- Exchange mechanism

In the exchange mechanism for the formation of a common electron pair, two bonding atoms provide one unpaired electron each. This is exactly what happens, for example, when a hydrogen molecule is formed.

- Donor-acceptor mechanism

In the donor-acceptor mechanism, a common electron pair is represented by one of the bonding atoms, the one that is more electronegative. The second atom represents a free orbital for the common electron pair, thus forming the ammonium ion NH4 +. This positively charged ion (cation) is formed when ammonia gas interacts with any acid. In an acid solution, there are hydrogen cations (protons), which in a hydrogen medium form the hydronium cation H3O +.A covalent bond can be non-polar-between two atoms with the same electronegativity, that is, in simple substances, and polar - between atoms whose electronegativity is different, that is, in complex substances.

2.Ionic bond-a chemical bond between unlike ions, due to their electrostatic attraction.Ions are particles with a charge, into which atoms turn in the process of giving or receiving electrons.Moreover it can be considered the limiting case of a covalent bond, when the difference in the electronegativities of the bonded atoms is so great that a complete separation of charges occurs.

3. Metallic bond-chemical bond, between atoms in a metal crystal.Metallic bond is described with regard by many physical properties of metals, such as strength, plasticity, thermal conductivity, electrical resistivity and conductivity, opacity and gloss.

4. Hydrogen bond-bond,formed between a hydrogen atom that is already bonded to an atom with high electronegativity and another electronegative atom.Acording to the hydrogen atom, being bound to one electronegative atom, lacks electron density and is attracted to the second electronegative atom, which is rich in electrons. Usually the hydrogen bond is denoted as follows: D – H ··· A. The atom "D" bonded to hydrogen by a covalent chemical bond is called the donor of the hydrogen bond, and the atom "A" is called the acceptor of the hydrogen bond.

It can be concluded that chemical bonds have different characteristics and properties.

WHAT IS GENETIC ENGINEERING

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Genetic engineering refers to the direct manipulation of DNA to alter an organism's characteristics (phenotype) in a particular way.

*What is genetic engineering?*Genetic engineering, sometimes called genetic modification, is the process of altering the DNA in an organism's genome.

This may mean changing one base pair (A-T or C-G), deleting a whole region of DNA, or introducing an additional copy of a gene.It may also mean extracting

DNA from another organism's genome and combining it with the DNA of that individual.Genetic engineering is used by scientists to enhance or modify the characteristics of an individual organism.Genetic engineering can be applied to any organism, from a virus to a sheep. For example, genetic engineering can be used to produce plants that have a higher nutritional value or can tolerate exposure to herbicides.

*How does genetic engineering work?*To help explain the process of genetic engineering we may take the example of insulin, a protein that helps regulate the sugar levels in our blood.Normally insulin is produced in the pancreas, but in people with type 1 diabetes there is a problem with insulin production.People with diabetes therefore have to inject insulin to control their blood sugar levels. Genetic engineering has been used to produce a type of insulin, very similar to our own, from yeast and bacteria like E. coli. This genetically modified insulin, 'Humulin' was licensed for human use in 1982.

*The genetic engineering process*A small piece of circular DNA called a plasmid is extracted from the bacteria or yeast cell.A small section is then cut out of the circular plasmid by restriction enzymes, 'molecular scissors'.The gene for human insulin is inserted into the gap in the plasmid. This plasmid is now genetically modified.

The genetically modified plasmid is introduced into a new bacteria or yeast cell.This cell then divides rapidly and starts making insulin.To create large amounts of the cells, the genetically modified bacteria or yeast are grown in large fermentation vessels that contain all the nutrients they need. The more the cells divide, the more insulin is produced.

When fermentation is complete, the mixture is filtered to release the insulin.The insulin is then purified and packaged into bottles and insulin pens for distribution to patients with diabetes.

*What else is genetic engineering used for?*Plant-based Engineering Genetic Examples. Rapeseed is a flowering plant used to make certain types of vegetable oil. Genetic engineering has allowed these plants to be resistant to certain pesticides so that when the fields are treated to remove pests, the plants will remain unscathed.

Plants that fight pollutants.Poplar trees developed by scientists at the University of Washington can absorb polluted water through their roots and clean it before the water is released back into the air. The plants were many times more efficient at cleaning certain pollutantsthan regular poplars.

*Golden Rice.*Genetic modification is often used to make healthier foods, such as golden rice, which contains beta-carotene the very same vitamin that makes carrots orange. The result is that people without access to many vitamins will get a healthy dose of vitamin A when the rice is consumed.Genetic Engineer *Examples with AnimalsOne* of the most controversial uses of genetic engineering has been cloning, or producing a genetically identical copy of an organism. While the ethics of cloning are hotly debated, the first-ever sheep (named Dolly) was cloned in 1996 by scientists. In 2020, scientists cloned the endangered black-footed ferret.

*COVID Vaccine*Amid the COVID-19 pandemic, the COVID-19 vaccine used genetic engineering to achieve immunity. The Pfizer and Moderna vaccines use mRNA genetic sequencing to help a person's body recognize the COVID virus.

*Genetic engineering history*The first genetically modified organism to be created was a bacterium, in 1973.In 1974, the same techniques were applied to mice.In 1994 the first genetically modified foods were made available.

Genetic engineering has a number of useful applications, including scientific research, agriculture and technology.In plants, genetic engineering has been applied to improve the resilience, nutritional value and growth rate of crops such as potatoes, tomatoes and rice.

In animals it has been used to develop sheep that produce a therapeutic protein in their milk that can be used to treat cystic fibrosis, or worms that glow in the dark to allow scientists to learn more about diseases.

BIOTECHNOLOGY – A MODERN SCIENCE OR A NEW NAME FOR AN OLD SCIENCE?

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Biotechnology is a technology that utilizes biological systems, living organisms or parts of them to develop or create different products. It is an interdisciplinary field that emerged at the intersection of biological, chemical and technical sciences. Biotechnology follows the principle of using biological processes to develop products, processes, and systems that improve our lives. In this context, biotechnology is one of the key technologies that can help us overcome challenges of our time. This results in breakthrough products and technologies that fight diseases, minimize the ecological footprint, improve food production and create more efficient manufacturing processes.

Brewing and baking bread are examples of processes that fall within the concept of biotechnology (use of yeast(living organisms) to produce the desired product). Such traditional processes usually utilize the living organisms in their natural form (or further developed by breeding), while the more modern form of biotechnology will generally involve a more advanced modification of the biological system or organism.

Study of Biotechnology involves studies of molecules, cells, and organisms aiming to understand how biological processes work. Nowadays biotechnologist plays an essential role in creating and developing methods of production for biomolecules such as vaccines, antibiotics, enzymes,bio-interfaces, biopolymers, biofuels, and many others. New and advanced methods of analysis are always being created.