

**Chapter 6 – Lewis Structures of Covalent Compounds****Rules for Writing Lewis Structures: NASL Method**

The octet rule alone does not let us write Lewis structures. We still need to know how to place the electrons around the bonded atoms. The NASL method is an easier format for doing this.

**Steps for the NASL Method**

- 1.) Select a reasonable skeletal structure for the molecule or polyatomic ion to be drawn. In general, the least electronegative element or the element written first in the formula is the **central** element (never hydrogen);
- 2.) Calculate **N** (**N**eeded) as the sum of electrons needed for all atoms by the octet rule. Remember the exceptions: H=2, Be=4, B=6;
- 3.) Calculate **A** (**A**vailable) as the sum of all valence electrons. For negatively charged ions, add the number of electrons equal to the charge of the anion to **A**. For positively charged ions, subtract the number of electrons equal to the charge of the cation to **A**;
- 4.) Calculate **S** (**S**hared) as the difference between **N** – **A**;
- 5.) Divide **S** by 2 to obtain the number of bonds to be extended from the central atom;
- 6.) Calculate **L** (**L**one-pair electrons or simply “dots”) as the difference between **A** – **S**. Place the **L** dots into the skeleton as to fill the octet of every “A-group” element, except hydrogen. Remember that hydrogen has only one bond and **NO** dots;
- 7.) Check that the total number of used electrons is equal to **A**.

Example:

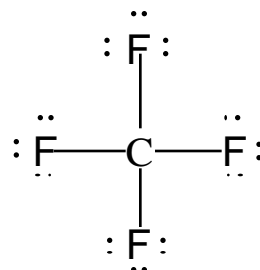


$$N = 5(8) = 40$$

$$A = 1(4) + 4(7) = 32$$

$$S = N - A = 40 - 32 = 8; \text{ implies } 4 \text{ bonds (4b's).}$$

$$L = A - S = 32 - 8 = 24 \text{ dots.}$$



Charge on individual atoms = Valence of atom – Number of Bonds extending from atom – dots on atom. All atoms in  $\text{CF}_4$  are neutral.

$$\text{Carbon} = 4 - 4 - 0 = 0 \text{ (neutral)}$$

$$\text{Fluorine} = 7 - 1 - 6 = 0 \text{ (neutral)}$$

Write the Lewis structures for the following:

