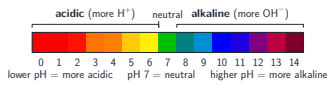


Acids, Bases & Salts IGCSE Chemistry ▪ Topic 7 IGCSE Chemistry 	Acids, Bases & Salts What we will cover 1 Acids & their reactions 2 Indicators 3 Strong vs weak acids 4 The pH scale 5 Oxides 6 Preparing salts 
1 Acids and bases	Acids, Bases & Salts └─ Acids and bases Acids and their reactions An acid 酸 forms H^+ in water. ■ metal → salt 盐 + hydrogen (effervescence) ■ base 碱 → salt + water (neutralisation 中和) ■ carbonate 碳酸盐 → salt + water + CO_2 You cannot see hydrogen – write effervescence, not “hydrogen is given off”.
Acids, Bases & Salts └─ Acids and bases Indicators An indicator 指示剂 is a dye that changes colour. ■ litmus 石蕊 – red in acid, blue in alkali ■ methyl orange – red in acid, yellow in alkali ■ thymolphthalein – colourless in acid, blue in alkali	Acids, Bases & Salts └─ Acids and bases Strong vs weak acids A strong acid 强酸 (HCl, H_2SO_4, HNO_3) is fully ionised. A weak acid 弱酸 (ethanoic) is only partly ionised, so at the same concentration it has a higher pH and reacts more slowly.

The pH scale

pH < 7 acid, = 7 **neutral** 中性, > 7 alkali. Each step of 1 is a tenfold change in $[H^+]$.



- with **metals** 金属: acid + metal → a **salt** 盐 + **hydrogen** 氢气
- with **bases**: acid + **base** 碱 → a salt + water (this is **neutralisation** 中和)
- with **carbonates** 碳酸盐: acid + carbonate → a salt + water + **carbon dioxide** 二氧化碳

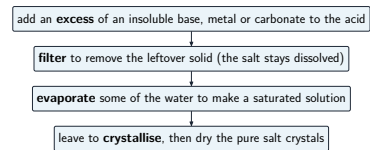
2 Oxides and salts

Oxides

acidic	basic	amphoteric 两性
non-metal oxides (SO ₂ , CO ₂)	metal oxides (CuO, CaO)	react with both (Al ₂ O ₃ , ZnO)

Metal oxides tend to be basic; non-metal oxides tend to be acidic.

Making a soluble salt

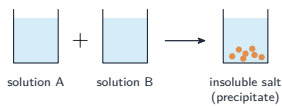


React acid with **excess** solid (metal, base or carbonate):

- 1 add excess, then **filter** 过滤
- 2 **evaporate** 蒸发 some water
- 3 **crystallise** 结晶

An alkali needs **titration** 滴定 instead.

Making an insoluble salt



By **precipitation** 沉淀: mix two solutions that each carry one needed ion.

The insoluble salt appears as a solid – then filter, wash & dry it.

3 Recap

Worked example – choosing a salt preparation

How would you prepare (a) copper(II) sulfate and (b) lead(II) sulfate?

- (a) Copper(II) sulfate is **soluble**: add **excess** insoluble copper(II) oxide to warm sulfuric acid.
- Filter off the excess, then **crystallise** the filtrate.
- (b) Lead(II) sulfate is **insoluble**: mix two **solutions** (lead nitrate + sodium sulfate).
- **Precipitation**: filter, wash and dry the solid.

Ask “is the salt soluble?” first. Soluble $\Rightarrow$ acid + excess solid, filter, crystallise. Insoluble $\Rightarrow$ mix two solutions and filter the precipitate.

Topic 7 – key takeaways

1 Acids

make H^+ ; react with metals, bases, carbonates

2 Strong/weak

full vs partial dissociation (not conc.)

3 pH

< 7 acid, 7 neutral, > 7 alkali

4 Salts

soluble: filter/evaporate;
insoluble: precipitate

Check yourself

- 1 What gas forms when an acid reacts with a metal?
- 2 What does “strong acid” mean?
- 3 What is the pH of a neutral solution?
- 4 How do you make an insoluble salt?

acid 7 alkali

Answers 1. hydrogen 2. fully dissociated into ions 3. 7 4. precipitation – mix two solutions