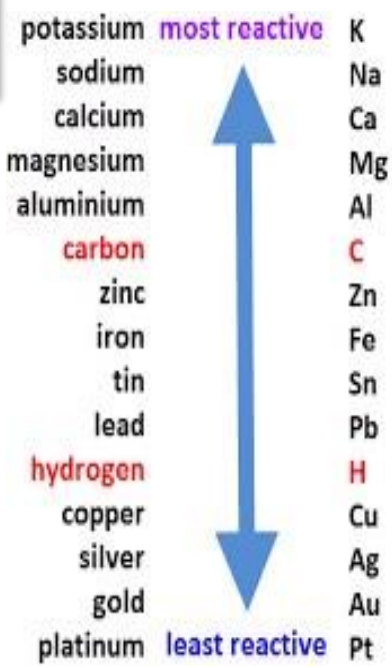
# AQA C4a Chemical Changes: Metal & acid reactions
# COMBINED FOUNDATION
# RP – Making salts

| Reactivity Series | | |
|---|---|---|
| **Metals form positive ions when they react** | The reactivity of a metal is related to its tendency to form positive ions | The reactivity series arranges metals in order of their reactivity |
| **Carbon and hydrogen** | Carbon and hydrogen are non-metals but included in the reactivity series | These 2 non-metals are included as they can be used to extract some metals from their ores, depending on their reactivity. |
| **Displacement** | A more reactive metal can displace a less reactive metal from a compound. | Silver nitrate + Sodium → Sodium nitrate + Silver |

| Neutralisation of acids | | |
|---|---|---|
| **Neutralisation** | Acids can be neutralised by bases | A **base** is a substance that neutralises an acid e.g. a metal carbonate, metal oxide. or soluble metal hydroxide,<br>An **alkali** is a soluble base e.g. a metal hydroxide. |
| **Acid + Base → Metal Salt + Water** | | |

| Oxidation, Reduction and Metal Oxides | | |
|---|---|---|
| **Metals and oxygen** | Metals react with oxygen to form metal oxides | **magnesium + oxygen → magnesium oxide**<br>**2Mg + $O_2$ → 2MgO** |
| **Reduction** | When oxygen is removed during a reaction | e.g. metal oxides reacting with hydrogen, extracting low reactivity metals |
| **Oxidation** | When oxygen is gained during a reaction | e.g. metals reacting with oxygen, carbon during extraction of some metals from their ores |




**Acids react with some metals to produce salts and hydrogen.**

| | Reaction with water | Reaction with dilute acid | Extraction Method |
|---|---|---|---|
| **Potassium** | Bubbles, gives off hydrogen and leaves an alkaline solution | Explode | Electrolysis |
| **Sodium** | | | |
| **Lithium** | | | |
| **Calcium** | | Bubbles, gives off hydrogen and forms a salt | |
| **Magnesium** | Very slow reaction | | Reduction (removal of oxygen) with carbon |
| **Aluminium** | | | |
| **Zinc** | | | |
| **Iron** | | | |
| **Tin** | Slight reaction with steam | Slow reaction with warm acid | |
| **Lead** | | | |
| **Copper** | No reaction | No reaction | Found as native metal |
| **Silver** | | | |
| **Gold** | | | |

| Reactions of Acids |
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| **Acid + Metal → Metal Salt + Hydrogen**<br>Sulfuric acid + Iron → Iron sulfate + Hydrogen |
| **Acid + Metal Oxide → Metal Salt + Water**<br>Sulfuric acid + Iron Oxide → Iron sulfate + Water |
| **Acid + Metal Hydroxide → Metal Salt + Water**<br>Sulfuric acid + Iron Hydroxide → Iron sulfate + Water |
| **Acid + Metal Carbonate → Metal Salt + Water + Carbon Dioxide**<br>Sulfuric acid + Iron carbonate → Iron sulfate + Water + Carbon dioxide |

| Metal Salt production | |
|---|---|
| **Acid name** | **Salt name** |
| **Hydrochloric acid** | Chloride |
| **Sulfuric acid** | Sulfate |
| **Nitric acid** | Nitrate |