**Rules for Drawing Lewis Structures of Molecules (Covalent Compounds)**

1. Determine the ***total number*** of valence electrons for the molecule (valence electrons of ***all*** the atoms in the molecule)

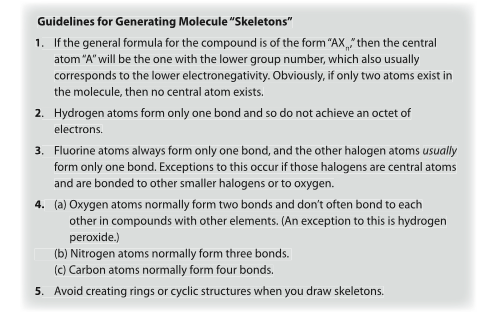
**Example Molecule: NCl3**  N = 5 x 1 = 5

+ 3 x Cl = 3 x 7 = 21

26

***NOTE:*** If the molecule is a polyatomic ion adjust the number by ***subtracting one electron for every positive charge*** and ***adding one electron for every negative charge*** on the molecule

1. Construct the ***skeleton*** of the molecule using lines to indicate single ***covalent bonds*** (each line represents ***2 electrons***) between the atoms.  ***This can be the most challenging step of the process. Follow the following guidelines.***



Using the above rules, we see that Nitrogen is the mostly like central atom. The Chlorines surround the central atom.

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1. Subtract the total number of valence electrons used to construct the skeleton from the total number of valance electrons available from step 1. Remember each ***line (or bond)*** represents 2 electrons. 26 – (3 x 2) = 20.
2. Assume that all the atoms in the molecule obey the octet rule (***except hydrogen***). Determine the number of additional valence electrons required to give all of those atoms the required eight valence electrons.

Each Chlorine is associated with 2 electrons from it’s bond with Nitrogen, each needs 6 more = 6 x 3 = 18

Nitrogen is associated with 6 electrons from the 3 bonds with Nitrogen, it needs 2 more = 2 x 1 = 2

1. If the number of electrons needed matches the number of electrons left from step 4 start to place the electrons in pairs (from the outside atoms in; Chlorine atoms before N atom) where needed to satisfy the octet. If they do not match… stay tuned, we will look at this soon. ***If the molecule is an ion, place brackets around the ion and add the charge to the top right corner.***

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1. Check that the total number of valence electrons represented in the diagram matches the total number of valence electrons you began with in step 1.

Quick Check Questions:

1. Hydrogen sulphide, H2S, is a poisonous, foul-smelling, and flammable gas. Why is the molecular skeleton “S-H-H” incorrect for the molecule?
2. Determine the total number of valence electrons presented in each of the following molecules

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **H2Se** | **CCl4** | **NF3** | **PCl5** | **SF6** |
|  |  |  |  |  |

