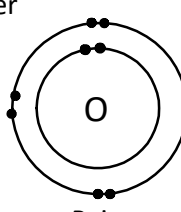

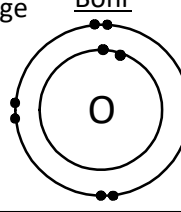
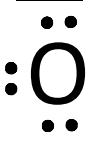


C11 - 1.1 - Atomic Theory: Atom or Ion # Atoms

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!

<u>Atom - Uncharged</u>		Oxygen Atom: O	<u>Ion - A charged particle</u>		Oxygen Ion: O^{2-}
Atomic Number	Bohr	Lewis	Ion Charge	Bohr	Lewis
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> 8 Oxygen 16.0 </div>			<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> 8 2 - Oxygen 16.0 </div>		
Atomic Mass	Pairs	Lewis: Only valence electrons	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 electrons = # of protons - charge # = 8 - (-2) = 10	
# of neutrons = Atomic Mass - # of protons = 16 - 8 = 8		$\#p^+ = A\# = \#e^-$ $\#n = Am - \#p^-$	$\#e^- = \#p^+ - \text{charge}$	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)?

Atoms : Molecules Ratio

Li_2O	Li: 2 O: 1	$1 \text{ molecule } Li_2O \times \frac{2 \text{ atoms } Li}{1 \text{ molecule } Li_2O} = 2 \text{ atoms } Li$	Useful Math! Given \times Conversion factor
		$1 \text{ molecule } Li_2O \times \frac{1 \text{ atoms } O}{1 \text{ molecule } Li_2O} = 1 \text{ atoms } O$	

$Li(OH)$	Li: 1 O: 1 H: 1	$(H_2O)_2$	H: 4 O: 2	Multiply Inside Brackets by Outside Subscript
----------	-----------------------	------------	--------------	---

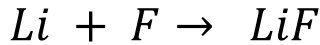
$3Li_2O$	Li: 6 O: 3	Multiply by Coefficient	$4(H_2O)_2$	H: 16 O: 8
----------	---------------	-------------------------	-------------	---------------

How many molecules of Fe_2O_3 if you have 6 atoms of Fe?

$$6 \text{ atoms } Fe \times \frac{1 \text{ molecule } Fe_2O_3}{2 \text{ atoms } Fe} = 3 \text{ molecules } Fe_2O_3 \quad \text{Obviously!}$$

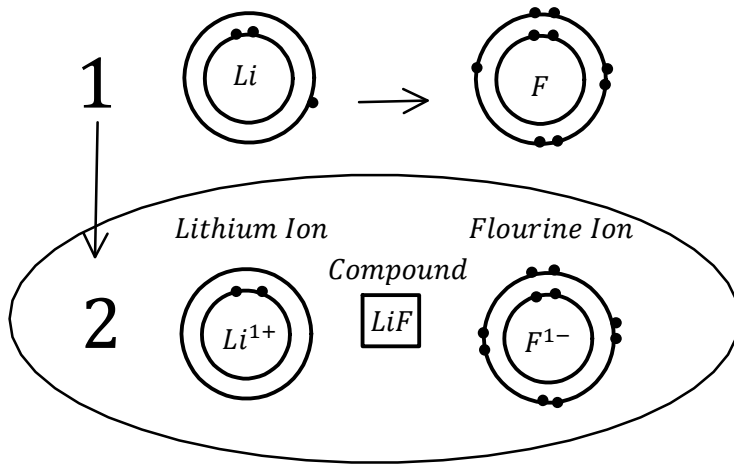
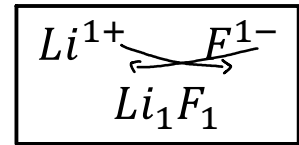
C11 - 1.2 - Ionic Bonding 1:1 Transfer Electrons Notes

Lithium and fluorine react to produce lithium fluoride.



Lithium Atom

Flourine Atom



Unreacted

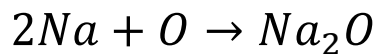
Lithium transfers its outermost electron to Fluorine's outermost shell.

Reacted
Full outermost shells!

Lithium gives up an electron giving it a charge of +1

Flourine accepts an electron giving it a charge of -1

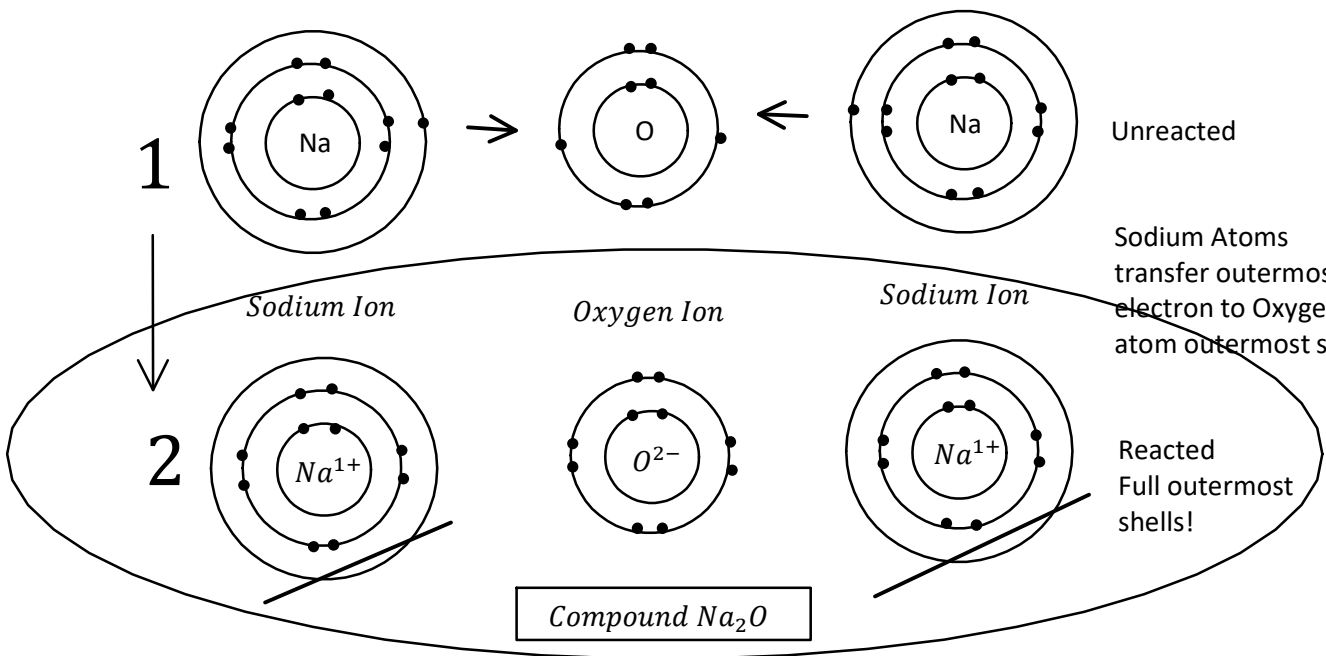
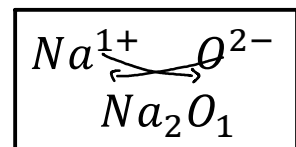
Sodium and oxygen react to produce sodium oxide.



Sodium Atom

Oxygen Atom

Sodium Atom



Unreacted

Sodium Atoms transfer outermost electron to Oxygen atom outermost shell

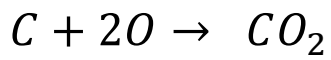
Reacted
Full outermost shells!

Sodium gives up an electron giving it a charge of +1

Oxygen accepts two electrons giving it a charge of -2.

C11 - 1.3 - Covalent Bonding Share Electrons Notes

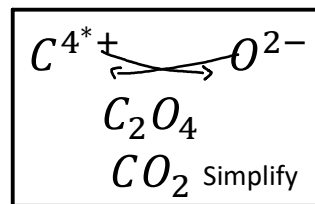
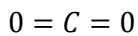
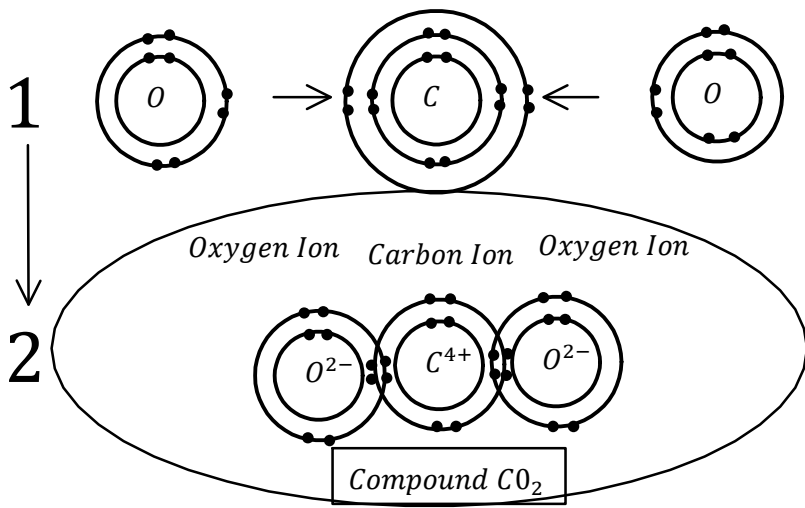
Carbon and oxygen react to produce carbon dioxide.



Oxygen Atom

Carbon Atom

Oxygen Atom



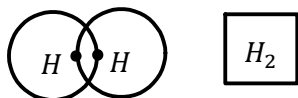
Not always!

Unreacted

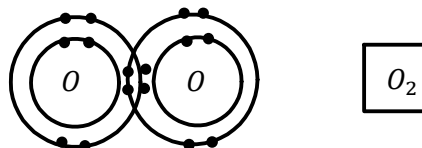
Oxygen atoms bond with carbon atom by sharing electrons

Reacted
Full outermost shells!

Two Hydrogen atoms form Diatomic



Two Oxygen atoms form Diatomic



C11 - 1.4 - Naming Ionic/Covalent/Multivalent/Polyatomic/Acid/Base Notes

Ionic Compounds: Metal/Non-metal Transfer electrons Metal 1st Metal Non-metal-ide

Salt $Na^{1-}Cl^{1-}$ ~~Sodium Chlorine~~ $NaCl = \text{Sodium Chloride}$ $ine \rightarrow ide$ Boron \rightarrow Boride
 $NaCl$ $ine \rightarrow ide$ $gen \rightarrow ide$ Oxygen \rightarrow Oxide
 $Mg^{2+}O^{2-}$ ~~Magnesium Oxygen~~ $MgO = \text{Magnesium Oxide}$ $on \rightarrow ide$ Flourine \rightarrow Flouride
 MgO $xxx \rightarrow ide$ Sulfer \rightarrow Sulfide

Multi-valent Compounds: Multi-valent: More than one ionic charge

$Fe^{2+}N^{3-}$ $Fe_3N_2 = \text{Iron (II) Nitride}$ Roman Numerals in brackets to the right of the element representing its charge being used. $I = 1$ $VI = 6$
 Fe_3N_2 $Fe^{3+}N^{3-}$ $FeN = \text{Iron (III) Nitride}$ $II = 2$ $VII = 7$
 Fe_3N_3 $III = 3$ $VIII = 8$
 FeN $IV = 4$ $IX = 9$
 $V = 5$ $X = 10$

Covalent Compounds: Non-metal/Non-metal Share Electrons. Non-metal Non-metal-ide

$CO_2 = \text{Carbon Dioxide}$ * Monocarbon Dioxide
 $BO = \text{Boron Monoxide}$
 $CCl_4 = \text{Carbon Tetrachloride}$
 $C_2H_6 = \text{Dicarbon Hexahydride}$

*always write the more metallic non-metal first.

Monoboard, Dice, Tricycle, Tetrahedron, Penta Hexa Hepta Octa Nona Deca } Gon

Prefixes	
1	Mono
2	Di
3	Tri
4	Tetra
5	Penta
6	Hexa
7	Hepta
8	Octa
9	Nona
10	Deca

Exceptions to the naming:
 $NaCl$: Table Salt
 NH_3 : Ammonia
 O_3 : Ozone etc!

Why is October the 10th month. Because the Egyptians got it wrong and Julius Caesar and Augustus inserted July and August

Polyatomic Compounds See Polyatomic Table

$Li^+ (OH)^{-1}$ $Li(OH)$ Lithium Hydroxide $Fe^{+3} (SO_4)^{-2}$ $Fe_2(SO_4)_3$ Iron (III) Sulphate

Acids: tend to have an H^+

Contain Oxygen

Do not contain Oxygen

~~Hydrogen Chlorine~~
 $HCl = \text{Hydrochloric Acid}$
~~Hydrogen Bromine~~
 $HBr = \text{Hydrobromic Acid}$

~~gen~~
 $ine \rightarrow ic$
 Add: acid

~~Hydrogen Nitrate~~
 $HNO_3 = \text{Nitric Acid}$

~~Hydrogen~~
 $ate \rightarrow ic$
 Add: acid

~~Hydrogen Sulfate~~
 $H_2SO_4 = \text{Sulfuric Acid}$

~~Hydrogen~~
 $ate \rightarrow uric$
 Add: acid

Bases: tend to have an OH^-
 (Name as you would a polyatomic)
 $LiOH = \text{Lithium hydroxide}$
 $Ca(OH)_2 = \text{Calcium hydroxide}$
 $NH_4OH = \text{Ammonium Hydroxide}$

Mnemonic: Ateic Itous
 $ate \rightarrow ic$
 $ite \rightarrow ous$

~~Hydrogen Nitrite~~
 $HNO_2 = \text{Nitrous Acid}$

~~Hydrogen~~
 $ite \rightarrow ous$
 Add: acid

$\text{Hydrogen Phosphate} \rightarrow \text{Phosphuric}$
 $\text{Hydrogen Phosphite} \rightarrow \text{Phosphurous}$

$ate \rightarrow uric$
 $ite \rightarrow urous$