

Chemical Bonding 4.2

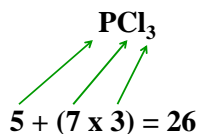
Lewis Diagrams

Lewis Structures

- We will only use these for covalent compounds (molecules).
- They provide a visual representation of the location of atoms and the relative distribution of electrons.
- You must know how to do these in order to predict the shape of molecules.

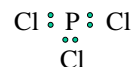
Ex1) Lewis Structures

Step 1. Count the total number of valence electrons in the molecule.



Ex1) Lewis Structures

Step 2. Put the **least** electronegative atom in the center and connect terminal atoms to it with single bonds.

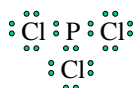


Exception to rule:

Hydrogen is always a terminal atom, as it only needs to share 2 electrons to fill its octet.

Ex1) Lewis Structures

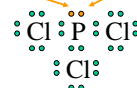
Step 3. Complete the octets for all terminal atoms except Hydrogen atoms.



Ex1) Lewis Structures

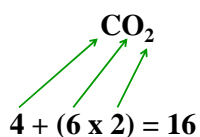
Step 4. Add up the electrons you have used and subtract them from the total number of valence electrons (Step 1). Attach leftover electrons to the central atom as **lone pairs**.

$$26 - (3 \times 8) = 2$$



Ex2) Lewis Structures

Step 1. Count the total number of valence electrons in the molecule.



Ex2) Lewis Structures

Step 2. Put the **least** electronegative atom in the center and connect terminal atoms to it with single bonds.



Ex2) Lewis Structures

Step 3. Complete the octets for all terminal atoms except Hydrogen atoms.



Ex2) Lewis Structures

Step 4. Add up the electrons you have used and subtract them from the total number of valence electrons (Step 1). Attach leftover electrons to the central atom as **lone pairs**.

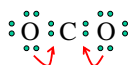
$$16 - (2 \times 8) = 0$$



We do not have extra electrons, and carbon's octet is not full, so we go to step 5.

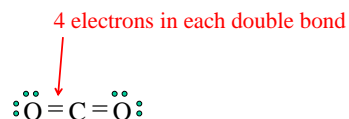
Ex2) Lewis Structures

Step 5. Make multiple bonds to compete the octet of the central atom.



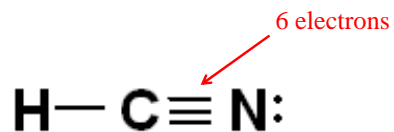
Ex2) Lewis Structures

Step 5. Make multiple bonds to compete the octet of the central atom.



Ex3) Lewis Structures

In some cases you may need to make triple bonds to complete the octet around the central atom.



Ex4) Lewis Structures

If you are making a Lewis structure for a polyatomic ion, you must take the overall charge of the ion into consideration.

Iodate IO_3^-

