C11 - 1.1 - Atomic Theory: Atom or Ion # Atoms

Protons: Positive charge p^+
Electrons: Negative charge e^-
Neutrons: No charge n^0

Valence electron: electrons in Outermost Shell
Closed shell (Stable): a shell with its maximum number of electrons. Goal!

Cation : (+ve ion)
Anion : (−ve ion)

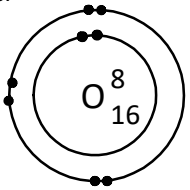
Atom - Uncharged **Oxygen Atom: O**

Atomic Number

8
O
Oxygen
16.0

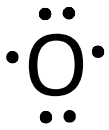
Atomic Mass

Bohr



Pairs

Lewis



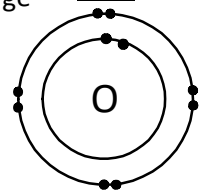
Lewis: Only valence electrons

Ion - A charged particle **Oxygen Ion: O^{2-}**

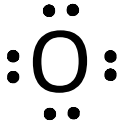
Ion Charge

8 2−
O
Oxygen
16.0

Bohr



Lewis



Electrons have a negative charge:
Losing an electron -> positive charged ion
Gaining an electron -> negatively charged ion

$$\#\ of\ protons = atomic\ number = 8\ \ (This\ number\ never\ changes)$$

$$\#\ of\ electrons = \#\ of\ protons = 8$$

$$\#\ of\ neutrons = Atomic\ Mass - \#\ of\ protons = 16 - 8 = 8$$

$$\#p^+ = A\# = \#e^-$$
$$\#n = Am - \#p^-$$

$$\#\ of\ electrons = \#\ of\ protons - charge\ \# = 8 - (-2) = 10$$

$$\#e^- = \#p^+ - charge$$

Lost electrons
Lewis Empty

An elements ionic charge is exactly the number of electrons it needs to give up or accept or share in order to have a full valence shell*

Row # = # of electron shells
electrons in shell = # elements in row
Max in shell =2,8,8,18,18….

How many atoms in a molecule(s)?

$$Given \times Conversion\ factor$$

Atoms : Molecules Ratio

$$\frac{atoms}{molecule}$$

Li_2O (Li: 2, O: 1)

$$1\ molecule\ Li_2O \times \frac{2\ atoms\ Li}{1\ molecule\ Li_2O} = 2\ atoms\ Li$$

$Li(OH)$ (Li: 1, O: 1, H: 1)

$(H_2O)_2$ (H: 4, O: 2)

Multiply Inside Brackets by Outside Subscript

$3Li_2O$ (Li: 6, O: 3)

Multiply by Coefficient

$4(H_2O)_2$ (H: 16, O: 8)

How many molecules of hydroxide in 4 molecules of $Ca(OH)_2$.

$$molecules\ OH = 4\ molecules\ Ca(OH)_2 \times \frac{2\ molecules\ OH}{1 molecule\ Ca(OH)_2} = 8\ molecules\ OH$$

$$\frac{molecule(s)}{molecule(s)}$$