choose the four specified gas tests and distinguish observations from conclusions. Original questions and authored marking guidance for 4.8.2.1–4.8.2.4, both tiers. Actual gas handling uses school-approved supervision and containment.

1 Key knowledge and worked examples

Gas	Action	Positive observation
hydrogen	Burning splint at open end of test tube	Pop
oxygen	Glowing splint inserted into gas	Relights
carbon dioxide	Bubble through limewater	Milky/cloudy
chlorine	Damp litmus in approved contained setup	Bleached white

Worked evidence. A glowing splint relights. Among these four gases this supports oxygen. A splint already burning cannot demonstrate relighting; "it stays alight" is not the specified observation. A failed pop test alone does not identify a different gas.

Worked limewater answer. Name aqueous calcium hydroxide (limewater) and record milky/cloudy appearance. Prolonged bubbling until clearing is not required. Chlorine gas bleaches litmus; chloride ions instead use the separate silver-nitrate test.

2 Practice

2.1 State the action and positive result for hydrogen. [2]

2.2 Which gas bleaches damp litmus white? [1]

2.3 Correct this oxygen-test report: "I inserted a burning splint and it was still burning, so it relit." [2]

3 Exam-style questions

3.1 Describe the positive test for carbon dioxide. Give the reagent, its chemical name and the observation; do not require a later clearing stage. [3]

3.2 A gas relights a glowing splint. Identify it among the four specified gases, state what the observation demonstrates, and explain why a failed hydrogen test alone would be weaker evidence. [3]

3.3 A student says, "My gas turned damp litmus red, so it must be chlorine." Evaluate the conclusion and state the required chlorine observation. Explain how a chloride-ion result differs. [3]

3.4 Three separate gases A, B and C are each one of the four specified gases. A makes limewater cloudy, B produces a pop with a burning splint at the tube opening, and C relights a glowing splint. Identify all three and explain whether these data identify a fourth untested sample D. [4]

Solutions

2.1 Hold a burning splint at the open end of the test tube of gas; a pop/squeaky pop is heard. Do not substitute a glowing splint.

2.2 Chlorine.

2.3 Use a **glowing**, not already burning, splint; observe it **relight**, rather than merely continuing to burn. The original report did not perform the specified positive test.

3.1 Bubble through/shake with limewater, aqueous calcium hydroxide, which turns milky/cloudy. Accept the paired chemical/reagent name in one sentence. The positive stage is the formation of cloudiness; clearing later is neither necessary nor an extra required mark.

3.2 Oxygen; relighting is the specified positive oxygen observation among these four gases; no pop only fails to establish hydrogen and does not choose between oxygen, carbon dioxide and chlorine. Do not claim universal specificity beyond the stated possibilities.

3.3 Red alone is insufficient; chlorine's specified positive observation is **bleaching white**. Damp litmus becoming red can indicate acidity without that bleaching evidence. Chloride ions give a white precipitate with dilute nitric acid and silver nitrate, a solution test distinct from chlorine gas. Do not propose unsupervised gas generation.

3.4 A carbon dioxide, B hydrogen, C oxygen. D remains untested and cannot be identified from these observations alone unless an additional premise says the four samples contain four different gases. Do not silently assume all gases are different.