

Covalent Bonding Models

There are two main ways that we will model covalent bonding, the localized electron model and the delocalized electron model.

Localized electron model- The position of the electron is specified.

Lewis structures are used to describe where the valence electrons are in a molecule.

VSEPR (Valence Shell Electron Pair Repulsion) theory is used to describe the geometry of the molecule.

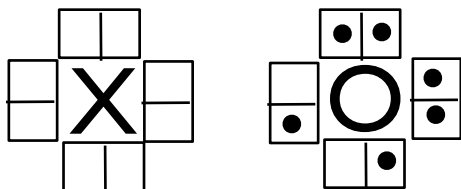
Hybridization is used to describe how atomic orbitals are used to make molecules.

Delocalized electron model- the position of the electron is not specified.

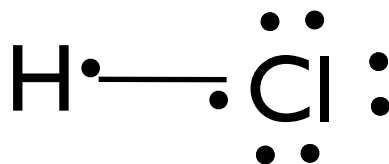
In the Delocalized model the wave function is solved for the molecule as a whole and new molecular orbitals are used.

Lewis Structures

In 1916 Gilbert Newton Lewis published a very successful model for describing bonding. The Lewis model was based on the realization that full valence shells have eight electrons, what came to be known as the octet rule. Lewis envisioned each atom with space for eight electrons arranged in pairs.



Bonds are pairs of shared electrons that are usually represented as a line.



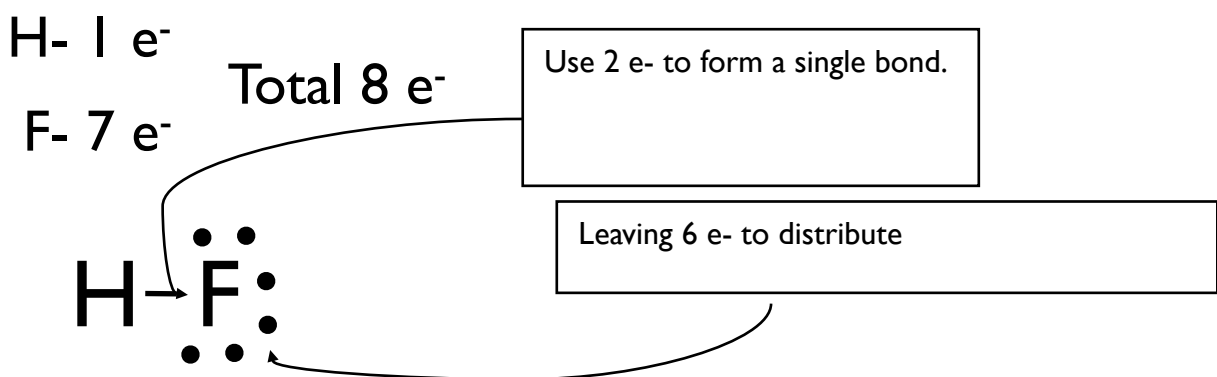
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Writing Lewis Structures

There are three basic steps involved in writing Lewis structures:

- 1- Sum the total number of valence electrons from all the atoms. If there are not enough electrons then go back and try double or triple bonds.
- 2- Use a pair of electrons to form a single bond between the central atom and each other atom.
- 3- Arrange the remaining electrons around all the atoms to fulfill the octet and duet rules.

Ex: Write the Lewis structure for HF.



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