

Chemical bond

Chemical bond is an interaction, which binds combined atoms of elements in a molecule (or ions in a crystal) to each other through valence electrons.

General rules

Chemical bonds are created and destroyed in the chemical reactions. During the formation of chemical bond, binding energy is released, on the contrary, dissociation energy must be supplied to dissolve a chemical bond. Binding and dissociation energy have the same magnitude; the greater the binding (dissociation) energy, the stronger the bond. The conditions for the formation of a chemical bond is sufficient proximity of atom that have sufficiently high energy and the correct spatial orientation.

Types of bonds

Metal bond

It is formed by cations grouped in lattices. Valence electrons occur in the form of an electron cloud, so they are shared by all atoms and it is impossible to recognize which electron belongs to which cation.

Covalent bond

Covalent bond is mediated either **by a shared electron pair**, where each partner provides one electron, or as a donor-acceptor bond (coordination-covalent), where one of the partners provides an unoccupied orbital and the other one a full electron pair.

- covalent non-polar - Δx less than 0,4
- covalent polar - Δx from 0,4 inclusive to 1,67
- covalent ionic - Δx from 1,67 inclusive

Ionic bond

Extremely covalent bond, where atoms don't share electrons, but one completely removes electrons from the other. Ions are created by this mechanism.

Division of bonds according to the probability of occurrence of bonding electrons

Bond sigma - σ

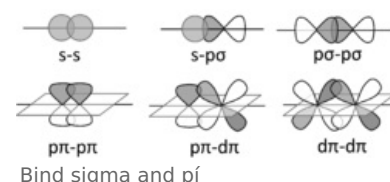
It is created by occupying the sigma molecular orbital. Its electron density is the greatest **at the junction of atomic nuclei**. A molecular orbital can be formed by overlapping:

1. two orbitals **s**, **s** and **p** or **s** and **d**;
2. two orbitals **p** or **p** and **d**;
3. two orbitals **d**.

Bond pi - π

It is formed by occupying the pi molecular orbital. Its electron density is the greatest **outside the junction of atomic nuclei, but in the plane passing through this junction**. It is created after the formation of the sigma bond and participates in the formation of multiple bonds. Because it is weaker than sigma bond, molecules with multiple bonds are more reactive than compounds with single bonds. A molecular orbital can be formed by overlapping:

1. two orbitals **p**;
2. orbitals **p** and **d**;
3. two orbitals **d**.



Multiple bonds

Single bond

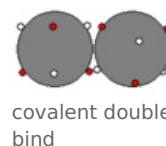
The bond is accomplished by sharing only one electron pair. It is formed by a **σ bond** and is longer and weaker than multiple bonds (double, triple).

Double bond

Double bond is made by sharing two electron pairs. It consists of one σ bond and one π bond. It is shorter and stronger than single bond.

Triple bond

The bond is formed by sharing three electron pair. It consists of one σ bond and two π bond. Triple bond is the shortest and the strongest.



Links

Related articles

- Chemical Reaction
- Orbital

Literature

- LEDVINA, Miroslav. *Biochemie pro studující medicíny*. 2. edition. Karolinum, 2009. pp. 0. ISBN 978-80-246-1414-4.
- BENEŠOVÁ, Marika – SATRAPOVÁ, Hana. *Odmaturuj! z chemie*. 1. edition. Didaktis, 0000. pp. 0. ISBN 80-862-8556-1.
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