Chem "Molecules" Summary

Saturday, December 31, 2022 3:31 PM

1. **Molecule:**

→ It is an electrically neutral entity that consists of definite number of atoms.

→ Molecules can be formed from atoms of same element, pr atoms of different elements.

2. **Valance shell, valence electrons, valency and Lewis dot symbol:**

a. **Valence shell:**
It is the outer energy level.

b. **Valance electron:**
It is the number of electrons in the outer shell.

c. **Valency: (valence):**
it is the number of electrons gained, lost or shred by an atom to attain stability(saturate the outer shell).

d. **Lewis dot symbol:**
It is the representation of an atom surrounded by dots.

3. **Stability of the atom:**
Each atom has a tendency to become stable, to saturate the valence shell. This saturation is attained by duet rule or octet rule.

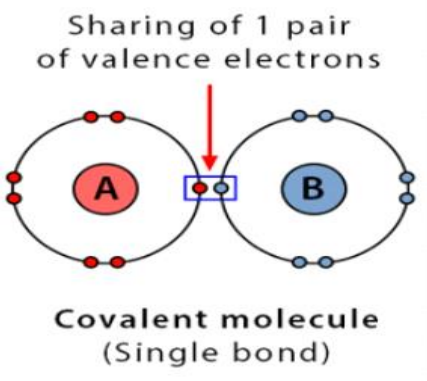
a. **Duet rule:**
The element tends to lose, gain or share electrons to saturate the outer shell with 2 electrons.

b. **Octet rule:**
the elements tends to lose, gain or share electrons to saturate the outer shell with 8 electrons.

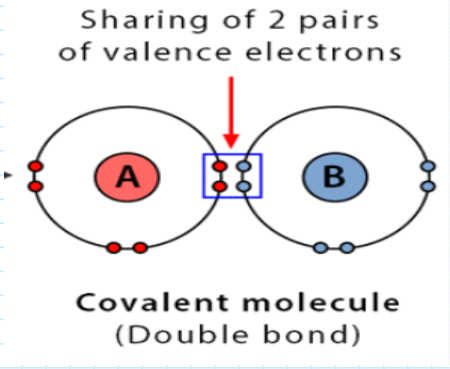
4. **Chemical bonding:**

→ **Covalent bond:**
Sharing of electrons between atoms in the valance shell (non-metal + non-metal).
There are 3 types of covalent bonds:

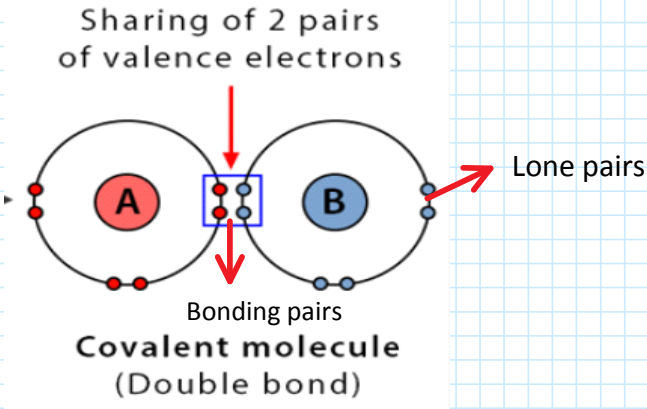
a. **Single covalent bond:** sharing of 1 pair of electrons.



b. <u>Double covalent bond:</u> sharing of 2 pairs of electrons.

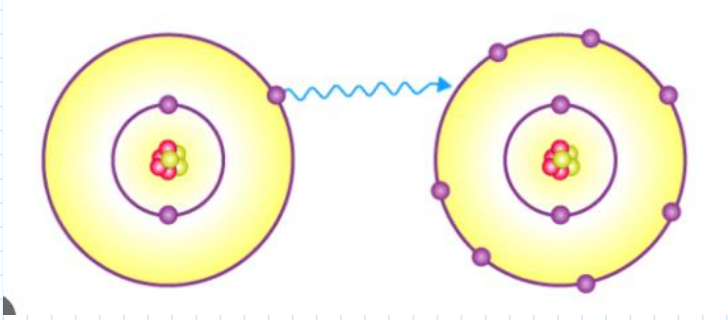


c. <u>Triple covalent bond:</u> sharing of 3 pairs of electrons



→ **<u>Ionic bond:</u>**

complete transfer of electrons from one atom (metal) to another atom (non-metal).



5. **Electronegativity:**

The tendency of an atom to attract the shared electrons with other atoms.

→ **Variation in a group:**

As the atomic number of the atom increases, the electronegativity of the atom decreases.

→ **Variation in a period:**

As the atomic number of the atom increases, the electronegativity of the atom increases.

6. **Polarity:**

→ **Polarity of a bond:**

i. **Polar bond:**

Bond due to the sharing of electrons between different atoms of different E.N, or the shared electrons are not equally attracted.

ii. **Non polar bond:**

Bond due to the sharing of electrons between 2 identical atoms of the same E.N, where the shared electrons ae equally attracted.

→ **Polarity of a molecule:**

iii. **Polar molecule:**

i. If the bond between atoms is polar
ii. Resultant dipole ≠ 0 → **Polar molecule**

→ **Non polar molecule:**

i. If the bond non polar →non polar molecule
ii. If the bond is polar, Resultant dipole =0 → **Non polar molecule**

7. **How to calculate X_1, X_2, L and D**

→ X_1: sum of the valence electrons of all the atoms present in the molecule.

→ X_2: sum of electrons that correspond to the saturation of the valance shell of all the atoms in a molecule.

→ L: it is the number of pairs present in a molecule.

$$L=\frac{X_1-X_2}{2}$$

→ D: it is the number of lone pairs present in a molecule.

$$D=\frac{X_1-2L}{2}$$

8. Mole of molecules:

a. 1^{st} method:

1 mol 6.023 x 10^{23} molecules

b. 2^{nd} method:

$N_{atom} = N_{molecule} \times$ coefficient

$n_{atom} = n_{molecule}$ x coefficient