

12.1 Experimental design

Name: _____ Class: _____ Date: _____

Total: 7 marks

KEY WORDS apparatus 仪器 • measuring cylinder 量筒 • burette 滴定管 • thermometer 温度计
• stop-watch 秒表

Objective

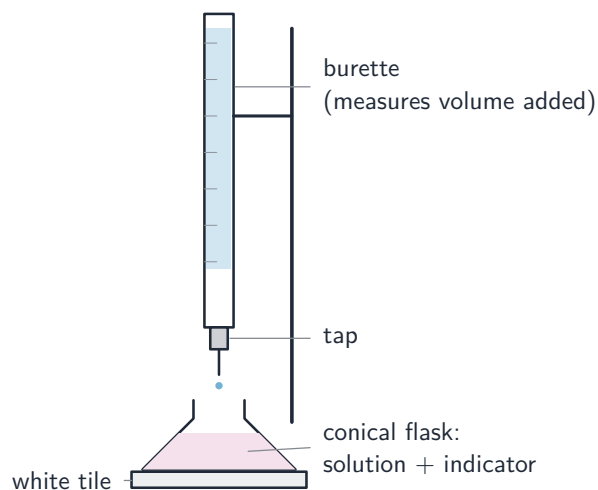
Build the skills to answer exam questions on **experimental design** 实验设计 — choosing **apparatus** 仪器 for each measurement and the key practical words.

You must be able to:

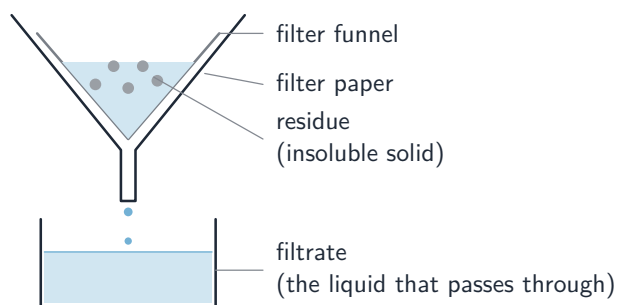
- choose the right apparatus for measuring time, temperature, mass and volume
- define solvent, solute, solution, saturated solution, residue, filtrate
- describe accurate vs rough volume measurement

1 Worked examples

■ Apparatus and key words



Accurate volume: burette/pipette; rough volume: measuring cylinder; gas volume: gas syringe



Filtration is a core separation technique

- **solvent** dissolves the **solute** to make a **solution**; **saturated** = max dissolved.
- **residue** = solid left behind; **filtrate** = liquid that passes through a filter.

2 Practice

2.1 Name the apparatus used to measure an accurate volume of a solution. [1]

2.2 Define a saturated solution. [1]

3 Exam-style questions

3.1 Which apparatus measures the volume of a gas produced? [1]

- **A** thermometer
- **B** balance
- **C** gas syringe
- **D** stop-watch

3.2 A student needs to measure exactly 25.0 cm³ of acid and the temperature of a reaction.

(a) Name the apparatus for each. [2]

(b) State the difference between a residue and a filtrate. [2]

Solutions

2.1 a burette or a (volumetric) pipette.

2.2 a solution holding the maximum amount of solute that will dissolve at that temperature.

3.1 C. A gas syringe measures the volume of gas produced.

3.2 (a) a pipette (or burette) for the acid; a thermometer for the temperature.

(b) the residue is the solid left behind on the filter; the filtrate is the liquid that passes through.