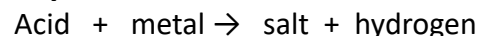




## Box 1: Keywords

| Word      | Definition                                                                         |
|-----------|------------------------------------------------------------------------------------|
| Acids     | Substances which dissolve in water to form solutions with a pH of less than 7.     |
| Bases     | Metal oxides or metal hydroxides                                                   |
| Alkalis   | Soluble bases which dissolve in water to form solutions with a pH of more than 7.  |
| Oxidation | A reaction in which a substance loses electrons (gains oxygen)                     |
| reduction | A reaction in which a substance gains electrons (loses oxygen)                     |
| salt      | Compounds formed when the hydrogen ions in an acid has been replaced by metal ions |

## Box 2: Acid equations



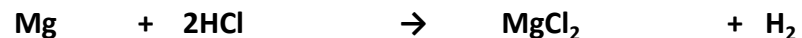
## Box 3: Key skills

- Use appropriate apparatus and techniques to produce a pure dry soluble salt
- Predict products of acid reactions from given reactants
- Use formula of common ions to deduce the formula of salts
- Explain redox reactions in terms of loss or gain of electrons (HT only)

## Box 4: The reactions of acids with metals

Metals react with acids to produce a salt and hydrogen

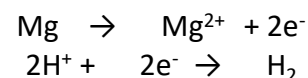
**Magnesium + hydrochloric acid → magnesium chloride + hydrogen**



Metals such as copper that are below hydrogen in the reactivity series do not react with acids

### Redox reactions (HT only)

When metals react with acids the metal is oxidised and hydrogen is reduced.

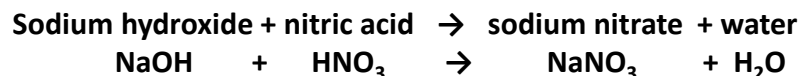
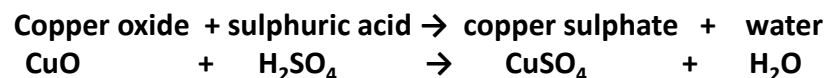


## Box 5: The reaction of acids with bases and metal carbonates

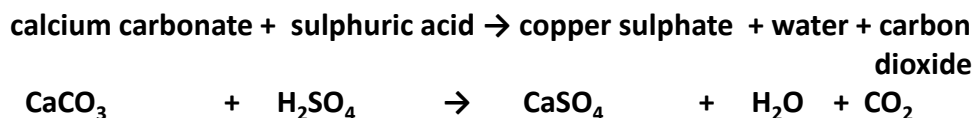
Bases are metal hydroxides and metal oxides.

Soluble metal hydroxides are also known as alkalis

Acids react with bases in a neutralisation reaction to produce a salt and water



Acids react with metal carbonates to produce a salt, water and carbon dioxide



**Key Observations:** The solid metal or metal compound will disappear as it reacts and a soluble salt is formed. With metals and metal carbonates only, fizzing will be seen as a gas is produced

## Box 4: Salts

Salts are compounds formed when the hydrogen ions in an acid has been replaced by metal ions.

### Naming salts

The first part of the name comes from the metal or metal compound and the second part comes from the acid

| Acid used    | Salt produced |
|--------------|---------------|
| Hydrochloric | chlorides     |
| Nitric       | nitrates      |
| Sulphuric    | sulphates     |

Sodium hydroxide + hydrochloric acid → sodium chloride + water

### Working out the formula of salts

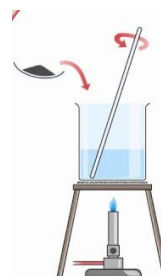
The formula can be worked out from the charges on the ions that make up the salt

| Metal ion        | Ion from Acid                 | Salt formula                      |
|------------------|-------------------------------|-----------------------------------|
| Na <sup>+</sup>  | Cl <sup>-</sup>               | NaCl                              |
| Mg <sup>2+</sup> | Cl <sup>-</sup>               | MgCl <sub>2</sub>                 |
| Cu <sup>2+</sup> | SO <sub>4</sub> <sup>2-</sup> | CuSO <sub>4</sub>                 |
| Ca <sup>2+</sup> | NO <sub>3</sub> <sup>-</sup>  | Ca(NO <sub>3</sub> ) <sub>2</sub> |

## Box 7: Cross curricular links

## Box 5: Preparing a soluble salt (Required Practical)

1. React acid with an **excess** of metal oxide or metal carbonate



2. **Filter** the mixture to remove **unreacted** solid



3. Turn off the heat and leave until **all** the water has evaporated and salt crystals remain



3. **Gently** heat the solution to **evaporate** the water until **crystals** start to appear.

## Box 6: Pathway

**Previous knowledge:** KS3 Acids, Alkalis and Neutralisation, KS4 Periodic table and structure and bonding

**Future links:** A Level Chemistry; Acids, bases and Buffers

**Careers:** Pharmacists, food scientist, environmental scientist, Cosmetic scientist, Quality controller

