

C2 – Chemical reactions and energy changes

Keyword	Definition
Soluble	Dissolves in water
Insoluble	Does not dissolve in water
Base	A substance that neutralises an acid. All metal oxides and hydroxides are bases.
Salt	A compound formed when an acid reacts with a metal or metal compound
Crystallisation	When a solution is heated, water evaporates and leaves the salt behind.
Displacement	When a more reactive metal takes the place of a less reactive metal in a compound
Oxidation	The gain of oxygen
Thermal decomposition	The breakdown of a substance using heat
Ore	A rock that contains enough metal or metal compound that is worth extracting
Atmosphere	The layer of gases surrounding the Earth
Exothermic	A reaction in which heat is given out to the surroundings
Endothermic	A reaction in which taken in from the surroundings
Combustion	Burning a substance in oxygen

Very Reactive	Li	Lithium			
	K	Potassium			
	Ba	Barium			
	Ca	Calcium			
	Na	Sodium			
	Mg	Magnesium			
	Al	Aluminum			
	C	Carbon			
	Zn	Zinc			
	Fe	Iron			
	Ni	Nickel			
	Sn	Tin			
	Pb	Lead			
	H	Hydrogen			
	Cu	Copper			
	Hg	Mercury			
	Ag	Silver			
	Au	Gold			
Very Unreactive	Pt	Platinum			

Reacts with Water

Reacts with Dilute Acids

Reacts with Oxygen

Carbon and Hydrogen are not metals but are included for reference.

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The reactivity series shows metals in order of how easily they react with other substances.

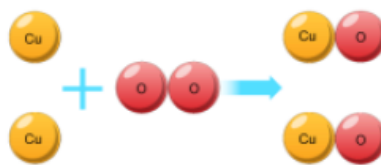
Very reactive take part in chemical reactions easily to form new substances.

Unreactive metals don't take part in chemical reactions easily. Some don't react at all, like platinum.

In an oxidation reaction, a substance gains oxygen.

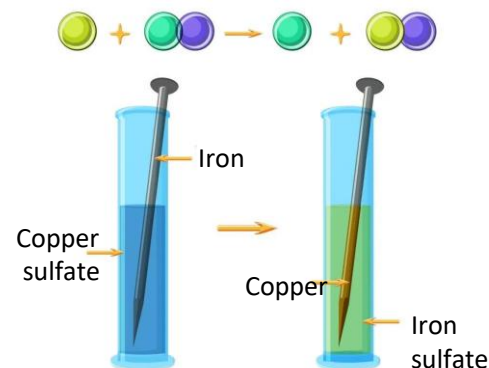
Metals react with oxygen in the air to produce metal oxides. For example, when copper is heated, it reacts with oxygen in the air to produce copper oxide:

Copper + Oxygen → Copper Oxide



A displacement reaction: iron is more reactive than copper, so it displaces (pushes out) the copper from copper sulfate:

Copper sulfate + iron → copper + iron sulfate



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Making salts:

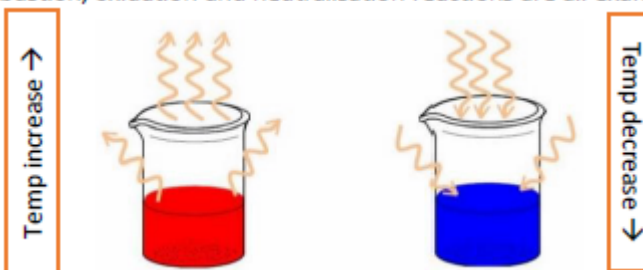
1. React an acid with an excess of metal, metal oxide, hydroxide or carbonate until no more reacts.
2. Filter the mixture to get a solution of the salt with the excess solid left behind
3. Heat the solution to start evaporating the water from the solution.
4. Turn off the heat and leave until all of the water has evaporated, leaving the solid salt behind.

Endothermic Reactions

In an endothermic reaction, thermal energy is taken in from the surroundings, therefore there is a temperature decrease. Thermal decomposition is an example.

Exothermic Reactions

In an exothermic reaction, thermal energy is given out to the surroundings, therefore there is a temperature increase. Combustion, oxidation and neutralisation reactions are all examples.

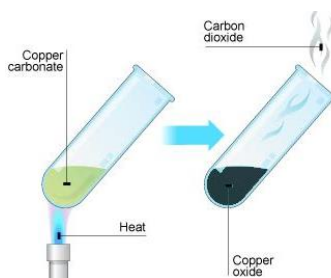


Thermal Decomposition

Some compounds break down when heated, forming two or more products from one reactants.

Many metal carbonates can break down easily when it is heated:

Copper Carbonate \rightarrow Copper Oxide + Carbon Dioxide



Activities that are increasing the level of carbon dioxide in the atmosphere:

- Burning fossil fuels
- Deforestation

Making salts: general equations

Acid + alkali \rightarrow salt + water

Acid + base \rightarrow salt + water

Acid + metal \rightarrow salt + hydrogen

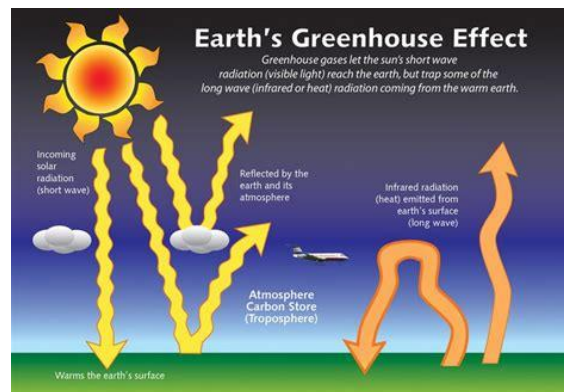
Metal + oxygen \rightarrow metal oxide

Complete combustion:

Fuel + oxygen \rightarrow carbon dioxide + water

Thermal decomposition:

Metal carbonate \rightarrow metal oxide + carbon dioxide



Composition of the Earth's atmosphere:

