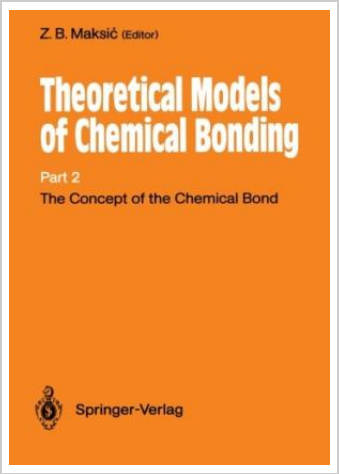

The Concept of the Chemical Bond. Theoretical Models of Chemical Bonding Part 2

By ZVONIMIR B. MAKSIC

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Chemical bond refers to the forces holding atoms together to form molecules and solids. This force is of an electric nature, and the attraction between electrons of one atom to the nucleus of another atom contributes to what is known as chemical bonds. Although electrons of one atom repel electrons of another, the repulsion is relatively small. So is the repulsion between atomic nuclei.Â These data prompted Linus Pauling to look at The Nature of the Chemical Bond, a book that introduced many new concepts such as the resonance, electronegativity, ionic bond, and covalent bond. In England, N.V. Sidgwick and H.E. Powell paid their attention to the lone pairs in a molecule. They developed the valence bond theory, the VSEPR (Valence Shell Electron Pair Repulsion) theory. Chemical Bonding refers to the formation of a chemical bond between two or more atoms, molecules, or ions to give rise to a chemical compound. These chemical bonds are what keep the atoms together in the resulting compound. Table of Content. Lewis Theory.Â In 1916 Kossel and Lewis succeeded in giving a successful explanation based upon the concept of an electronic configuration of noble gases about why atoms combine to form molecules. Atoms of noble gases have little or no tendency to combine with each other or with atoms of other elements. This means that these atoms must be having stable electronic configurations. scribe covalent bonds, donor-acceptor dative bonds, mul-. tiple bonds, charge-shift bond, and aromaticity from a. unied point of view. Theoretical background: When a system is split into. two parts called a bipartite system (the two parts of-. ten called Alice and Bob), the Hilbert space is H =.Â In case of quantum chemical systems nite number. of electrons are correlated on nite number of orbitals. and the number of electrons, n, as well as the total.Â Multiple bonds: We investigate N2 and CO as model compounds for multiple bond systems (Fig. 1g, h). In-deed, the mutual information analysis results in three bonds for both molecules as expected but detailed in-vestigation identify fundamental dierences. For Ï€-bond in N2, the eigenvector elements, c1(5,8)(2, 0) =. Chemical bonds: This pictures shows examples of chemical bonding using Lewis dot notation. Hydrogen and carbon are not bonded, while in water there is a single bond between each hydrogen and oxygen. Bonds, especially covalent bonds, are often represented as lines between bonded atoms.Â Bonds are formed when valence electrons, the electrons in the outermost electronic â€œshellâ€ of an atom, interact. The nature of the interaction between the atoms depends on their relative electronegativity. Atoms with equal or similar electronegativity form covalent bonds, in which the valence electron density is shared between the two atoms. The electron density resides between the atoms and is attracted to both nuclei. The chemical bond is the central concept in chemistry, which has been considered and investigated by many scientists and which will undoubtedly be further studied. NMR spectroscopy has provided valuable experimental data bringing detailed information on chemical bonds not accessible by other experimental techniques.Â There are two fundamental descriptions of the chemical bondâ€”the valence bond (VB, as developed by Heitler, London, Slater, and Pauling) and the molecular orbital (MO, as developed by Mulliken) theory. Both theoretical approaches start with the same Hamiltonian but differ in the manner in which the terms are grouped. The VB and MO theories are illustrated in the present section for the diatomic molecule.