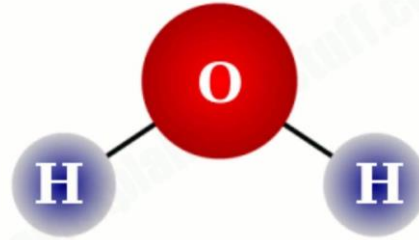




SUBJECT and GRADE	Physical Sciences Grade 10	
TERM 1	Week 2	
TOPIC	MATTER AND MATERIALS: Revise matter and classification	
AIMS OF LESSON	The learners must:  1. Write the names of elements and compounds 2. Write the formulae of compounds using the cation and anion tables	
RESOURCES	<b>Paper based resources</b>	<b>Digital resources</b>
	Use your own textbook to read up on Names and Formulae of Substances. Complete the activities in your textbook based on this section.	
INTRODUCTION	From your previous lesson, you have learnt that:  <b>Elements</b> are pure substances that cannot be broken down (divided) into simpler substances by chemical methods – consisting of one type of atom.  <b>Compounds</b> are substances consisting of two or more different elements – combined chemically.  Pure substances can be classified according to their composition as elements and compounds. Compounds are combination of elements (for example, sodium chloride) and formulae are a combination of symbols of elements (for example, NaCl).	
CONCEPTS AND SKILLS	1. A <b>chemical formula</b> represents:  (1) the elements that the compound is made of. (2) the ratio in which the atoms of different elements have bonded to form a compound.	

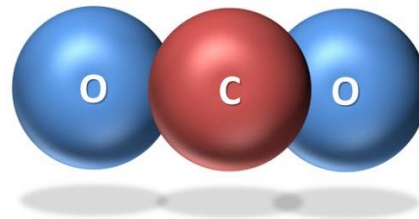
**Example 1:** water (H<sub>2</sub>O)

H<sub>2</sub>O is the formula for water – consists of 2 hydrogen atoms and 1 oxygen atom – it is expressed in the ratio 2:1



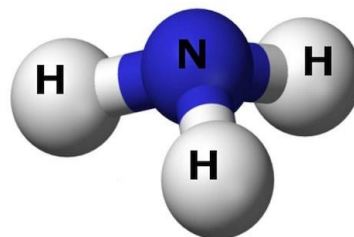
**Example 2:** Carbon dioxide (CO<sub>2</sub>)

CO<sub>2</sub> is the formula for carbon dioxide – consists of 1 carbon atom and 2 oxygen atoms – it is expressed in the ratio 1:2



**Example 3:** Ammonia (NH<sub>3</sub>)

NH<sub>3</sub> is the formula for ammonia – consists of 1 nitrogen atom and 3 hydrogen atoms – it is expressed in the ratio 1:3



2. Naming compounds:

- (1) when there are two elements in the compound, the name ends in **-ide**, e.g. carbon dioxide
- (2) If one of the elements in the compound is a metal (found on the left-hand side of the Periodic Table), the name of the metal comes first, e.g. sodium chloride (NaCl)
- (3) Prefixes – these are words that come in front of the element's name, are used to indicate the ratio in which that element occurs in the compound, e.g. carbon **di**oxide (di means 2 – and there are 2 oxygen atoms in the compound)

PREFIX	MEANING
Mono-	One
Di-	Two
Tri-	Three
Tetra-	Four
Penta-	Five

- (4) A compound can have polyatomic ions or multi atomic ions. When a metal is bonded with an oxygen to form a negative ion, the name will end with **-ate** or **-ite**.  
For example, magnesium sulf**ate** (MgSO<sub>4</sub>) and magnesium sulf**ite** (MgSO<sub>3</sub>).

- (5) Metals of the transition elements can form ions with different positive charges. The positive charge is indicated by a Roman numeral between brackets directly after the name of the metal. For example, copper (II)chloride ( $\text{Cu}^{2+}$  and  $\text{Cl}_2$ ) and copper(III)chloride ( $\text{Cu}^{3+}$  and  $\text{Cl}_3$ )
- (6) Acids usually have hydrogen (H) as first part of the formula. For example, hydrochloric acid (HCl) and sulfuric acid ( $\text{H}_2\text{SO}_4$ )
- (7) The hydroxides have a hydroxide (-OH) at the end. For example, sodium hydroxide (NaOH) and potassium hydroxide (KOH).

3. **IONS** – this is what we call an atom or group atoms with a charge.

**Cations** are positive ions – are formed when atoms donate electrons to other atoms.

For example, when a sodium atom (**Na**) donates an electron to another atom, it becomes a sodium ion (**Na<sup>+</sup>**).

Anions are negative ions – are formed when atoms receive electrons from other atoms.

For example, when a chlorine atom (**Cl**) receives an electron from another atom, it becomes a chlorine ion (**Cl<sup>-</sup>**).

4. Writing formulae:

Compounds	Water	Carbon dioxide	Calcium hydroxide
Charges of ions	$\text{H}_2^+$ and $\text{O}^{2-}$	$\text{C}^{4+}$ and $\text{O}_2^{2-}$	$\text{Ca}^{2+}$ and $\text{OH}_2^-$
Number of ions	2 x H and 1 x O	1 x C and 2 x O	1 x Ca and 2 x OH
Formulae	$\text{H}_2\text{O}$	$\text{CO}_2$	$\text{Ca}(\text{OH})_2$

ACTIVITIES/  
ASSESSMENT

**ACTIVITY:**

1. Name the element and give the number of atoms in each substance.

1.1 KOH

1.2 KMnO<sub>4</sub>

1.3 KClO<sub>3</sub>

2. Write the names of the following compounds.

2.1 HCl

2.2 MgO

2.3 ZnSO<sub>4</sub>

2.4 H<sub>2</sub>CO<sub>3</sub>

2.5 HNO<sub>3</sub>

3. Refer to the examples in the table to complete the other formulae in the table.

	<b>Cl<sup>-</sup></b>	<b>O<sup>2-</sup></b>	<b>SO<sub>4</sub><sup>2-</sup></b>
<b>H<sup>+</sup></b>			
<b>Ca<sup>2+</sup></b>	Ca <sup>2+</sup> Cl <sub>2</sub> <sup>-</sup>		
	CaCl <sub>2</sub>		
<b>Al<sup>3+</sup></b>			Al <sub>2</sub> <sup>3+</sup> (SO <sub>4</sub> <sup>2-</sup> ) <sub>3</sub>
			Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>

	<p>4. Write the formulae of the following substances.</p> <p>4.1 potassium nitrite</p> <p>4.2 sodium iodide</p> <p>4.3 calcium bromide</p> <p>4.4 magnesium hydroxide</p> <p>4.5 iron (II) sulfate</p>
CONSOLIDATION	<ul style="list-style-type: none"> <li>• Remember to study your definitions</li> <li>• Practice the writing of formulae using the correct ions and charges – refer to the cation and anion table in your prescribed textbook</li> <li>• Ensure that you are able to write the names of formulae because it is important</li> <li>• Complete the activities in your textbook – based on this section of Matter and Materials</li> </ul>
VALUES	<p>The formation of new compounds makes it possible for the medical field to develop new cures and vaccines. Accuracy and the correct combinations are important.</p>