TOPIC 2 Experimental Techniques

Objectives

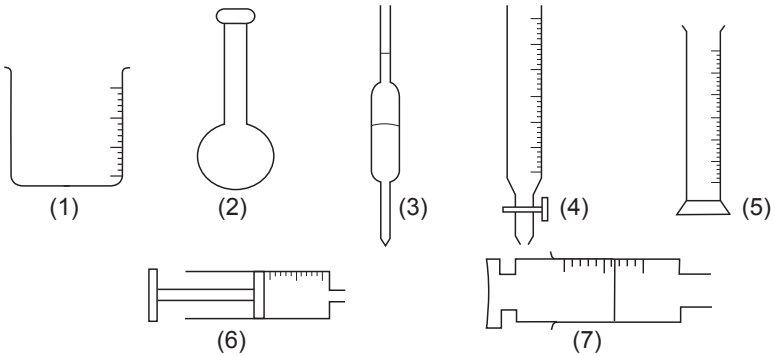
Candidates should be able to:

(a) name appropriate apparatus for the measurement of time, temperature, mass and volume, including burettes, pipettes, measuring cylinders and gas syringes

(b) suggest suitable apparatus, given relevant information, for a variety of simple experiments, including collection of gases and measurement of rates of reaction

1. Measuring Volume

Volumes of solutions have to be frequently measured in chemistry experiments. The following are apparatus for measuring volume.



1. Beaker : To measure volumes of liquids approximately according to the graduated marks on the apparatus.

2. Volumetric flask : To accurately measure fixed volumes of liquids when solutions of flask particular concentrations need to be prepared.

3. Pipette : To accurately measure volumes of liquids when a fixed volume of solution is needed for an experiment.

4. Burette : To accurately measure (nearest 0.1 cm^3) volumes of liquids which are used up in an experiment.

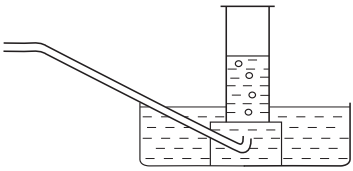
5. Measuring cylinder : To measure volumes of liquids with some accuracy (nearest 0.1 cm^3) according to the graduated marks on the apparatus.

6. Syringe : To measure small volumes of liquids with some accuracy according to the graduated marks on the apparatus.

7. Gas syringe : To accurately measure volumes of gases produced in experiments according to the graduated marks on the apparatus.

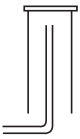
2. Collecting Gases Produced

1. Displacement of water: Used to collect gases which are not very soluble in water, such as oxygen and hydrogen.



2. Downward delivery: Used to collect gases which are denser than air, such as carbon dioxide, hydrogen chloride and chlorine.

3. Upward delivery: Used to collect gases which are less dense than air, such as ammonia and hydrogen.



3. Drying Gases Produced

When gases produced need to be obtained dry, the moisture content has to be removed using appropriate drying agents.

1. Fused calcium chloride: This is calcium chloride which has been heated. This can be used to dry gas which does not react with calcium chloride.

2. Concentrated sulfuric acid: This is a common drying agent but it cannot be used to dry gases which are basic.

3. Quick lime: This is a drying agent used to dry basic gases such as ammonia.