

Grade 9 Science!

Unit 2 - Chemistry

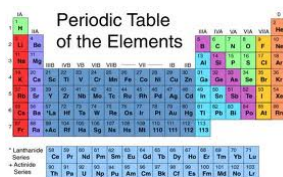
Chapter 3: Elements combine to form compounds

- 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

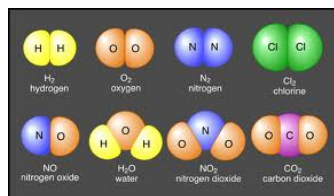
Element: A pure substance containing only **one** type of atom.

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



Periodic Table of the Elements

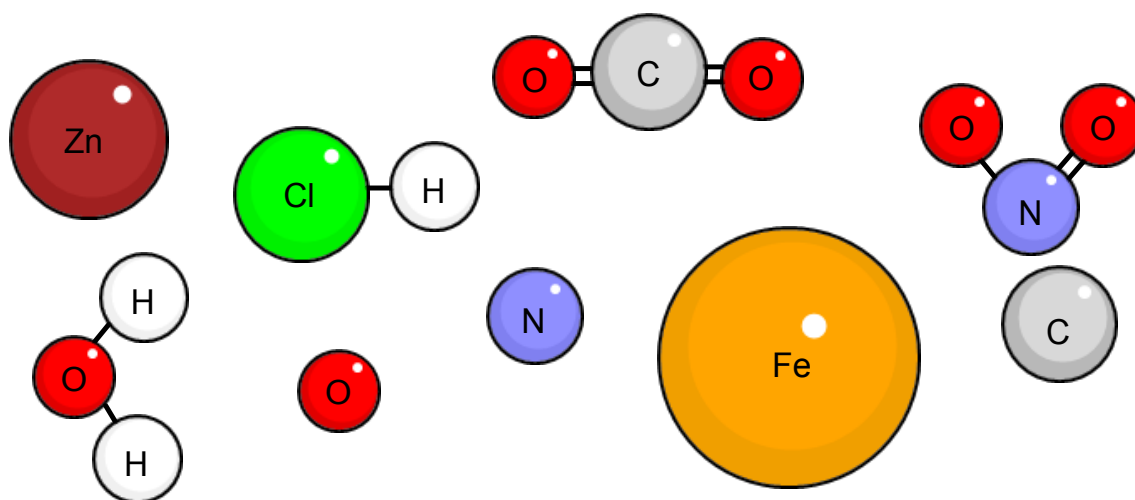
A standard periodic table of elements with color-coded groups. The title "Periodic Table of the Elements" is centered at the top.



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

Examples: H₂O (water), CO₂ (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

Carbon dioxide  CO₂

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

Examples: H₂O, CO₂ , 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

The periodic table is color-coded by groups: Group 1 (green), Group 2 (purple), Groups 13-18 (orange), Groups 3-12 (yellow), and Groups 19-20 (blue). A blue arrow labeled "Stair Case" points to the diagonal line that starts at Hydrogen (H) and goes down to the right, passing through Boron (B), Silicon (Si), and Germanium (Ge).

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
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	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
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	52 Te Tellurium	53 I Iodine	54 Xe Xenon
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	85 At Astatine	86 Rn Radon
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

Non-metals
RIGHT of Stair Case

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
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	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
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	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	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	
87 Fr Francium	88 Ra Radium	89 Ac Actinium	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	

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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

Metals

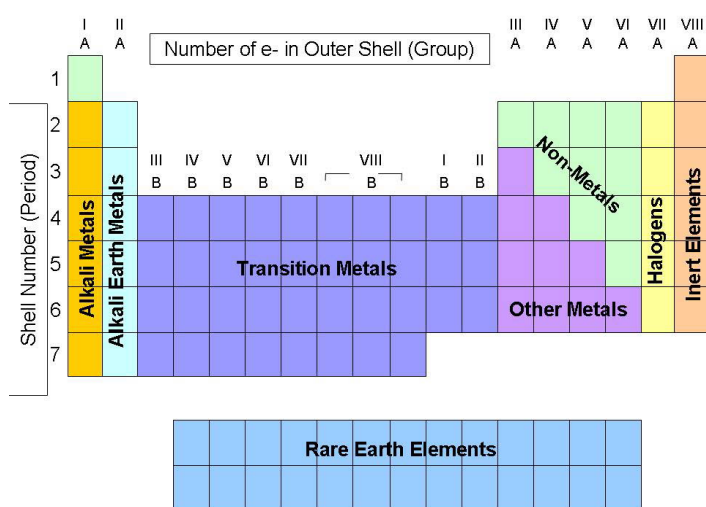
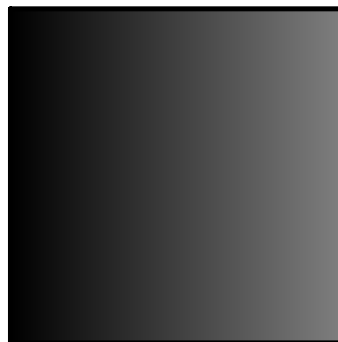
LEFT of Staircase

The periodic table is color-coded and includes the following elements:

1 H	2 He																	10 Ne	
3 Li	4 Be																	10 Ne	
11 Na	12 Mg																	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn		
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt											
58 Ce 59 Pr 60 Nd 61 Pm 62 Sm 63 Eu 64 Gd 65 Tb 66 Dy 67 Ho 68 Er 69 Tm 70 Yb 71 Lu																			
90 Th 91 Pa 92 U 93 Np 94 Pu 95 Am 96 Cm 97 Bk 98 Cf 99 Es 100 Fm 101 Md 102 No 103 Lr																			

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 (H₂O), Carbon dioxide (CO₂)

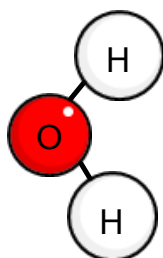
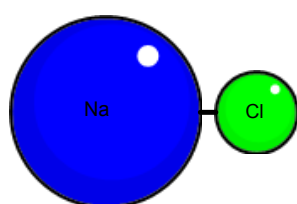


Ionic Bond:

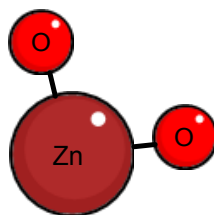
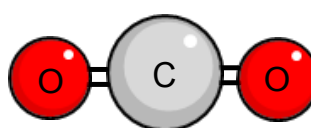
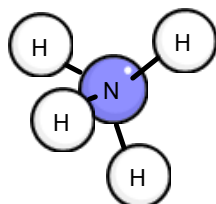
- A metal and a non-metal compound
- bond between elements = **Give or Take** electrons
- Create Ionic compounds

Examples: Sodium chloride (NaCl), Calcium Carbonate (CaCO₃)

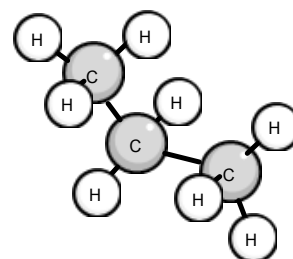
Ionic or Covalent?



Ionic



Covalent



Ratio of elements

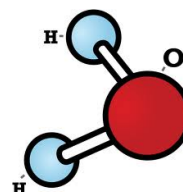
- A compound can have **more than 1** of each element in it
 - H_2O - Has **2 Hydrogen** and **1 Oxygen** atoms, **3** atoms in all
 - CO_2 - Has **1 Carbon** and **2 Oxygen** atoms, **3** in all
 - CaCO_3 - Has **1 Calcium**, **1 Carbon** and **3 Oxygen**, **5** in all

* 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 ₂ O		
CO ₂		
H ₂ O ₂		
CH ₃ COOH		
Fe		

Name the following Ionic compounds:

1. MgO :

2. K₃N:

3. BeF₂:

4. Li₂S:

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

CO₂ : Carbon dioxide
↑
Pre-fix —————

Prefixes

- Prefixes are given to Covalent/Molecular compounds:

- 2 atoms : **di**

CO₂ : Carbon dioxide

- 3 atoms : **tri**

F₃P : Triflourine phosphide

- 4 atoms : **tetra**

BCl₄ : Boron tetrachloride

* **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:



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*Example: K***Compound***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*Example: Na***Non-metal***O*

Name: _____

____/27=____%

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

	<u>Number of elements</u>	<u>Total Atoms</u>
1. <i>Example: NaCl</i>	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

CO₂Mg₂P

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	
<i>Example: Na₃P</i>	<i>Sodium phosphate</i>
Li ₃ N	
MgF ₂	
NaCl	
Molecular Naming	
<i>Example: CO₂</i>	<i>Carbon dioxide</i>
NO ₂	
PCl ₄	
P ₂ O ₃	

Attachments

1206Attendance.xlsx