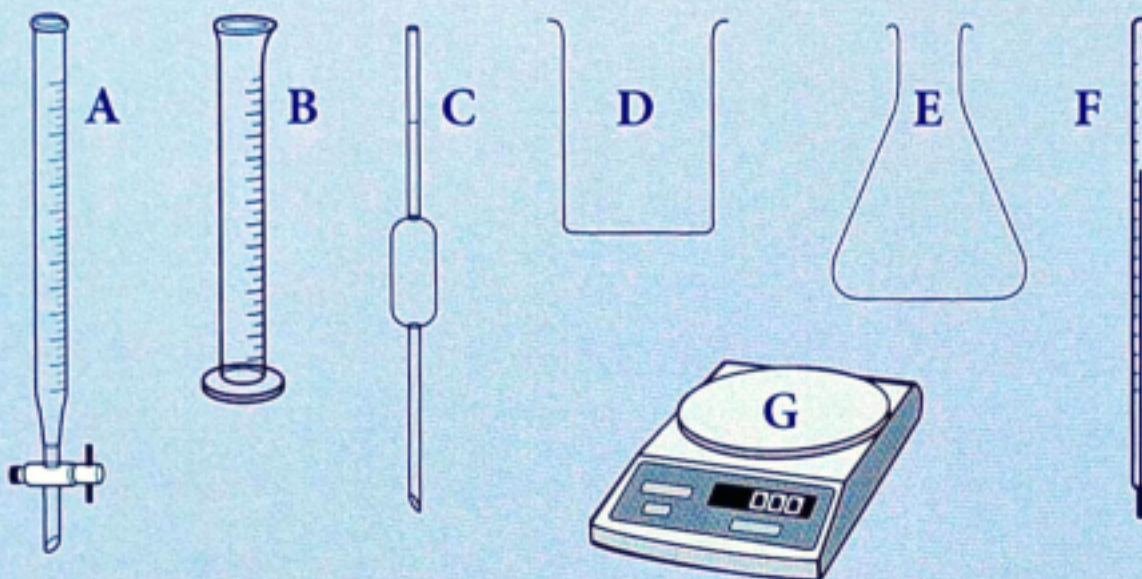


Apparatus

Name the following pieces of apparatus and say what each is used for:



State the measurement units, where appropriate.

Burette (A):

Used for accurately measuring the volume of a liquid (in cm^3), usually during a titration

Measuring Cylinder (B):

Used for measuring the volume of a liquid (in cm^3)

Volumetric Pipette (C):

Used to accurately measure out a fixed volume of liquid (in cm^3)

Beaker (D):

Used for containing liquids during a reaction (can also be used to measure the approximate volume of a liquid in cm^3 or dm^3)

Conical Flask (E):

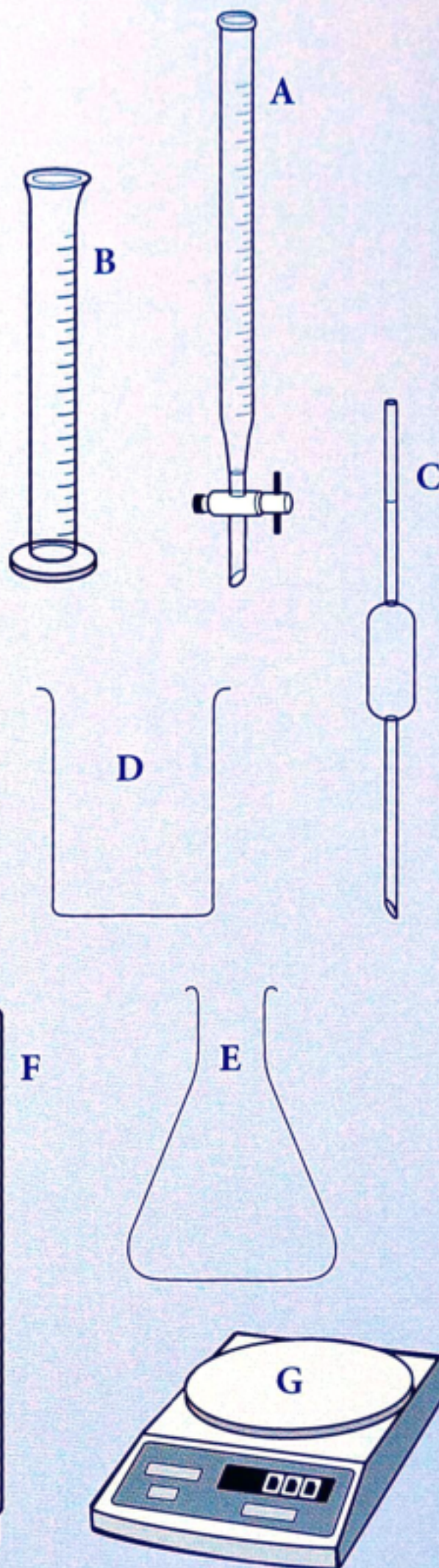
Used for containing liquids during a reaction, particularly when performing titrations

Thermometer (F):

Used for measuring temperature in degrees Celsius ($^{\circ}\text{C}$)

Weighing Balance (G):

Used to measure mass in grams (g) or kilograms (kg)



Apparatus Accuracy

List 4 pieces of apparatus used for measuring volumes in order of their accuracy.

Gas Collection

Sketch the apparatus for the following methods of collecting gases:

Upward Displacement of Air

Downward Displacement of Air

Over Water

Gas Syringe

What type of gas can you collect in each case?

Give examples.

Apparatus Accuracy:

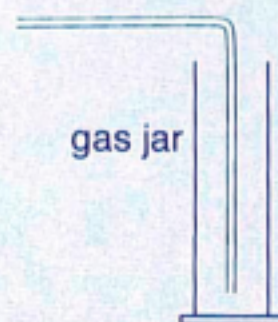
<i>most accurate</i>	Volumetric Pipette
	Burette
	Measuring Cylinder
<i>least accurate</i>	Beaker

Gas Collection Methods:

Upward Displacement of Air:

For collecting gases which are **heavier** than air

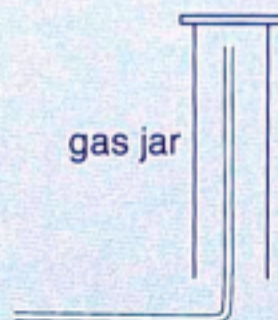
e.g. carbon dioxide, CO_2
sulphur dioxide, SO_2
hydrogen chloride, HCl



Downward Displacement of Air:

For collecting gases which are **lighter** than air

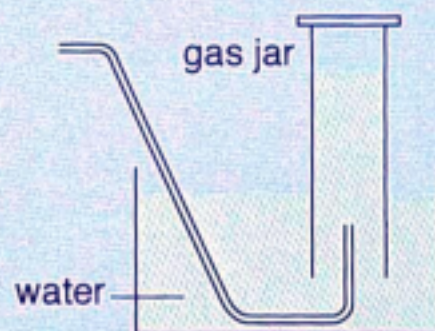
e.g. ammonia, NH_3
hydrogen, H_2



Over Water:

For collecting gases that are insoluble
(or sparingly soluble) in water

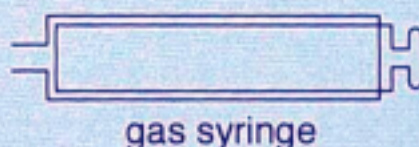
e.g. carbon dioxide, CO_2
hydrogen, H_2
oxygen, O_2



Gas Syringe:

For collecting any gas

*This is used when you need to measure the volume
of gas accurately*



Experimental Definitions

Define *Independent Variable*, *Dependent Variable* and *Control Variable*.

Define *Locating Agent* and *R_f value* (in chromatography).

Define *Solute*, *Solvent*, *Saturated Solution* and *Precipitate*.

Purity

Define *Pure Substance* and *Impurity*.

What effect does purity have on melting and boiling points?

Variables:

Independent Variable: The only thing that **you change** as you do the experiment

Dependent Variable: The thing that **you measure** in an experiment

The dependent variable changes as you change the independent variable

Control Variables: Things which must be kept constant to ensure your results are valid

Chromatography:

Locating Agent: A chemical used to develop the chromatogram, i.e. show up colourless substances in chromatography

R_f value:
$$R_f \text{ value} = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

Solution Definitions:

Solute: the substance you dissolve in a liquid to make a solution

Solvent: the liquid in which a solute is dissolved

Saturated Solution: a solution in which no more solute can dissolve

Precipitate: an insoluble chemical produced in a chemical reaction

Purity:

Pure Substance: A material containing only one substance

Impurity: An unwanted substance, mixed in with the substance you want

Determining Purity from Melting/Boiling Points:

- A **pure** substance has definite, sharp melting and boiling points
- The more impure a substance, the wider the range of its melting point and its boiling point

*Adding impurities makes the **melting point decrease**, but the **boiling point increase***

Separation Techniques

Explain what the following techniques are used for:

Filtration

Evaporation

Crystallisation

Distillation

Fractional Distillation

Chromatography

Sketch and label diagrams of the apparatus,
(where appropriate).

Filtration (A):

Separates an insoluble solid from a liquid

Evaporation (B):

Separates a solute from its solution

Crystallisation:

Separates a solute from its solution, as crystals

Allow the solvent to evaporate slowly, so that crystals form

Distillation (C):

Separates a solvent from a solution

Fractional Distillation:

Separates liquids with different boiling points from each other

*(see diagram on card **Green 5**)*

Chromatography (D):

Separates compounds (e.g. coloured dyes, amino acids) which can be identified based on their R_f values

$$R_f \text{ value} = \frac{x}{y}$$

