

The Chemical Reactions

What are Chemical Reactions?

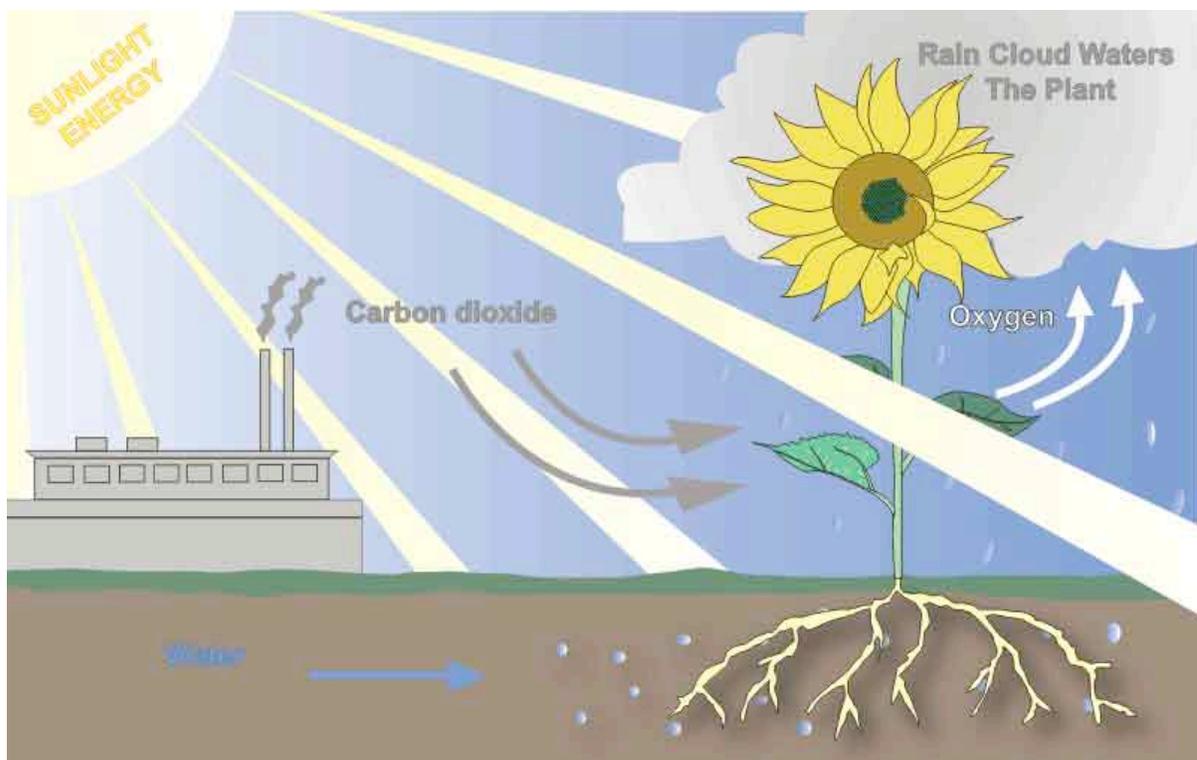
Chemical reactions are concerned with breaking of old bonds to create new bonds. It is the interaction of two or more substances, resulting in chemical changes in them. Chemical reactions take place when some kind of energy is supplied to them. The supplied energy may be in the form of heat, light or mechanical shaking for proper contact between the reactant molecules or electricity. Chemical reactions involve rearrangement of the atoms and produce new substances in this process.



For example, in the above picture, just the mixing of two substances can cause the chemical reaction to occur.

Chemical Reactions are everywhere in nature.

The process by which the plants make their own food is called photosynthesis. In the presence of sunlight, the chemical reactions take place on the surface of the leaf. The green pigment inside the leaves called “chlorophyll” help in the manufacturing of food by making use of CO_2 , H_2O and other soil nutrients. In this process Oxygen is released, which is our daily consumption.

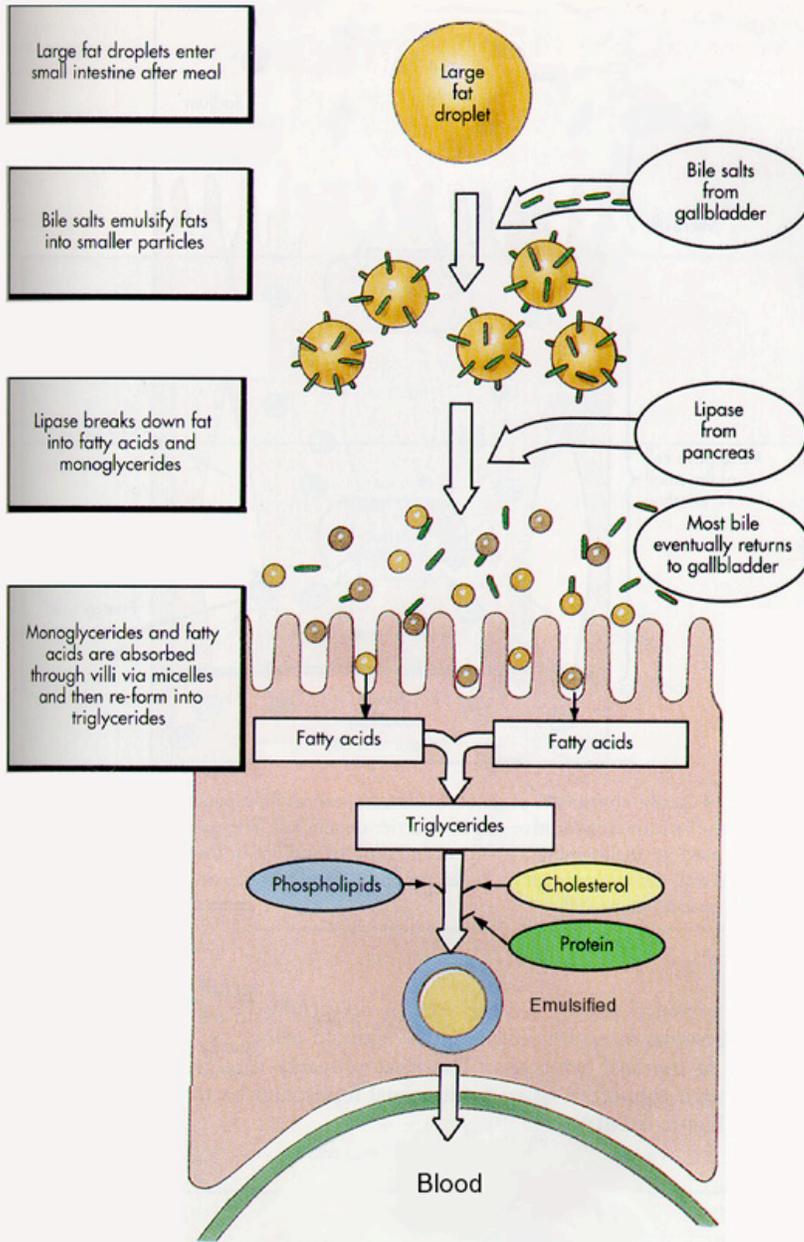


Our Body is a Big Chemical Factory

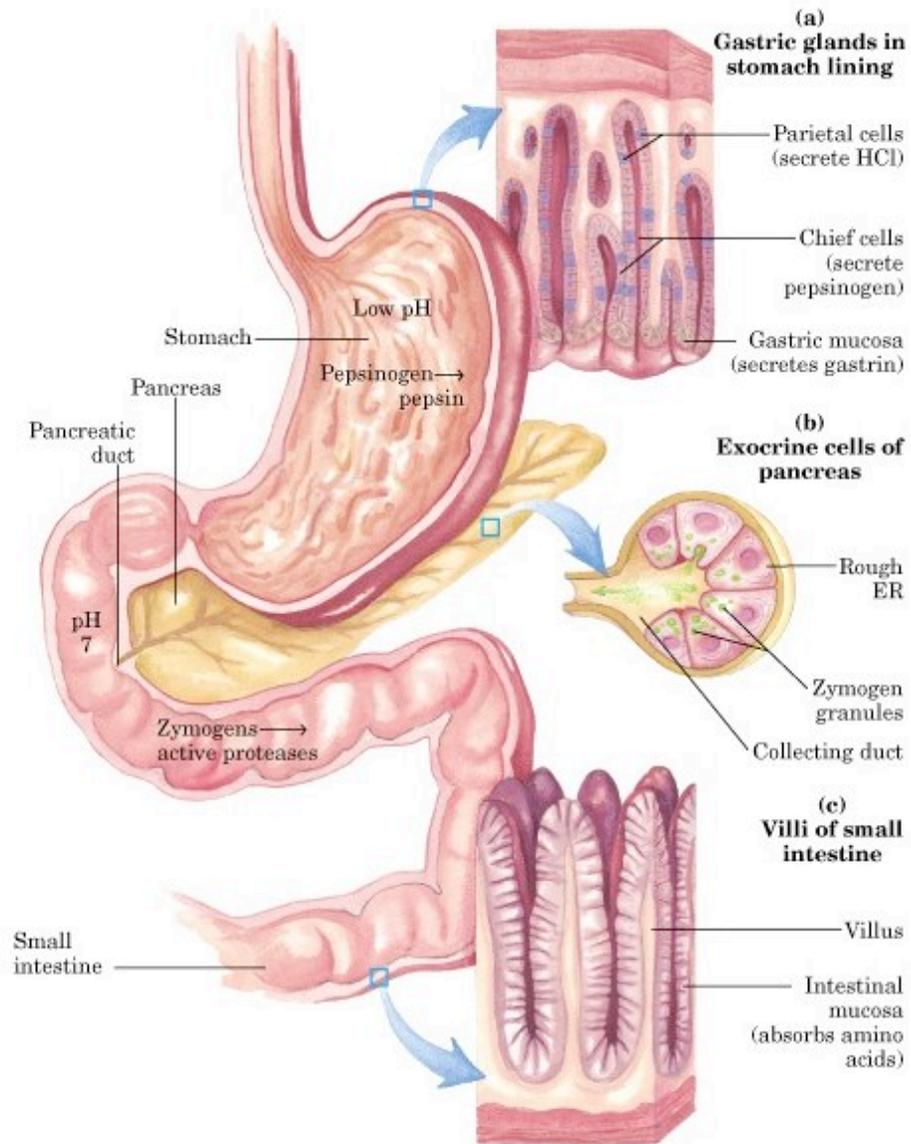
Chemical Reactions take place in our body too. Our whole body depends on chemical reactions for proper functioning. These chemical reactions keep on happening in our body throughout our life.

For example, the whole digestion process involves chemical reaction of acids and the food. During digestion, the food is broken down in to smaller molecules. The salivary glands in our mouth release digestive enzymes which help in the breakdown of food. Digestion continues in the stomach and small intestine with the help of digestive enzymes.

Digestion and Absorption

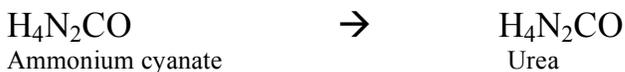


Protein digestion



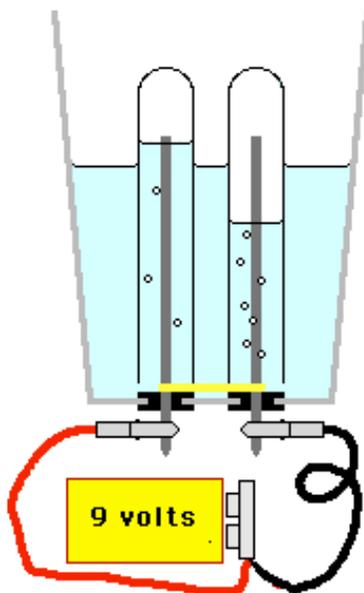
Different types of Chemical Reactions

A simple rearrangement of atoms is also a chemical reaction. For example



The molecular formula is same but the bonds are rearranged. Such compounds are called **isomers**. This reaction is called an **isomerisation reaction**.

A Decomposition Reaction- occurs when a molecule is broken down into smaller parts. For example, Passing electric current through water produces H_2 and O_2 . This electrolysis reaction – the breaking down of molecule by passing electricity is an example of decomposition reaction.



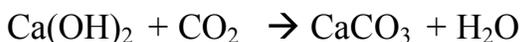
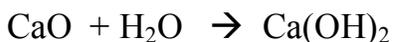
Decomposition reactions are used to obtain several metals from their oxides or salts. The salt is electrolysed and the pure metal is obtained. Digestion in our body is also an example of decomposition reactions. The starch decomposes in the body and proteins get decomposed into smaller substances called amino acids.

Combination Reaction: The combination reaction is the opposite of decomposition reaction. Water can be made by combining H_2 and O_2 ,



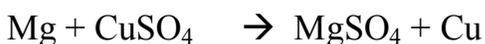
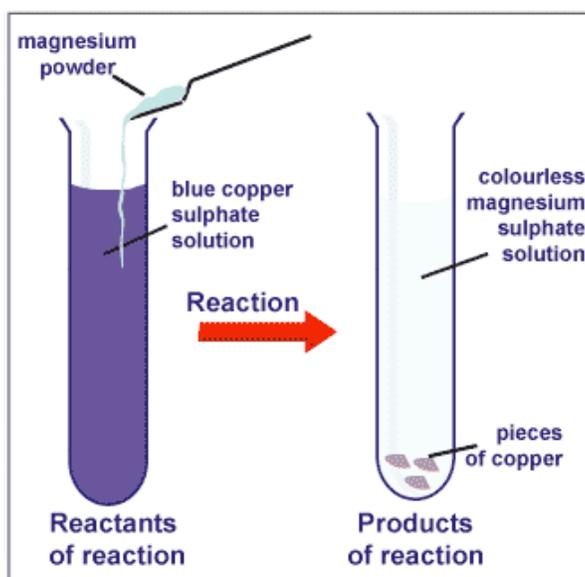
Another example of a combination reaction is when the walls are white washed with lime.

Lime (Calcium Oxide), when added to water, forms slaked lime (Calcium Hydroxide). Calcium hydroxide reacts slowly with the carbon dioxide in the air to form a thin layer of calcium carbonate on the walls.



Displacement Reaction- involves the displacement of one set of atoms in a molecule by another.

Example of displacement of Cu in a salt by another metal:



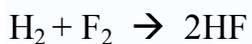
Similarly for Zn and Fe:



Oxidation Reaction – Oxidation reaction is a reaction with oxygen. Oxidation is used in a wide variety of industries such as in the production of cleaning products. It involves the loss of an electron by a molecule, atom, or ion.

Reduction Reaction – Reduction is the opposite of oxidation, it is often reaction with hydrogen. It involves gain of an electron by a molecule, atom, or ion.

The oxidation and reduction always go together because one cannot occur without the other. Electrons that are lost by one atom must be gained by another.



This reaction can be written as two half reactions. First, the oxidation reaction:



And the reduction reaction



In the formation of water from its elements, oxygen is reduced while hydrogen is oxidised.