Unit 2 - Chemistry

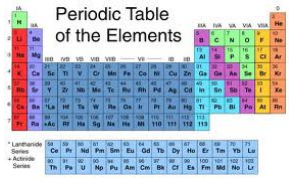
Chapter 3: Elements combine to form compounds

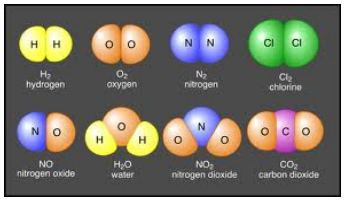
- Element Vs. Compound and Name Vs. Formula
- Metals Vs. Non-metals and Ionic Vs. Covalent
- Element Ratios
- Naming ionic and molecular compounds
- Conclusions
- Worksheet
- Challenge
- Homework

Element Vs. Compound

Element: A pure substance containing only **one** type of atom.

Examples: He (Helium), H (Hydrogen), C (Carbon), O (oxygen)

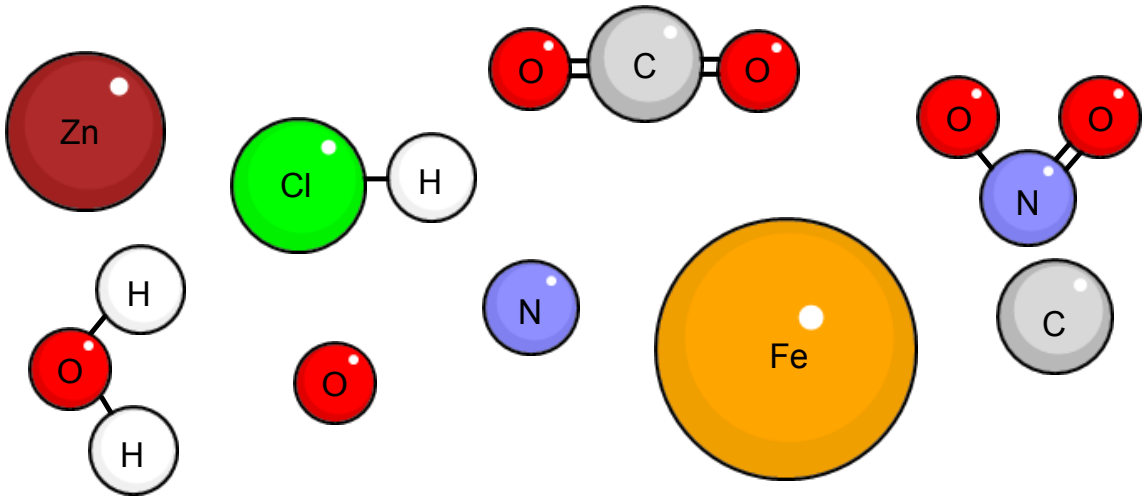




Compound: A pure substance containing **two or more** types of atoms.

Examples: H_2O (water), CO_2 (Carbon dioxide),
NaCl (Sodium chloride)

Element or Compound?



Element

Compound

Chemical Name Vs. Formula

Chemical Name: A Scientific **name** given to a compound
*tells us what it **elements** it is made up of

Examples: Sodium sulfide, Carbon dioxide

*Sometimes we use trivial (meaningless names): Water, Methane

Chemical Formula: Scientific **symbols** given to a compound from the **periodic table**

Examples: H_2O, CO_2 , NaS

How can we switch between the Formula and Name?

- First we need to know the difference between:

metals and non-metals

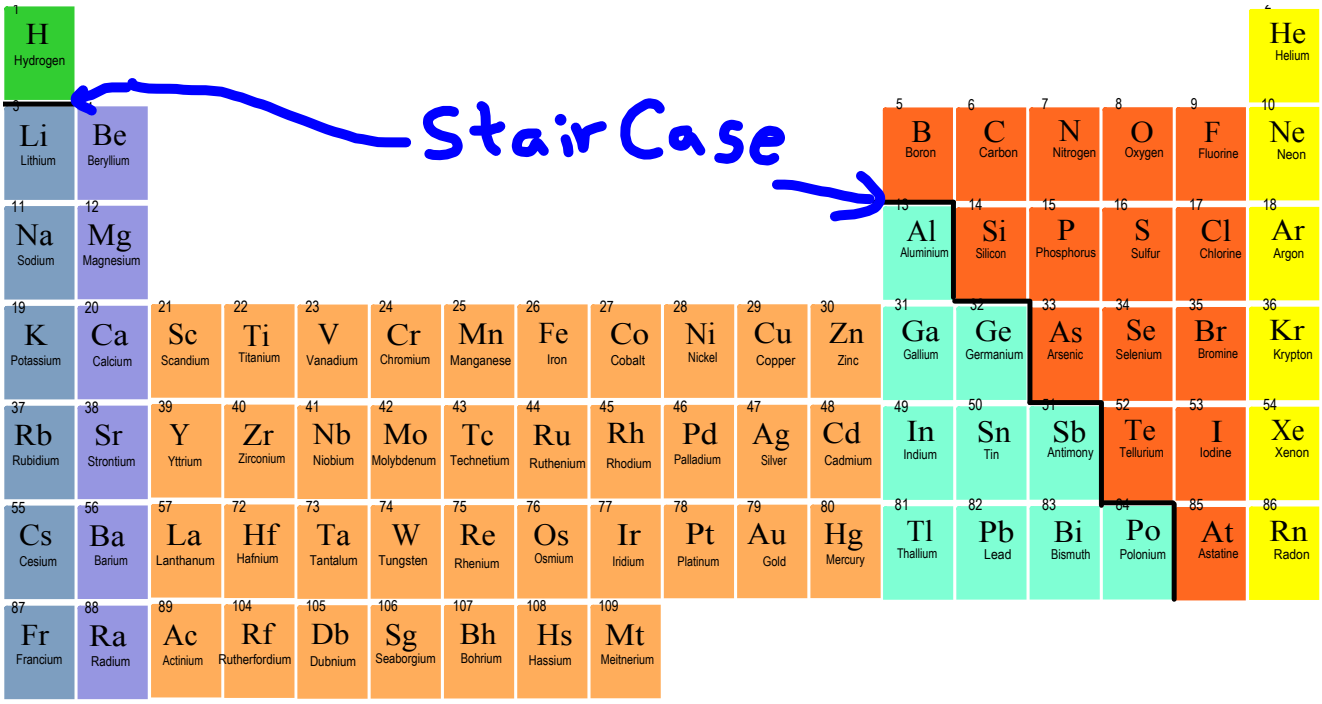
Metal Vs. Non- Metal

Metal: An element that is a good conductor of heat and electricity
Found on the **LEFT** side of the staircase

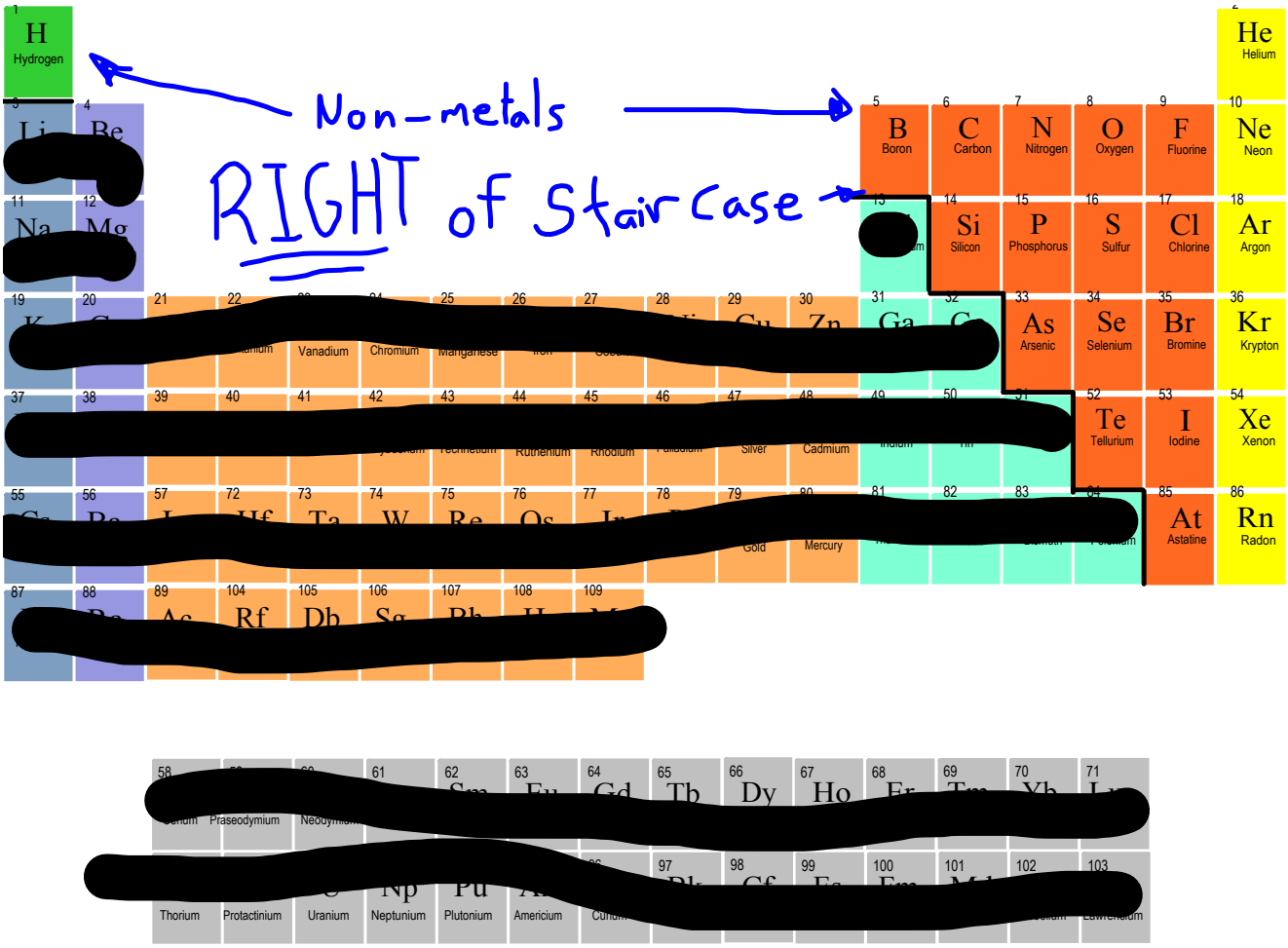
Examples: Gold, Magnesium, Sodium

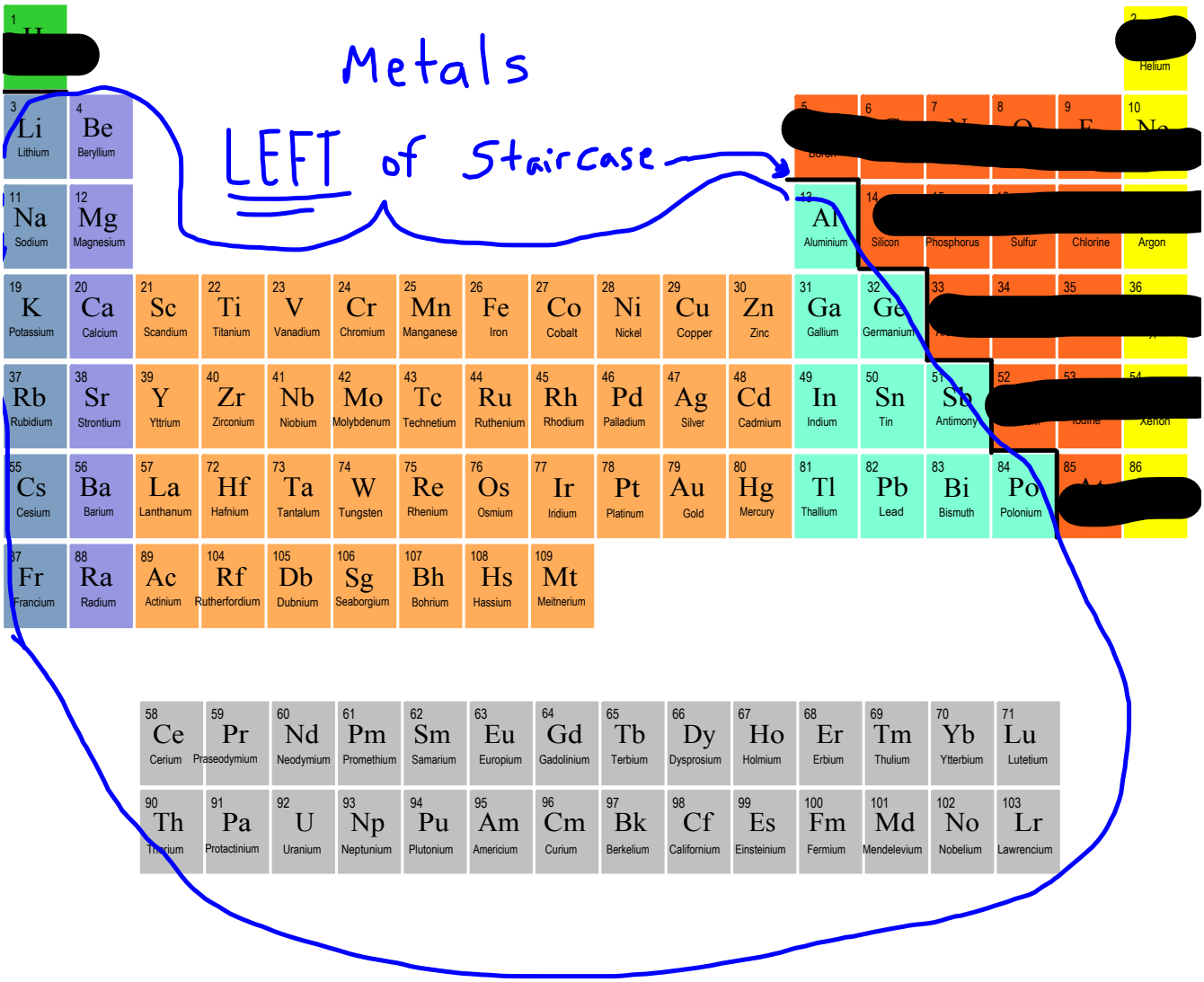
Non-Metal: An element that is a poor conductor of heat and electricity
Found on the **RIGHT** side of the staircase

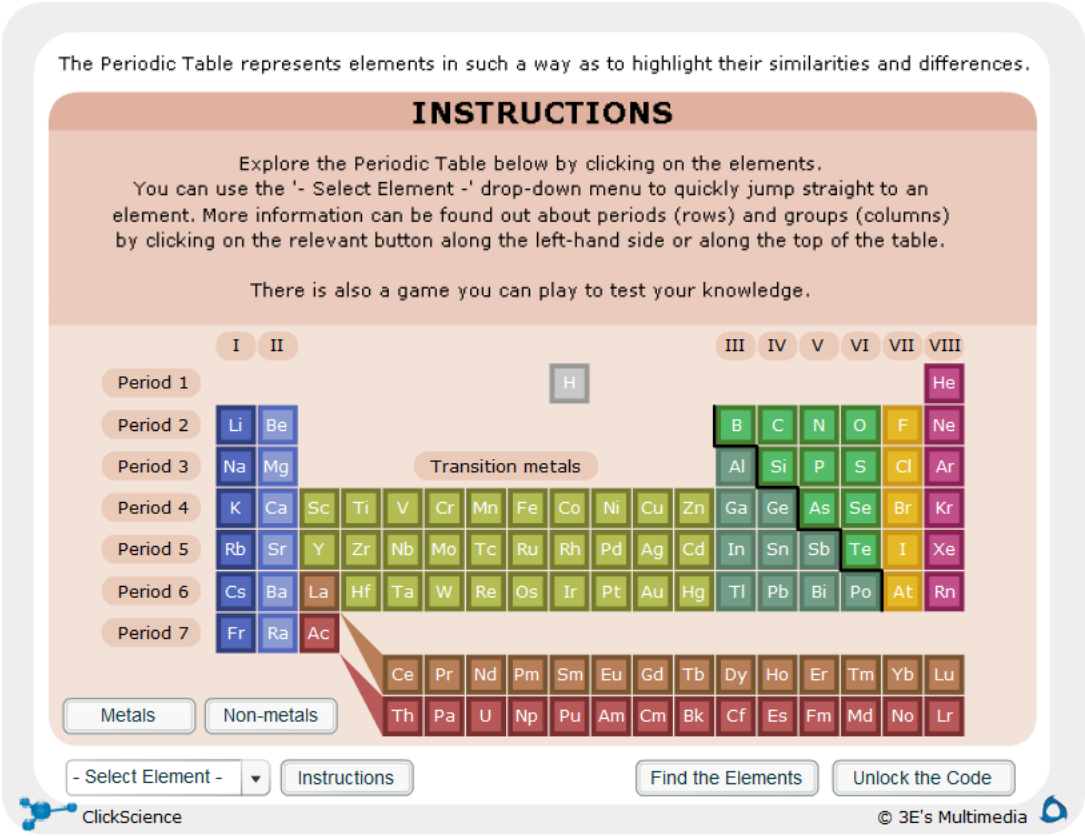
Examples: Carbon, Hydrogen, Chlorine



58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium


Non-metals
RIGHT of Staircase
H Hydrogen
He Helium
B Boron
C Carbon
N Nitrogen
O Oxygen
F Fluorine
Ne Neon
Si Silicon
P Phosphorus
S Sulfur
Cl Chlorine
Ar Argon
As Arsenic
Se Selenium
Br Bromine
Kr Krypton
Te Tellurium
I Iodine
Xe Xenon
At Astatine
Rn Radon


Metals
LEFT of Staircase
3 Li Lithium
4 Be Beryllium
11 Na Sodium
12 Mg Magnesium
19 K Potassium
20 Ca Calcium
21 Sc Scandium
22 Ti Titanium
23 V Vanadium
24 Cr Chromium
25 Mn Manganese
26 Fe Iron
27 Co Cobalt
28 Ni Nickel
29 Cu Copper
30 Zn Zinc
31 Ga Gallium
32 Ge Germanium
37 Rb Rubidium
38 Sr Strontium
39 Y Yttrium
40 Zr Zirconium
41 Nb Niobium
42 Mo Molybdenum
43 Tc Technetium
44 Ru Ruthenium
45 Rh Rhodium
46 Pd Palladium
47 Ag Silver
48 Cd Cadmium
49 In Indium
50 Sn Tin
51 Sb Antimony
55 Cs Cesium
56 Ba Barium
57 La Lanthanum
72 Hf Hafnium
73 Ta Tantalum
74 W Tungsten
75 Re Rhenium
76 Os Osmium
77 Ir Iridium
78 Pt Platinum
79 Au Gold
80 Hg Mercury
81 Tl Thallium
82 Pb Lead
83 Bi Bismuth
84 Po Polonium
87 Fr Francium
88 Ra Radium
89 Ac Actinium
104 Rf Rutherfordium
105 Db Dubnium
106 Sg Seaborgium
107 Bh Bohrium
108 Hs Hassium
109 Mt Meitnerium
58 Ce Cerium
59 Pr Praseodymium
60 Nd Neodymium
61 Pm Promethium
62 Sm Samarium
63 Eu Europium
64 Gd Gadolinium
65 Tb Terbium
66 Dy Dysprosium
67 Ho Holmium
68 Er Erbium
69 Tm Thulium
70 Yb Ytterbium
71 Lu Lutetium
90 Th Thorium
91 Pa Protactinium
92 U Uranium
93 Np Neptunium
94 Pu Plutonium
95 Am Americium
96 Cm Curium
97 Bk Berkelium
98 Cf Californium
99 Es Einsteinium
100 Fm Fermium
101 Md Mendelevium
102 No Nobelium
103 Lr Lawrencium


The Periodic Table represents elements in such a way as to highlight their similarities and differences.
INSTRUCTIONS
Explore the Periodic Table below by clicking on the elements.
You can use the '- Select Element -' drop-down menu to quickly jump straight to an element. More information can be found out about periods (rows) and groups (columns) by clicking on the relevant button along the left-hand side or along the top of the table.
There is also a game you can play to test your knowledge.
I II III IV V VI VII VIII
Period 1 H He
Period 2 Li Be B C N O F Ne
Period 3 Na Mg Transition metals Al Si P S Cl Ar
Period 4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
Period 5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe
Period 6 Cs Ba La Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
Period 7 Fr Ra Ac
Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu
Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr
Metals
Non-metals
- Select Element -
Instructions
Find the Elements
Unlock the Code
ClickScience
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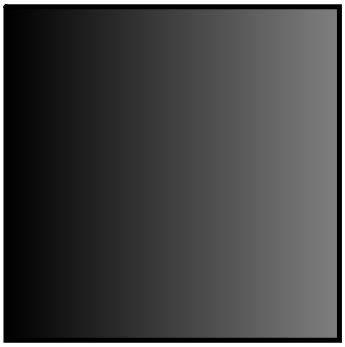
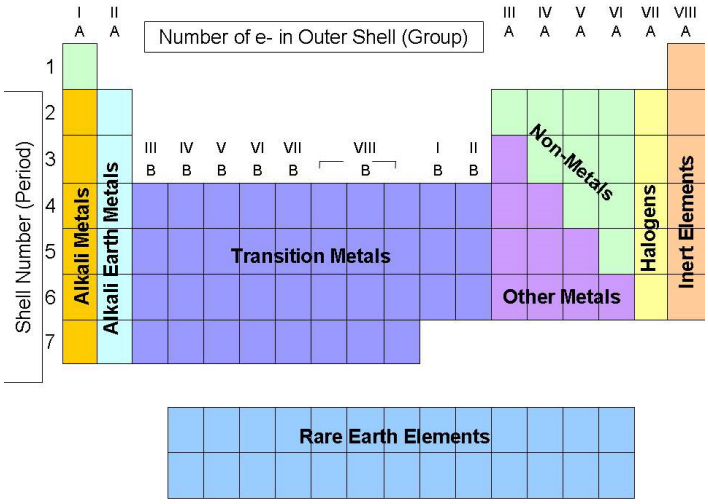
Question

- Is gold a metal or non-metal?
- Is sulfur a metal or non-metal?
- Is calcium a metal or non-metal?





Metals and Non- Metals in compounds

You can have a mixture of metal and non metal elements in your compounds:

- 3 major groups:

(Not doing) ~~1.~~ Metallic compounds

Metal and metal

2. Covalent compounds

Non- metal and non-metal

3. Ionic compounds

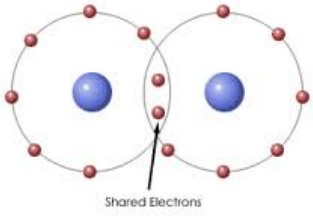
Metal and non-metal

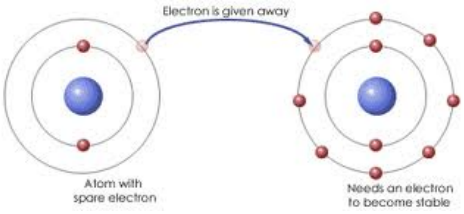
Ionic Vs. Covalent

Covalent bond:

- A non-metal and non-metal compound
- bond between elements = **Sharing** electrons
- Create Molecular compounds (Molecules)

Examples: Water (H_2O), Carbon dioxide (CO_2)



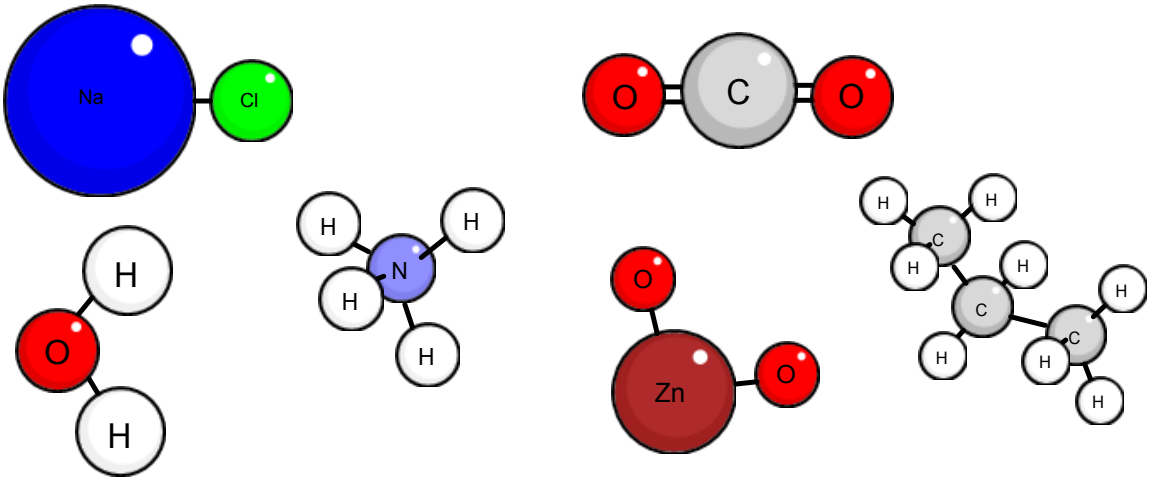


Ionic Bond:

- A metal and a non-metal compound
- bond between elements = **Give or Take** electrons
- Create Ionic compounds

Examples: Sodium chloride (NaCl), Calcium Carbonate ($CaCO_3$)

Ionic or Covalent?



Ionic

Covalent

Ratio of elements

- A compound can have **more than 1** of each element in it

  - H_2O - Has **2 Hydrogen** and **1 Oxygen** atoms, **3** atoms in all

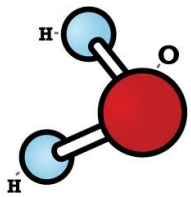
  - CO_2 - Has **1 Carbon** and **2 Oxygen** atoms, **3** in all

  - $CaCO_3$ - Has **1 Calcium**, **1 Carbon** and **3 Oxygen**, **5** in all

*** be careful:**

*elements can have two letters

Co - Cobalt
CO - Carbon and Oxygen



* The prefix only belongs to the element in front of it

CO_2 - 2 oxygen not 2 Carbon

Prefix

How many atoms?

	#Atoms	#Elements
H_2O		
CO_2		
H_2O_2		
CH_3COOH		
Fe		

Naming Ionic Compounds

Ionic compound Rules:

1. Ionic compounds are made of a **metal and non metal**
2. The **metal's** name goes **first**
3. Only the **first** name gets **capitalized**
4. The **last** name always ends in **ide**

Examples: NaCl : Sodium chloride

metal

$CaCl_2$: Calcium chloride

metal

Name the following Ionic compounds:

1. MgO :

2. K_3N:

3. BeF_2:

4. Li_2S:

Naming Covalent/Molecular Compounds

Covalent compound Rules:

1. Covalent compounds are made of 2 **non-metals**
2. Only the **first** name gets **capitalized**
3. The **last** name always ends in **ide**
4. If there is **more than 1** atom of an element we give **prefixes**

Examples: SiO : Silicon oxide

CO_2 : Carbon dioxide

Prefix

Prefixes

- Prefixes are given to Covalent/Molecular compounds:

  - 2 atoms : **di**

    CO_2 : Carbon di<u></u>oxide

  - 3 atoms : **tri**

    F_3P : Tri<u></u>flourine phosphide

  - 4 atoms : **tetra**

    BCl_4 : Boron tetra<u></u>chloride

* **No** prefix given for **just 1** atom

Name the following Covalent compounds:

1. SCl_2:

2. NO_4:

3. PCl_2:

4. SO_3:

Conclusions?

- Element Vs. Compound?
- Name Vs. Formula?
- Metals Vs. Non-metals?
- Ionic Vs. Covalent?

Challenge!

Answer the following questions based on the item below:

NO_3

1. Element or compound?
2. Molecular or covalent?
3. How many atoms all together?
4. What is it's full name?

Chapter worksheet 1

Name: _____ ___/27=___%

Grade 9 Chapter 3 Worksheet 1

1. Put each of the following under either element or compound: (7 marks)

~~NaCl~~	~~K~~	Co
CO	Na	NO
N	C	Be

Element	**Compound**
Example: K	*NaCl*

2. Put each of the following under either metal or non-metal: (7 marks)

~~Na~~	K	~~O~~
C	Be	N
P	Al	H

Metal	**Non-metal**
Example: Na	*O*

Name: _____ ____/27=____%

3. How many elements and atoms are in the following? (3 Marks)

	Number of elements	Total Atoms
1. *Example: NaCl*	*2*	*2*
2. CO_2		
3. $CoCl_2$		
4. $MgCl_2$		

4. Put each of the following under either Covalent or Ionic: (4 marks)

~~NaCl~~	KF	CO_2
Mg_2P	~~SO~~	CaO

Covalent	**Ionic**
Example: SO	*NaCl*

Name: _____ ____/27=____%

5. Fill in the chart by naming the compounds. (6 marks)
   Remember to follow naming rules.

Formula	**Name**
Ionic Naming	
Example: Na_3P	*Sodium phosphate*
Li_3N	
MgF_2	
NaCl	
Molecular Naming	
Example: CO_2	*Carbon dioxide*
NO_2	
PCl_4	
P_2O_3	

Attachments

1206Attendance.xlsx