

Unit 2 - Chemistry

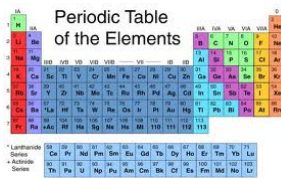
Chapter 3: Elements combine to form compounds

- 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

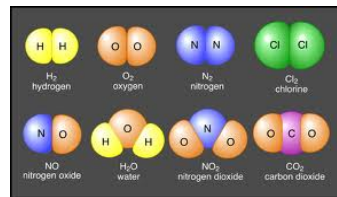
Element: A pure substance containing only **one** type of atom.

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



Periodic Table of the Elements

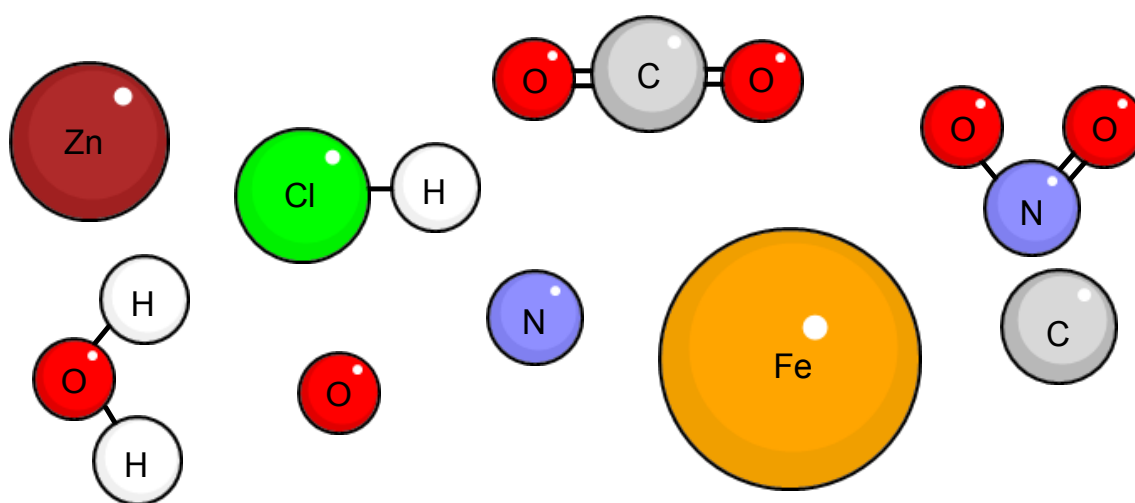
A standard periodic table of elements with color-coded groups. The title "Periodic Table of the Elements" is centered at the top. The table includes element symbols and names, with some elements highlighted in different colors.



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

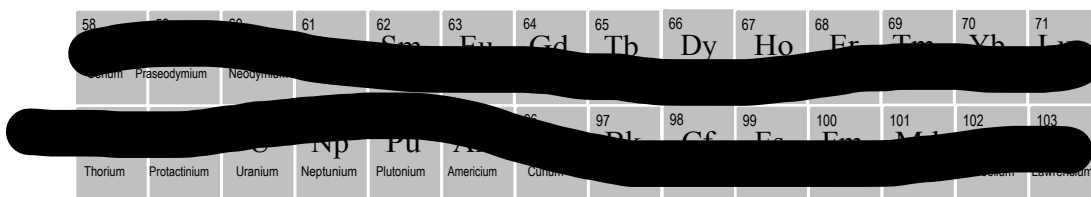
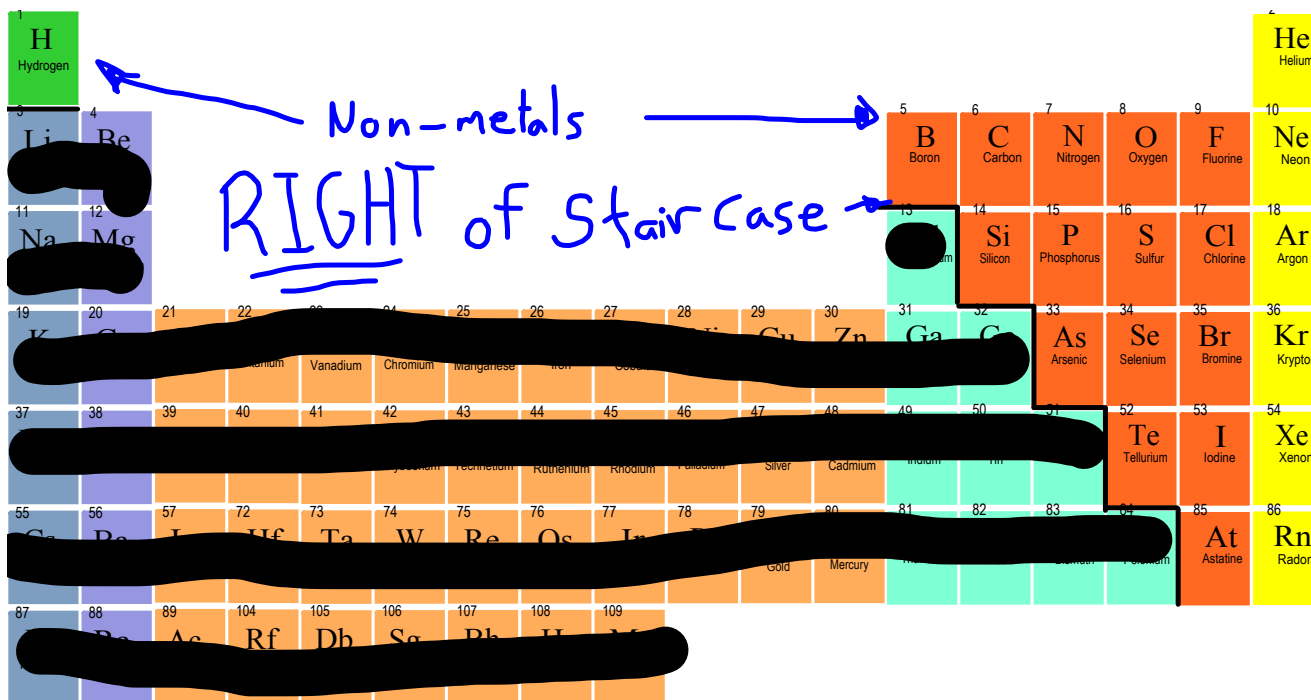


Non-Metal: An element that is a poor conductor of heat and electricity
Found on the **RIGHT** side of the staircase

Examples: Carbon, Hydrogen, Chlorine

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 Aluminum	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



Metals

LEFT of Staircase

The periodic table is color-coded: blue for alkali and alkaline earth metals, orange for transition metals, green for post-transition metals, red for non-metals, and yellow for noble gases. A blue staircase line starts at Boron (5) and descends through Aluminum (13), Gallium (31), Indium (49), and Thallium (81) to Astatine (85). Elements to the left of this line are labeled as metals. Handwritten blue text 'Metals' and 'LEFT of Staircase' with arrows points to the area to the left of the staircase. Several elements are redacted with black bars: Hydrogen (1), Helium (2), Boron (5), Carbon (6), Nitrogen (7), Oxygen (8), Fluorine (9), Neon (10), Silicon (14), Phosphorus (15), Sulfur (16), Chlorine (17), Argon (18), Scandium (21), Titanium (22), Vanadium (23), Chromium (24), Manganese (25), Iron (26), Cobalt (27), Nickel (28), Copper (29), Zinc (30), Germanium (32), Arsenic (33), Selenium (34), Bromine (35), Krypton (36), Strontium (38), Yttrium (39), Zirconium (40), Niobium (41), Molybdenum (42), Technetium (43), Ruthenium (44), Rhodium (45), Palladium (46), Silver (47), Cadmium (48), Tin (50), Antimony (51), Tellurium (52), Iodine (53), Xenon (54), Barium (56), Lanthanum (57), Hafnium (72), Tantalum (73), Tungsten (74), Rhenium (75), Osmium (76), Iridium (77), Platinum (78), Gold (79), Mercury (80), Lead (82), Bismuth (83), Polonium (84), Francium (87), Radium (88), Actinium (89), Rutherfordium (104), Dubnium (105), Seaborgium (106), Bohrium (107), Hassium (108), Meitnerium (109), Cerium (58), Praseodymium (59), Neodymium (60), Promethium (61), Samarium (62), Europium (63), Gadolinium (64), Terbium (65), Dysprosium (66), Holmium (67), Erbium (68), Thulium (69), Ytterbium (70), Lutetium (71), Thallium (81), Lead (82), Bismuth (83), Polonium (84), Astatine (85), and Francium (87).

1	2																	18	19
H	He																	Ar	Kr
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca		
Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon	Sodium	Magnesium	Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon	Potassium	Calcium		
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr		
Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton	Rubidium	Strontium		
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56		
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Cs	Ba		
Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon	Cesium	Barium		
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74		
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W		
Lanthanum	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium	Hafnium	Tantalum	Tungsten		
75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92		
Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Rf	Db	Sg		
Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon	Francium	Radium	Actinium	Rutherfordium	Dubnium	Seaborgium		
104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121		
Rf	Db	Sg	Bh	Hs	Mt	110	111	112	113	114	115	116	117	118	119	120	121		
Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	110	111	112	113	114	115	116	117	118	119	120	121		
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139		
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139		
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139		
122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139		

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	Transition metals										III	IV	V	VI	VII	VIII																												
Period 1												H							He																											
Period 2	Li	Be											B	C	N	O	F	Ne																												
Period 3	Na	Mg											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	<table border="1"> <tr> <td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> </table>															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
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 -

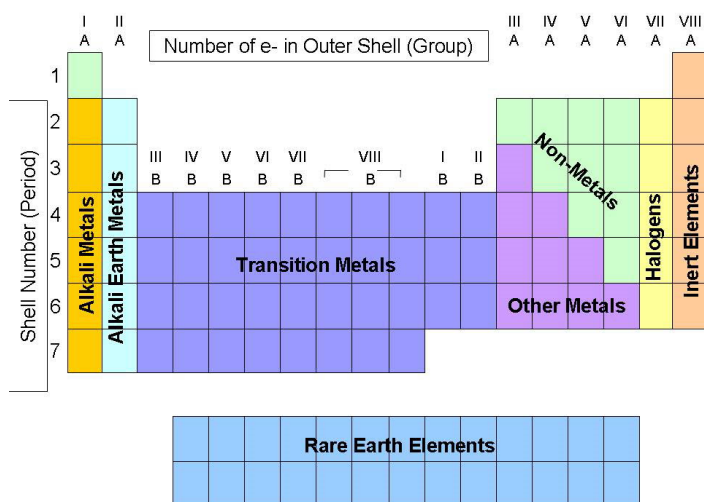
Instructions

Find the Elements

Unlock the Code

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:

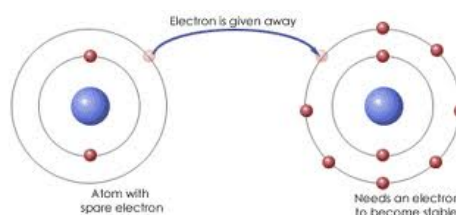
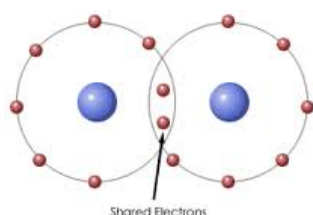
- 3 major groups:
 - (Not doing) ~~1.~~ Metallic compounds
Metal and metal
 2. Covalent compounds
Non- metal and non-metal
 3. Ionic compounds
Metal and non-metal

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)

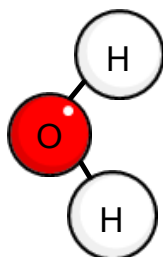
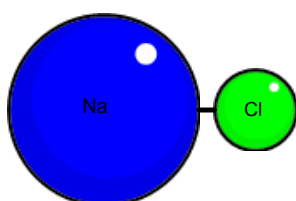


Ionic Bond:

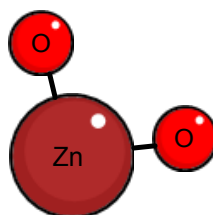
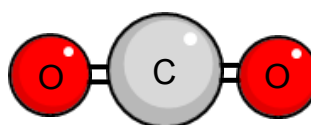
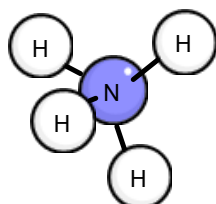
- A metal and a non-metal compound
- bond between elements = **Give or Take** electrons
- Create Ionic compounds

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

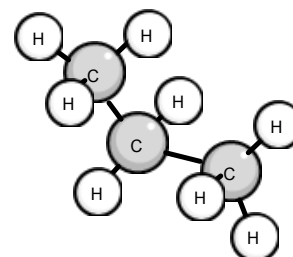
Ionic or Covalent?



Ionic



Covalent



Ratio of elements

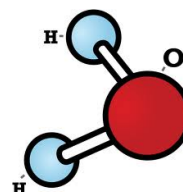
- A compound can have **more than 1** of each element in it
 - H_2O - Has **2 Hydrogen** and **1 Oxygen** atoms, **3** atoms in all
 - CO_2 - Has **1 Carbon** and **2 Oxygen** atoms, **3** in all
 - CaCO_3 - Has **1 Calcium**, **1 Carbon** and **3 Oxygen**, **5** in all

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

CaCl₂ : Calcium chloride

↑
metal

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
↑
Prefix —————

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