

**Subject: Basic science**

**Topic: STATE OF MATTER**

**Class: J S 1**

**Definition of matter:** Matter is anything that has weight and occupies space.

The amount of space which is occupied by matter is referred to as **volume**. The mass of a substance is measured with an instrument called **beam balance**, and recorded in kilogram (kg).

Matter can be divided into two categories on the basis of whether matter has life or not. Those matter which such as plants and animals which have life is called **living matter**, while those without life are called **non-living matters**. Examples of non-living matters are stone, iron, water, soil, metals and gases.

### **COMPONENTS OF MATTER**

Matter is made up of tiny particles called **atoms** or **molecules**. Atoms and molecules are constantly in motion. Atoms are the smallest unit of matter that can take part in a **chemical reaction**. Whenever atoms are joined together, molecules are formed.

### **STATES OF MATTER**

There are three states of matter namely:

- i. Solid
- ii. Liquid
- iii. Gas

#### **Solid**

##### **Characteristics of solids**

1. Solids have definite geometrical shape.
2. The shape may be regular (triangle, square, cube etc) or irregular.
3. The atoms or molecules of solids are tightly packed together and are arranged in a regular order or pattern.
4. The distance between two atoms or molecule in a solid is very short.
5. The atoms are held together by strong attractive forces which do not permit free movement of the atoms resulting to the hardness of solids.

#### **Liquid:**

##### **Characteristics of liquids**

1. Liquids have fixed size and no definite shape and so assume the shape of the vessel that contains them.

2. The distance between the particles (atoms and molecules) of liquids is longer than those observed in solids.
3. The forces of attraction holding the particles of a liquid together are not as strong as that of solids.

**Gas:**

#### **Characteristics of gases**

1. Gases do not have fixed shape and fixed size but they occupy the shape of their container.
2. The particles that make up gas are very far apart.
3. The attractive forces holding gases are very weak, much weaker than those observed in solids and liquids.
4. The molecules move freely.

### **CHANGE OF STATE**

When heat is applied to matter, the particles absorb the heat- energy, they move faster and finally change from one form or state to another.

1. When solid is heated, the particles break down the strong binding force between them, movement of the particles increase and eventually the solid changes to liquid.
2. On further application of heat to the liquid, the force of attraction binding the molecules are further broken down thereby allowing the particles to move freely.
3. If the liquid is heated to its boiling point it will change to the gaseous state
4. The change of state from solid to liquid is called **melting**, while that from liquid to gas is known as **vaporization**.
5. In some cases, some liquids like **camphor and iodine** which when heated changes directly from solid to gaseous state. This process or phenomenon is called **sublimation**.
6. Water can exist in three (3) states namely, ice-block--- (melts)---→ water----- (boils)---→ vapour or steam and this is referred to as **gaseous state of matter**.
7. On cooling, the reverse process of change of state occurs.
8. When gases are sufficiently cooled, they change to the liquid state. This is called **condensation**.
9. Liquids can also turn to solids when temperature is lowered, and this is referred to as **freezing**.

### **PARTICULATE THEORY OF MATTER**

- (A) **Boiling:** when heat is applied to liquids, the particles become agitated and finally escape. They all exert a pressure called **vapour pressure**. When this vapour pressure equals the atmospheric
- (B) **Evaporation:** evaporation could be defined as process by which liquids **change** into vapour. eg, methylated spirit.

- C. Diffusion:** Diffusion Is the movement of gaseous or liquid molecules from the region of higher concentration to a region of lower concentration Eg, when a rat dies at one hidden corner of a room, the inhabitants soon become disturbed with the unpleasant rotten smell which slowly spreads to all parts the room.

#### **HOMEWORK**

1. Explain the meaning of the following with specific examples
  - a. Melting
  - b. Conduction
  - c. Convection
2. What do you understand by the boiling point of a liquid? What factors affect this point?