

DRAWING LEWIS STRUCTURES

The Lewis structure for molecules which follow the “octet” rule may be drawn by the following method:

â Find the total number of valence electrons supplied by all the elements in the structure.

The number of valence electrons corresponds to the group number for “A” elements.

For a negative ions, **increase** the number by the charge on the ion.

For positive ions, **decrease** the number by the charge on the ion.

Total number of electrons available for bonding equals the sum of the valence electrons of all the atoms in the molecule.

ã Determine the number of electrons that all the elements in the molecule would have if they had a noble gas electron configuration.

Each hydrogen would have **2** electrons.

All other elements would have **8** electrons.

Total number of electrons needed to form a noble gas configuration = 2 times the number of hydrogen atoms + 8 times all the other atoms present in the molecule.

ä Calculate the number of electrons involved in bonding by subtracting the number of electrons available (step 1) from the number of electrons needed to form a noble gas configuration (step 2).

Number of bonding electrons = (total number of electrons needed) - (total number of valence electrons)

â Since each covalent chemical bond consists of a shared pair of electrons, then the number of chemical bonds = number of bonding electrons (step 3) divided by 2.

$$\# \text{ bonds} = \frac{\text{No. bonding electrons (step 3)}}{2}$$

æ Write the symbols for the atom present in the structure, arranging them in the way in which they are found in the structure.

The element with the lowest electronegativity is usually found at the center of the molecule.

ç Attach each atom together by one covalent bond as represented by a line drawn between them.

Use any remaining bonds determined in step 4 to make multiple bonds. Note that hydrogen can only form one bond.

è The total number of electrons (step 1) minus the number of bonding electrons (step 3) equals the number of unshared electrons.

Complete the Lewis structure by adding unshared electrons to each atom until it has acquired an “octet” of electrons except hydrogen which would only have two electrons (one bond).