

LESSON NOTES

Subject: Basic Science

Year/Level: 10

Week 21

Strand	2: MATTER
Sub Strand	2.1 : INVESTIGATING MATTER
Content Learning Outcome	Investigate the structure of an atom and explain the properties of common elements in relation to their position on the periodic table.

Properties of Common Elements: 1st Twenty

- scientists tried to **arrange the elements in an order which is related to the size of their atoms and also showed regular repeating patterns in their behavior or properties.**
- most successful attempt was published by the Russian, **Dimitri Mendeleev**, in 1869, and still forms the basis of the modern **periodic table**. Mendeleev arranged the elements in a table in **order of increasing relative atomic mass**. He also arranged the table so that elements with **similar properties** were in the same vertical column.

1. Periodic Table

- an arrangement of the elements in order of their atomic numbers.
- Both the physical and chemical properties of an element and its compound are related to the position of the element in the periodic table.
- This relationship has led to the table being divided into **groups** and **periods**.

PERIODIC TABLE OF THE ELEMENTS

Legend:

- Alkali metals
- Alkaline earth metals
- Transition metals
- Post-transition metals
- Metalloids
- Nonmetals
- Halogens
- Noble gases
- Lanthanides
- Actinides

2. Period

- **horizontal row of elements** in the periodic table.
- 7 in all.
- Moving from left to right across a period, the atomic number increases by one from one element to the next.
- All elements have the **same number of electron** shells except the **outer shell has one more electron** than the previous one.

3. Group

- **vertical column of elements** in the periodic table.
- are numbered (except transition metal groups) using Roman numerals **one (I) – eight (VIII)** and some have names.
- Elements in the same group have the **same number of electrons in their outer shell** and so have similar chemical properties.
- Groups with alternative names:
 - ❖ **Group I** – Alkali metals
 - ❖ **Group II** – Alkaline earth metals
 - ❖ **Group VII** – Halogens
 - ❖ **Group VIII** – Noble gases/Inert gases

Mnemonics for Elements



*Hi He Lies Because Boys Can Not Operate Fireplaces New Nations Might
Also Sign Peace Security Clause A King Can.*

H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca.

Physical & Chemical Properties

- Physical property

- *characteristic of a substance that can be observed or measured without changing the chemical nature of the substance.*

- Common physical properties and their characteristics are:

- ❖ Physical state – solid, liquid or gas at room temperature

- ❖ Colour – related to the ability of a substance to reflect visible light.

- ❖ Density – is the concentration of matter in a substance.

- ❖ Melting – temperature at which a substance changes state from solid to liquid

- ❖ Boiling point - temperature at which a substance changes state from liquid to solid

- ❖ Lustre – describes how well the substance shines

- ❖ Electrical conductivity – the ability of a substance to allow an **electric current** to pass through it.

- ❖ Thermal conductivity – the ability of a substance to allow **heat** to pass through it.

- ❖ Malleability – the ability of a substance to be beaten into a sheet

- ❖ Ductility – the ability of a substance to be drawn into wires.

- ❖ Tensile strength – ability to support pressure or load

Chemical properties

- *are those that alter the chemical nature of the substance and enable the product to be recognized as a separate substance.*

- More than three quarter of the 109 elements are **metals**.
- About 19 elements are **non-metals**
- About 7 more are **semi metals** or **metalloids** (elements having both metal and non-metal properties).
- properties of elements are **repeating themselves**.
- pattern of repeating properties matches the **pattern of electrons in their outer (last) shells**.
- elements with the same number of electrons in their outer shell have **similar properties**.
- **Groups** of elements with similar properties are called **blocks**.
- elements in a group resemble each other.
- Sometimes they look alike, and usually they behave in the same way.

ACTIVITY:

Complete the table below for elements with the given atomic number.

Atomic Number	Electron Configuration	Symbol of Element	Group of Periodic Table
3			
12			
10			
1			
17			
19			
20			
15			
9			
5			
18			

...STAY SAFE.. 