Experimental Design

Common Laboratory Apparatus

Measuring Mass

Name of Apparatus	Accuracy of Apparatus	All readings should be in
Electronic mass balance	0.01 g	2 decimal places
Digital stopwatch	0.01 s	Nearest seconds
Alcohol thermometer	0.5 degrees Celsius	1 decimal place (nearest .0 or .5)

Measuring Volume

Name of Apparatus	Accuracy of Apparatus	All readings should be in
Measuring cylinder	Half of the smallest division	1 or 2 decimal places (depending on the apparatus)

Name of Apparatus	Accuracy of Apparatus	All readings should be in
Burette	0.05 cm^3	2 decimal places
Pipette	0.01 cm^3	1 decimal place
Gas syringe	0.1 cm^3	1 decimal place

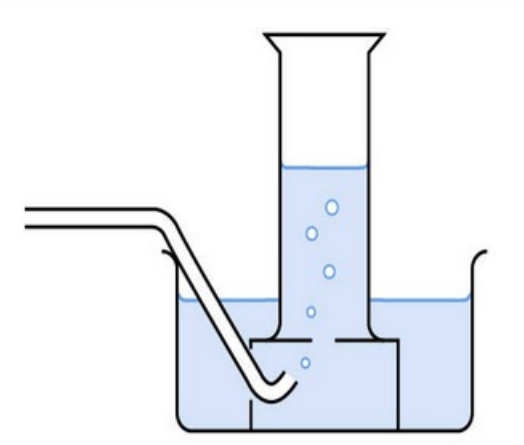
Collection of Gas

The method used to collect a gas depends on the physical properties of the gas:

- Solubility in water
- Density: Less dense or denser than air?
    - Take the molar mass of air to be approximately 30 g/mol

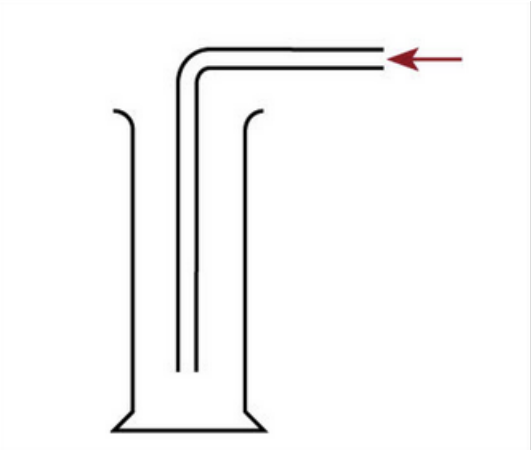
Gas Collection Methods

Water Displacement



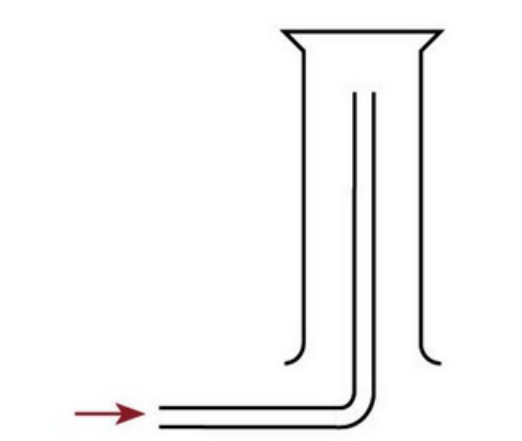
- Suitable for gases that are **insoluble** in water

Downward Delivery



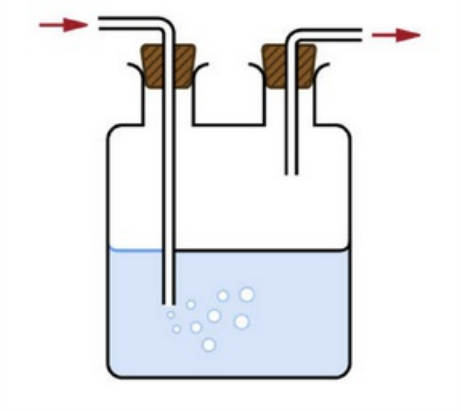
- Suitable for gases that are **more dense** than water

Upward Delivery



Methods for Drying Gases

Using Concentrated Sulfuric Acid

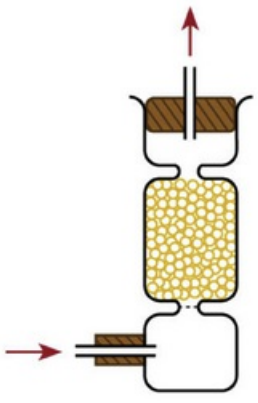


- Suitable for gases that are **acidic/neutral** in nature

> For **Method 1** explain why the inlet tube is inserted into the concentrated sulfuric acid while the outlet tube needs to be above the concentrated sulfuric acid

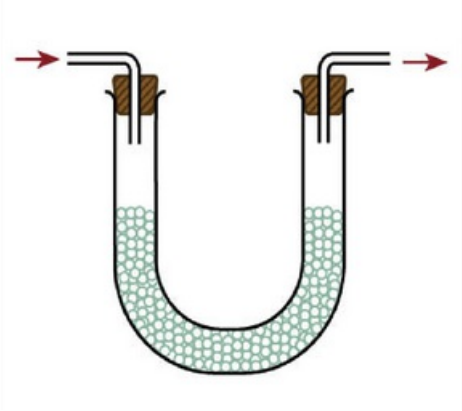
The inlet tube needs to be in the concentrated sulfuric acid so that **gas needs to be bubbled into the acid to remove the water vapour.** The outlet tube needs to be above the concentrated sulfuric acid so that the dry gas can escape.

Using Calcium Oxide



- Suitable for gases that are **basic/neutral** in nature

Using Fused Calcium Chloride



- Suitable for gases that are **acidic/alkaline/neutral** (except for ammonia)

> For **Method 3**, explain what it meant by "fused" and why ammonia gas cannot be collected using this method.

- "Fused" means anhydrous (does not contain water)
- This method cannot be used to collect ammonia gas because ammonia would react with calcium chloride