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**“The Sceptic-Chymist: Chemical bond-revised”**

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**[Foreword: Nano-Science-Social Education,open debate on nano-scale chemical bond](#)**

It is now 95 years after the publication of Gilbert Newton Lewis on the formation of chemical bonds (the Atom and the Molecule, J. Am. Chem. Soc. 1916, 38, 762).

Since that time, the structure of matter was based on the concepts of quantum mechanics on the sharing of electrons that produces the inter-molecular bonds.

The development of conceptions of chemical bonding was conceived as a result of giving shape to geometric probability of the organization of the motion of electrons on the basis of a number of key orbitals and their hybrids in the form of molecular orbitals.

The hybridization of the orbitals becomes useful to adapt the geometry to the effective shape of the molecules in order to propose an intuitive explanation of the formation of most chemical bonds.(1)

Even today there are many reasons why it deserves to explore the issues and problems concerning the chemical bonding in particular the "covalent" one, given its widespread use in a large quantity of cases about the different behavior of atoms forming molecules, that have a more and more high complexity .(2)

The "supra-molecular chemistry", studies complex molecular aggregates with weak interactions telling us that covalent electronic coupling, is not exhaustive; since remain broad possibilities of bonding that are a result of interaction mode of attraction sometimes caused by hybridization of the molecular orbitals or through other types of non-covalent weak interactions, such as hydrogen bonding bridges. (3)

Today the study of the formation of chemical bonds start to have a new focus in the construction of atomic-molecular compounds, which have nano-structured features. The nano-dimensionality open new and unexpected views of application that now it is still largely not investigated. (4).

In fact the theories of atomic and molecular orbitals only define geometric areas of probability, and therefore they have no physical meaning, so that orbitals are inactive entities and therefore cannot play any role in the change of physical properties of nano materials.

Conversely, some scientists have found that the overlap of the orbitals, change the bond strength in various types of nanostructures. (5)

This is a consequence of the change of electronic structures of nano-particles,so that there is a contraction of bond lengths than the normal structure of the "bulk". Hence the bond strength becomes "size dependent". This effect is essential to understand the properties of electro-optic activity and of the higher catalytic effects of nano-particles (6).

So if we think that the waves associated with particles are not considered mere probability waves, but areas of the real presence of electrons, then we can understand how the overlap of orbitals can give rise to the quantum phenomenon of "entanglement" (\*) generating the actual structure of the chemical bond as an interaction at distance between simultaneous "entangled electrons".(7), (8)

**Biblio On Line**

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(\*) <http://www.facebook.com/groups/ENTANGLEMENT/>