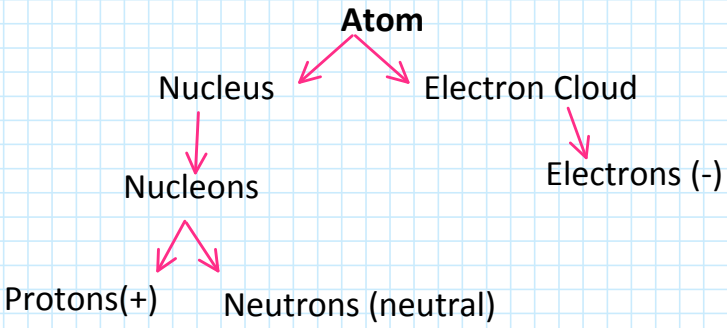
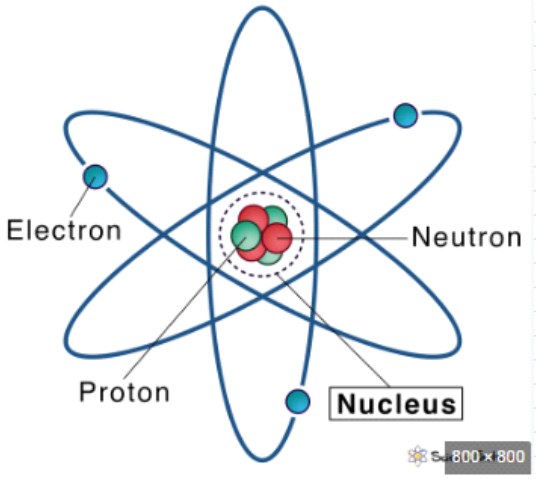
Chem "Atom" Summary

Tuesday, January 03, 2023 9:29 PM

1.



★ $m_{atom} = M_{nucleus}$



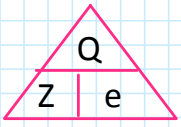
→ Atom is neutral → Z= atomic number = number of protons = number of electrons

2. <u>Charge of Nucleus:</u>

$Q_{nucleus} = Q_{protons} + Q_{neutrons}$

$\Rightarrow Q_{nucleus} = Q_{protons}$

$\Rightarrow Q_{nucleus}$ = Z x e



Where: Q= nuclear charge

Z= number of protons

e= electric charge = 1.6 x 10^{-19}C

3. <u>Charge of electron cloud:</u>

$Q_{electron\ cloud} = Q_{electrons}$

$\Rightarrow Q_{electron\ cloud}$=-Z x e

Where: Q= nuclear charge

Z= number of electrons

e= electric charge = 1.6 x 10^{-19}C

4. Charge of the atom:

$Q_{atom} = Q_{nucleus} + Q_{electron\ cloud}$

But the atom is electrically neutral, Z= atomic number = number of protons= number of electrons

$\Rightarrow Q_{atom}$=0

5. A=Z+N

Where: A=mass number

Z= atomic number

N= number of neutrons

6. **Nuclide:**

(Z,A)

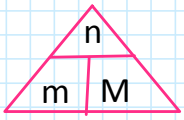
Atomic number

Mass number

7. **Atomic mass:**
   Mass number in a.m.u
   Or
   Mass number in a.u

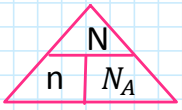
8. **Molar mass:**
   Mass number in g/mol

9. $= \frac{m}{M}$



Where: n: number of moles (Mol)
m: mass number (g)
M: molar mass (g/mol)

$n = \frac{N}{NA}$



Where: n: number of moles (mol)
N: number of atoms (atoms)
N_A: Avogadro's number (atoms/mol)

10. **Placement:**

Row/period: number of energy levels.

Group/column:

→ Group: (I, II, III, IV, V, VI, VII, VIII)
→ Column: (1,2,or 3+10--> 18)

11. **Metals:**
    Tend to gain electrons to become stable.

12. **Non-metals:**
    Tend to lose electrons to become stable.

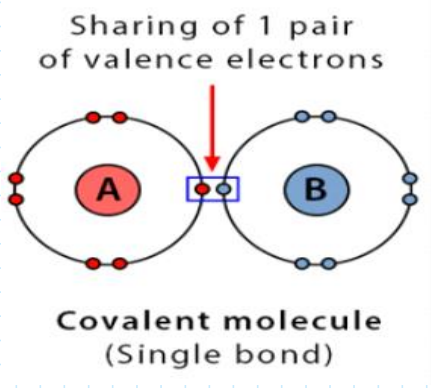
13. Valance electrons:
    Number of electrons on the outer energy level.

14. Valance:
    Number of electron needed to become stable.

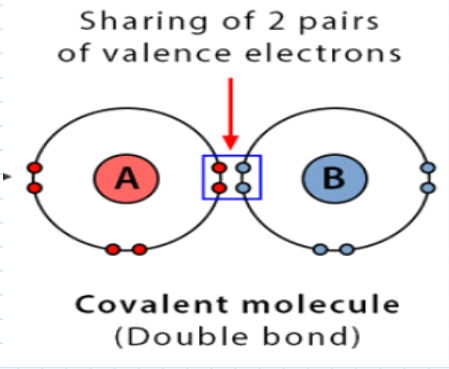
15. **Covalent bond:**

Number of electron needed to become stable.

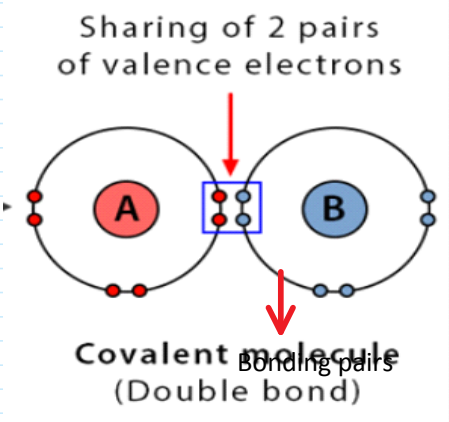
15. **Covalent bond:**
Sharing of electrons between atoms in the valance shell (non-metal + non-metal).
There are 3 types of covalent bonds:
   a. **Single covalent bond:** sharing of 1 pair of electrons.



   a. **Double covalent bond:** sharing of 2 pairs of electrons.



   a. **Triple covalent bond:** sharing of 3 pairs of electrons



16. **Ionic bond:**
complete transfer of electrons from one atom (metal) to another atom (non-metal).