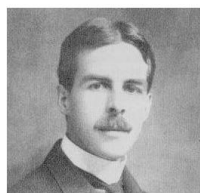


# The Octet Rule

Site : <http://www.chem1.com/acad/webtext/chembond/cb03.html>

The first successful theory of chemical bonding was formulated by G.N.Lewis in 1916.



**G.N. Lewis** (1875-1946) created the Chemistry Department at the University of California, Berkeley, and made it into one of the world's best. His other notable work included acid-base theory, the thermodynamics of solutions, the first isolation of heavy water ( $D_2O$ ), and the phosphorescence and magnetic properties of molecules.



Although Lewis originated the idea of the electron-pair bond, much of the credit for its early acceptance must go to Irving Langmuir, who extended it somewhat and enthusiastically popularized it to the extent that it began to be known as the Lewis-Langmuir theory, and even (to Lewis' annoyance) as the "Langmuir theory".



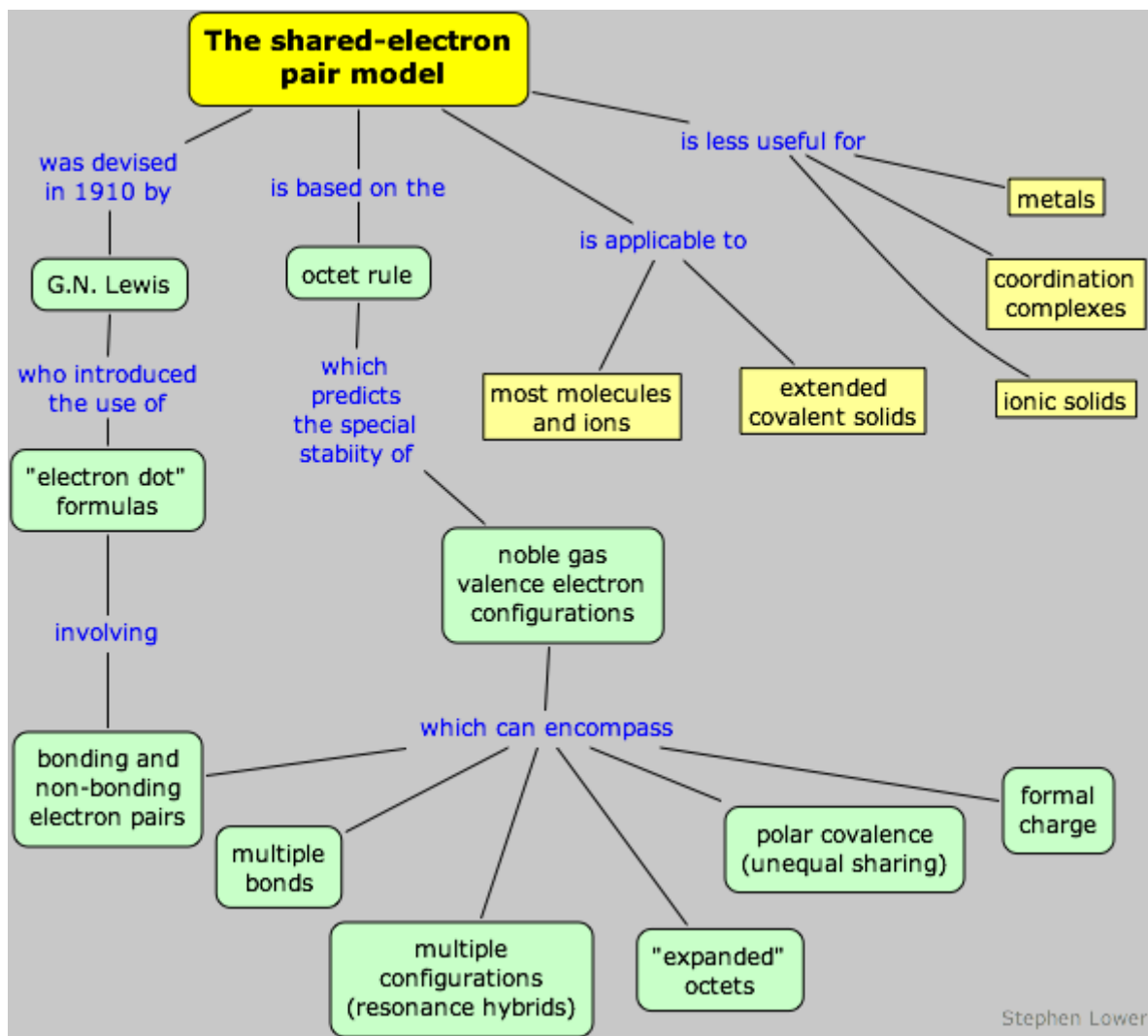
**Irving Langmuir** (1881-1967, Nobel Prize 1932) was an industrial scientist employed by the General Electric Co. His most notable work was on the chemistry of surfaces and monomolecular layers. Lewis and Langmuir were probably the two greatest American chemists of the first half of the twentieth century.

At the time Lewis began developing his ideas in 1902, it was widely believed that chemical bonding involved electrostatic attraction between ion-like entities. This seemed satisfactory for compounds such as NaCl that were known to dissociate into ions when dissolved in water, but it failed to explain the bonding in non-electrolytes such as  $CH_4$ . Atomic orbitals had not yet been thought of, but the concept of "valence" electrons was known, and the location of the noble gases in the periodic table suggested that all except helium possess eight valence electrons. It was also realized that elements known to form simple ions such as  $Ca^{2+}$  or  $Cl^-$  do so by losing or gaining whatever number of electrons is needed to leave eight in the valence shell of each. Lewis sought a way of achieving this octet in a way that did not involve ion formation, and he found it in his shared electron-pair theory published in 1916.

Present-day shared electron-pair theory is based on the premise that the eight electrons in the outermost shells of the noble gas elements above helium represent a particularly favorable configuration. This is not because of any mysterious properties of octets (or of noble gas elements); by allowing each nucleus to claim half-ownership of a shared electron, more electrons are effectively "seeing" more nuclei, leading to increased electrostatic attractions and a lowering of the potential energy.

The idea that the noble-gas configuration is a particularly favorable one which can be achieved through formation of electron-pair bonds with other atoms is known as the **octet rule**

*Le modèle de Lewis*



*Le modèle de Lewis et la structure géométrique des molécules*

