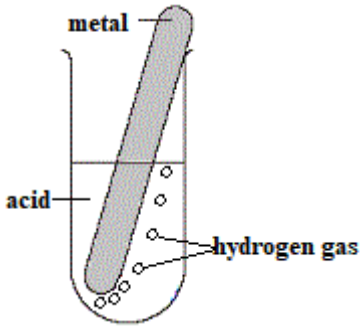
Reactions of acids

Acids react with some metals to produce salts and hydrogen.



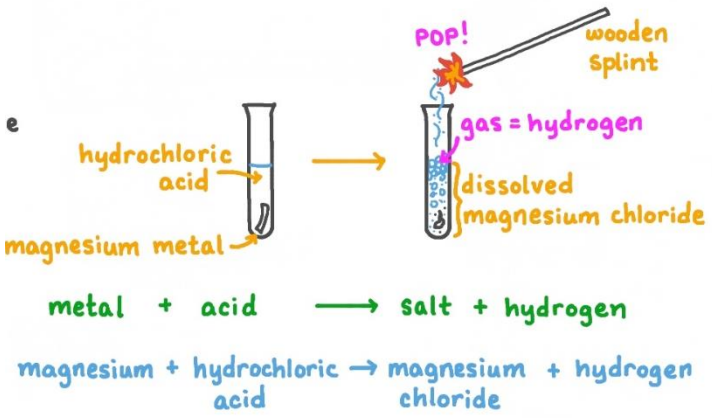
METAL + ACID ⟶ SALT + HYDROGEN

Hydrochloric acid produces chlorides and sulfuric acid produces sulfates.

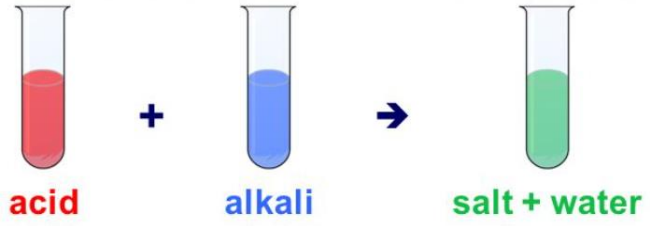
Zinc + hydrochloric acid → zinc chloride + hydrogen

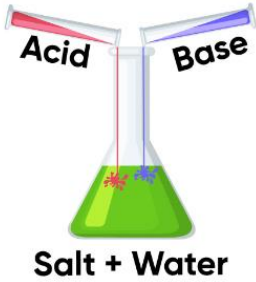
Magnesium + sulfuric acid → magnesium sulfate + hydrogen

The test for hydrogen uses a burning splint held at the open end of a test tube of the gas. Hydrogen burns rapidly with a pop sound.



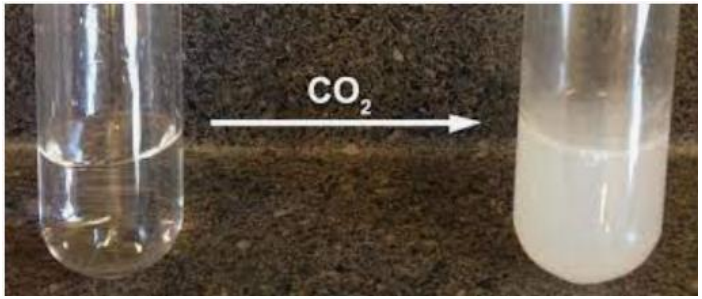
Acids are neutralised by alkalis (eg sodium hydroxide) and bases (eg insoluble metal oxides) to produce salts and water.



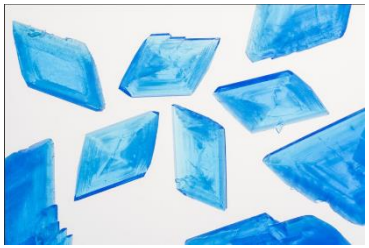


Carbonate + acid → salt + water + carbon dioxide

Carbon dioxide turns limewater milky.

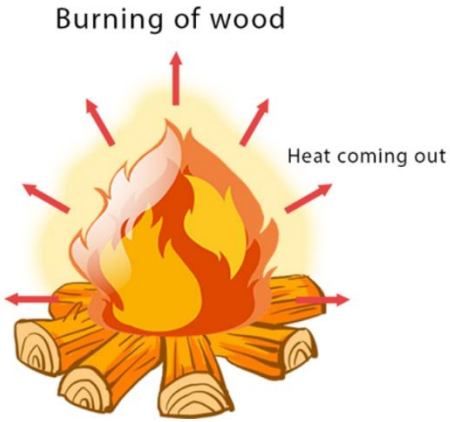


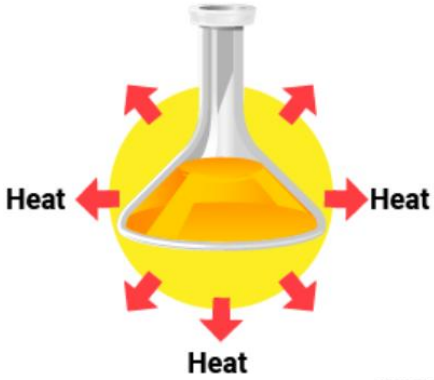
Salt solutions can be crystallised to produce solid salts.



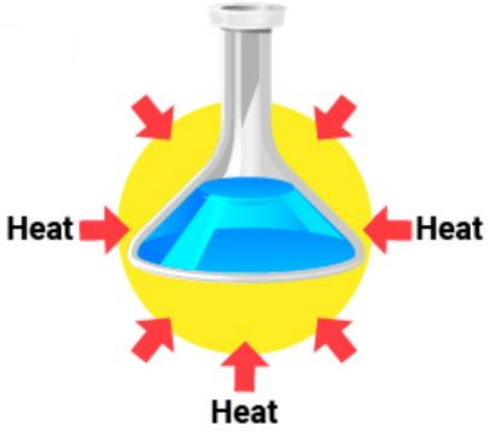
Energy and rate of reaction

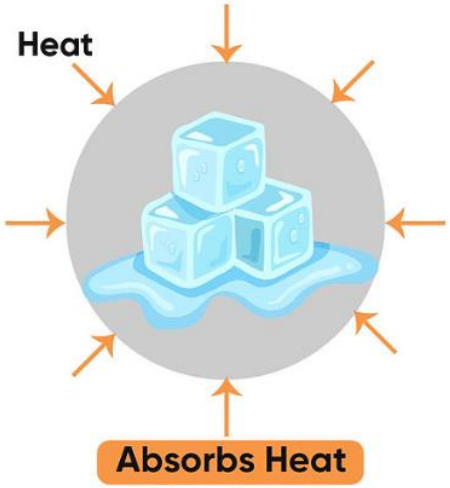
Some reactions transfer energy to the surroundings so the temperature increases. Such reactions include combustion, oxidation and neutralisation.





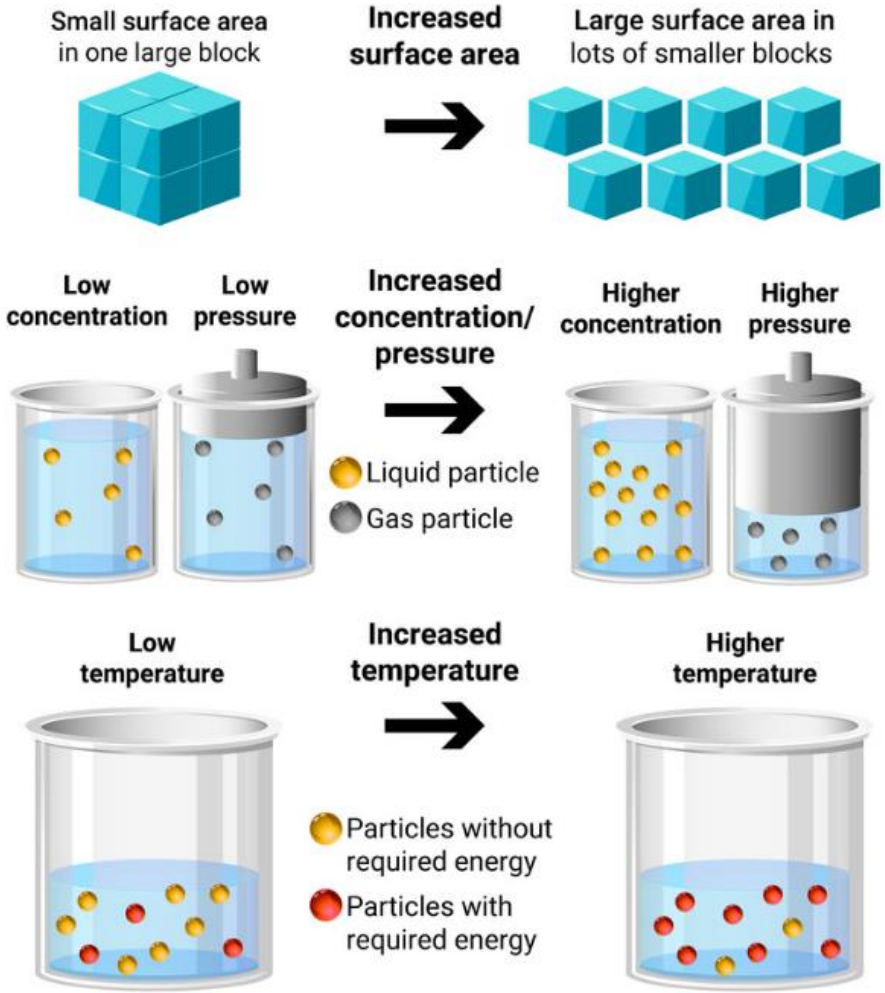
Other reactions take in energy from the surroundings, so the temperature decreases. These reactions include dissolving ammonium chloride in water and reacting citric acid with sodium hydrogen carbonate.





The rate of a chemical reaction may be increased by:

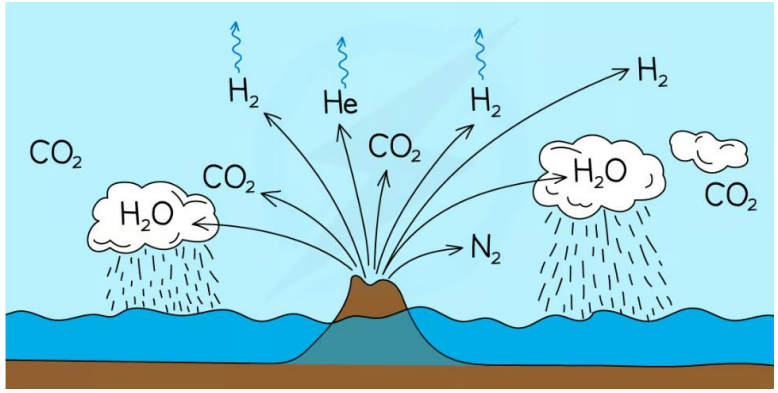
- increasing the temperature;
- increasing the concentration of reactants;
- increasing the surface area of solid reactants;
- adding a suitable catalyst.



Earth's atmosphere

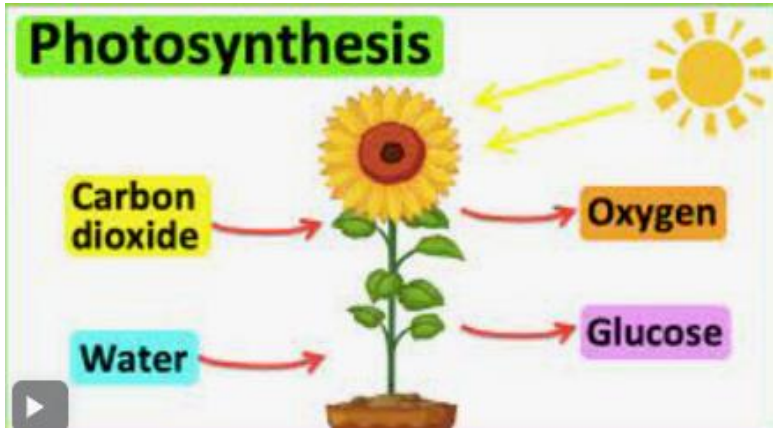
During the first billion years of the Earth's existence, there was intense volcanic activity that released gases that formed the early atmosphere and water vapour that condensed to form the oceans.

The early atmosphere was mainly carbon dioxide with little or no oxygen.

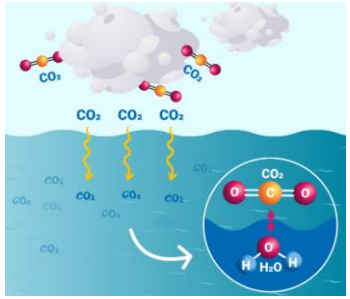


From about three billion years ago, algae and plants developed and produced the oxygen that is now in the atmosphere, by a process called photosynthesis. Photosynthesis can be represented by the word equation:

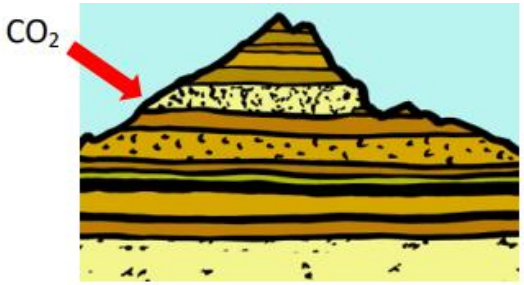
carbon dioxide + water → glucose + oxygen



Carbon dioxide was removed from the early atmosphere by dissolving in the oceans and by photosynthesis.



Most of the carbon from the carbon dioxide gradually became locked up in rocks as carbonates and fossil fuels.



The Earth's atmosphere is now about four-fifths (80%) nitrogen and about one-fifth (20%) oxygen, with small amounts of other gases, including carbon dioxide, water vapour and argon, which is a noble gas.