

CAIE Chemistry A-Level
Practicals for Papers 3 and 5
Gases Evolved



Qualitative test for a gas

- **Bubbles** are observed
- If you hold a finger above a test tube and see pressure build up in the tube this indicates a gas
- Note you must wear CLEAPSS approved **gloves** and work in **fume cupboard**, if in doubt of identity of gas, in case gas is harmful or toxic.

Testing for commonly used gases

	Hydrogen	Oxygen	Carbon dioxide	Ammonia	Chlorine
Less dense than air	yes	no	no	yes	no
More dense than air	no	slightly	yes	no	yes
Solubility in water	very low	low	low	very high	moderate

Take these data into account when testing gases. For example, **less** dense gases will **rise** so must be sealed in a bun **upside down** or they're lost and denser gases will sink. Also gases like ammonia are unlikely to be evolved from a liquid under standard conditions because it's very soluble.

Test for Hydrogen (H₂)

A lit wooden splint makes a **squeaky popping sound** in a test tube of hydrogen.

Test for Oxygen (O₂)

A glowing wooden splint **relights** in a test tube of oxygen.

Test for Carbon dioxide (CO₂)

To test the effervescence for carbon dioxide, pass the gas through calcium hydroxide solution (limewater). Carbon dioxide **turns limewater cloudy** white as solid calcium carbonate precipitates.

Test for Ammonia (NH₃)

Ammonia has a characteristic strong, choking smell. It also makes **damp red litmus paper turn blue**. Ammonia forms a white smoke of ammonium chloride when hydrogen chloride gas, from concentrated hydrochloric acid, is held near it.

Experimental advice:

- Ensure the litmus paper is **damp** and not dry, by adding a bit of distilled water to it.



- **Don't** let the litmus paper touch the test tube as alkali on the sides may cause the colour change to blue, which is a false positive for ammonia gas.
- Keep litmus paper **1cm away** from test tube
- State that **red** litmus paper is being used not just litmus, as blue litmus paper also exists.

Test for Chlorine (Cl_2)

Chlorine has a characteristic strong, **choking smell**. It also makes damp blue litmus paper turn red, and then **bleaches it white**. Chlorine makes damp starch-iodide paper turn blue-black.

NaOH heated with Al metal

Ammonia will likely be liberated if nitrate ions are present.

Sulfur dioxide (SO_2)

A qualitative test is the smell of **rotten eggs**. Other tests include paper dipped in potassium dichromate will go from orange to green and damp blue litmus paper will turn red.

NO_2

If you place a bung on a reaction of acid and nitrate ions test tube, a build-up of NO_2 will cause the sides of the test tube to go a pale brown. When the bung is released, a visible (on a white background) **pale brown gas** is released.

