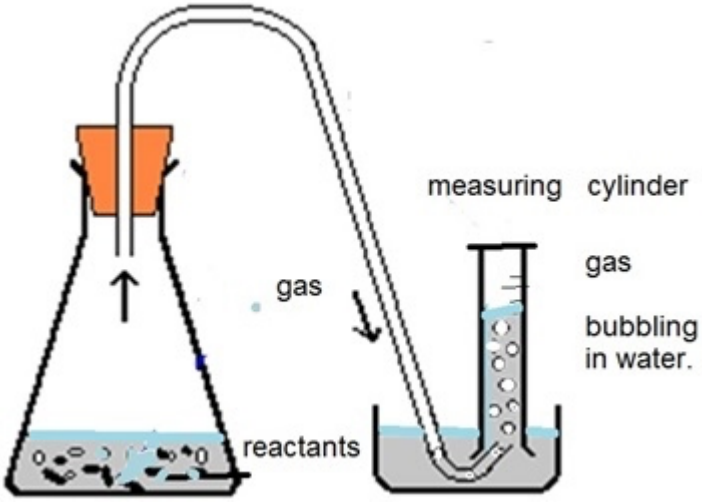
# OCR (A) Chemistry A-level

## PAG 1: Moles Determination

# 1.1 Determination of the Composition of Copper (II) Carbonate

## Method

1. Set up the apparatus as shown in the diagram using a 100cm$^3$ measuring cylinder and a 250cm$^3$ conical flask.




2. Weigh 1.5 g of $CuCO_3.Cu(OH)_2$ and add it to the conical flask.
3. Measure 50 cm$^3$ of $H_2SO_4$ in a 50 cm$^3$ measuring cylinder.
4. Add the $H_2SO_4$ into the conical flask and immediately insert the stopper. The gas will collect in the measuring cylinder.
5. Record the final volume of carbon dioxide in the measuring cylinder.

## Calculations

- Calculate the volume of carbon dioxide collected
- Work out the amount of copper carbonate, $CuCO_3$, that reacted in moles
- Calculate the percentage by mass of $CuCO_3$ in the original sample of $CuCO_3.Cu(OH)_2$.

## Errors

- Some carbon dioxide may escape before the bung is inserted.
  - Insert the bug as soon as the acid has been poured into the conical flask.
- Some copper carbonate may not react.
  - Swirl the conical flask to mix the contents and ensure that the reaction goes to completion.
- Carbon dioxide may dissolve in the water.
  - Use a gas syringe to measure the volume of $CO_2$ instead.
- Some copper carbonate may remain in the weighing boat meaning it's not transferred to the conical flask.
  - Use the weighing by difference technique (weigh the weighing boat with the copper carbonate, add the copper carbonate to the conical flask then reweigh the empty weighing boat. The difference between these masses is the exact mass of copper carbonate).

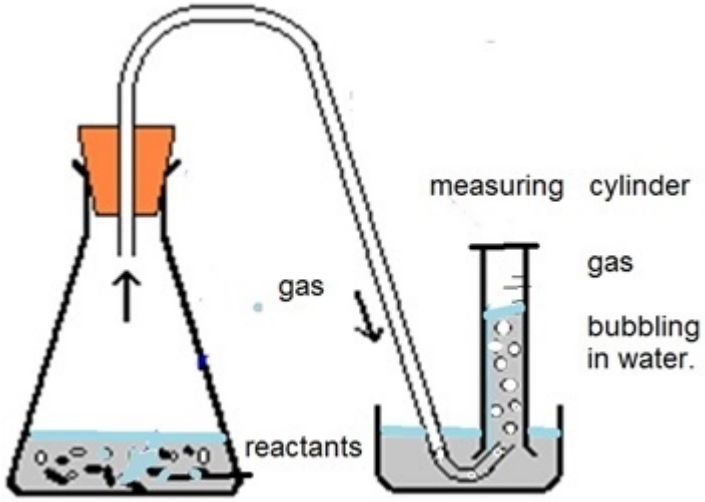
**Safety**

- ➢ $CuCO_3.Cu(OH)_2$ - causes serious eye irritation; harmful if swallowed or inhaled.
- ➢ Sulfuric acid - causes severe skin burns and eye damage.

## 1.2 Determination of the Relative Atomic Mass of Magnesium

**Method 1**

1. Set up the apparatus as shown in the diagram.




2. Add 10 $cm^3$ of sulfuric acid to the conical flask.
3. Weigh 0.15 g of magnesium. Add the magnesium to the acid, placing the bung into the flask immediately. The gas produced during the reaction will collect in the measuring cylinder.
4. Record the final volume of hydrogen in the measuring cylinder.
5. Retain the solution in conical flask for method 2.

**Method 2**

1. Weigh a clean evaporating basin.
2. Pour the solution produced during method 1 into the evaporating basin.
3. Rinse the conical flask with some distilled water and add the washings to the evaporating basin.
4. Evaporate the solution until a dry solid is left in the evaporating basin.
5. Leave to cool then reweigh the evaporating basin containing the solid magnesium sulphate. The mass of magnesium sulfate is the difference between the final mass and the mass of the empty basin.

**Calculation**

- ❖ Calculate the amount of magnesium sulphate formed, in mol.
- ❖ Work out the amount of Mg in $MgSO_4$
- ❖ Use the original mass of Mg calculate the relative atomic mass of magnesium

**Errors**

- The errors for method 1 are similar to experiment 1.1.
- Solid magnesium sulphate may not be completely dry
    - To ensure complete dryness heat until the mass no longer changes.

**Safety**

- ➢ Sulfuric acid - causes severe skin burns and eye damage.
- ➢ Magnesium - flammable.