

Definitions and Concepts for CAIE Chemistry IGCSE

Topic 11 - Air and Water

Definitions in **bold** are for extended supplement only

Definitions have been taken, or modified from the [CAIE Specification for GCSE Chemistry, 0971, Version 1 September 2020](#)

Acid rain: Rain that is acidic due to gases, such as sulfur dioxide, reacting with water vapour in the clouds. Sulfur dioxide is produced from the burning of fossil fuels which contain sulfur impurities.

Carbon cycle: The cycle of processes in which carbon compounds are transferred in the environment. It involves carbon dioxide being released by respiration and combustion, and being taken in by photosynthesis.

Catalytic converter: A device fitted in a car to reduce the amount of emissions from an internal combustion engine. They use expensive metals like platinum and rhodium as the heterogeneous catalyst. The catalyst is mounted on a ceramic honeycomb to maximise the surface area.

Chlorination: A process used in water treatment where chlorine gas is injected into the water to kill any microbes.

Climate change: A change in global climate patterns largely believed to be caused by the increase in concentration of carbon dioxide in the atmosphere.

Combustion: The burning of a substance in oxygen. If there is sufficient oxygen present for the substance to burn then it is called complete combustion. Energy is transferred to the surroundings as heat and light.

Complete combustion: Combustion carried out in sufficient oxygen. Water and carbon dioxide are the only products of the complete combustion of a hydrocarbon.

Corrosion: The destruction of materials by chemical reactions with substances in the environment. For example, iron rusts when in the presence of oxygen and water.

Displacement: A chemical reaction in which a more reactive element displaces a less reactive element from its compound.

Fertiliser: A chemical added to soil to increase the fertility, allowing crops to grow more

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effectively. They generally contain compounds of nitrogen, potassium and phosphorus.

Filtration: A separation technique used to separate an insoluble solid from a solution.

Fractional distillation: A process used to separate a mixture of liquids. The liquids have different boiling points so can be separated into different fractions within a fractionating column. **Used to separate oxygen and nitrogen from liquid air.**

Galvanise: A process used to protect against corrosion by coating the metal with a protective layer of zinc.

Greenhouse effect: The increase in the temperature of the Earth's atmosphere due to the greenhouse gases in the atmosphere trapping infra-red radiation from the surface.

Greenhouse gases: Greenhouse gases include water vapour, carbon dioxide and methane. Greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life.

Haber process: An industrial process which produces ammonia from the reaction between nitrogen and hydrogen. The reaction conditions are 450°C and 200 atm and it requires an iron catalyst.

Incomplete combustion: Combustion which is carried out with insufficient oxygen. It can lead to the production of toxic carbon monoxide and carbon particulates.

Photosynthesis: The reaction which takes place in plants in the presence of chlorophyll and sunlight (energy), where carbon dioxide and water react to produce glucose and oxygen.

Equation for photosynthesis: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Potable water: Water that is safe for humans to drink.

Respiration: A reaction which occurs in all living organisms in which energy is produced from glucose. Carbon dioxide is a by-product.

Equation for respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

Rust: A reddish coating of iron oxide which forms on iron when it undergoes oxidation. Iron rusts in the presence of oxygen and water.

Sacrificial protection: The protection of iron or steel against corrosion by using a more reactive metal. Zinc is often used as a sacrificial metal. Sacrificial protection creates a physical barrier to oxygen and water, preventing corrosion of the metal.

Thermal decomposition: The breaking down of a compound by heating. Thermal decomposition of carbonates leads to the production of carbon dioxide.

