

CHAPTER – 1

MATTER IN OUR SURROUNDINGS

All matters in the universe exist in three states. There are two ways of classification of matter.

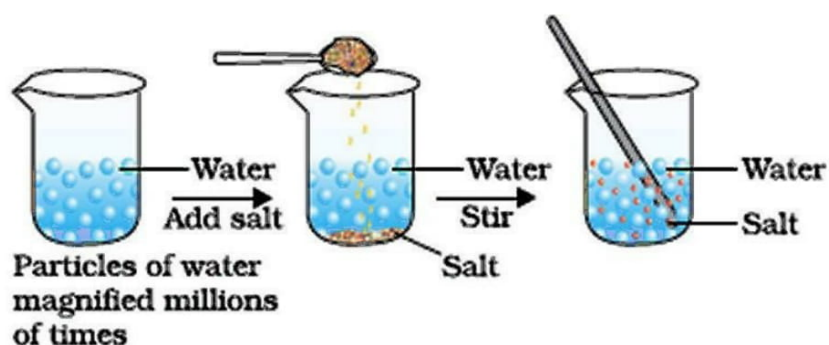
1. According to physical state as solid, liquid or gas.
2. According to its composition as element, compound or mixture.

CHARACTERISTICS OF PARTICLES OF MATTER

PARTICLES OF MATTER HAVE SPACE BETWEEN THEM- when we make tea, coffee or lemonade (nimbu paani), particles of one type of matter get into the spaces between particles of the other. This shows that there is enough space between particles of matter. Similarly particles of sugar, salt, Dettol, or potassium permanganate get evenly distributed in water.

PARTICLES OF MATTER ARE CONTINUOUSLY MOVING- Particles of matter are continuously moving, that is, they possess what we call the kinetic energy. As the temperature rises, particles move faster. So, we can say that with increase in temperature the kinetic energy of the particles also increases.

PARTICLES OF MATTER ATTRACT EACH OTHER- Particles of matter have force acting between them. This force keeps the particles together. The strength of this force of attraction varies from one kind of matter to another.



INTEXT QUESTIONS PAGE NO. 3

Q1. Which of the following are matter?

Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume.

Answer: Chair, air, smell, almonds, cold-drink and smell of perfume are matter because they have some weight and occupy space.

Q2. Give reasons for the following observation:

The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food you have to go close.

Answer: Hot food evaporates easily. Its vapours diffuse between the air molecules and reach within a short time to a distant place. But the case is different with the cold food because it remains in solid form and does not mix with air molecules, so we have to go close to smell it.

Q3. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?

Answer: The phenomena of cutting the water by the diver show that matter has space between its particles.

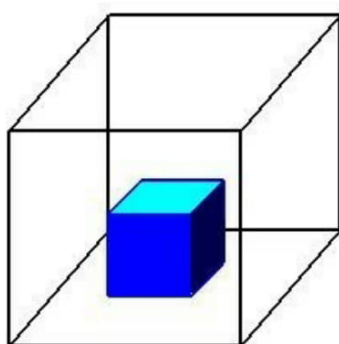
Q4. What are the characteristics of the particles of matter?

Answer: Characteristics of particles of matter :

1. Particles of matter have space between them.
2. Particles of matter are continuously moving.
3. Particles of matter have an attraction force between them.
4. Particles of matter are very small in size.

STATES OF MATTER

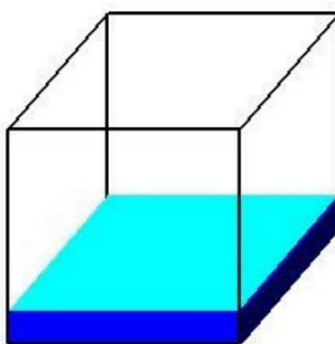
1. **THE SOLID STATE-** all solids have a definite shape, distinct boundaries and fixed volumes, that is, have negligible compressibility. Solids have a tendency to maintain their shape when subjected to outside force. Solids may break under force but it is difficult to change their shape, so they are rigid.
2. **THE LIQUID STATE-** Liquids have no fixed shape but have a fixed volume. They take up the shape of the container in which they are kept. Liquids flow and change shape, so they are not rigid but can be called fluid. The rate of diffusion of liquids is higher than that of solids. This is due to the fact that in the liquid state, particles move freely and have greater space between each other as compared to particles in the solid state.
3. **THE GASEOUS STATE-** Gases are highly compressible as compared to solids and liquids. The liquefied petroleum gas (LPG) cylinder that we get in our home for cooking or the oxygen supplied to hospitals in cylinders is compressed gas. In the gaseous state, the particles move about randomly at high speed. Due to this random movement, the particles hit each other and also the walls of the container.



Solid

Holds Shape

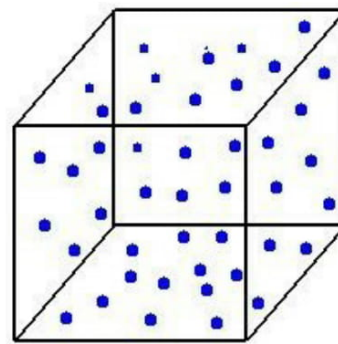
Fixed Volume



Liquid

**Shape of Container
Free Surface**

Fixed Volume



Gas

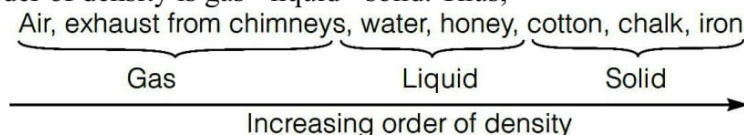
Shape of Container

Volume of Container

INTEXT QUESTIONS PAGE NO. 6

Q1. The mass per unit volume of a substance is called density. (density = mass/volume). Arrange the following in order of increasing density – air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Answer: The order of density is gas < liquid < solid. Thus,



Q2. (a) Tabulate the differences in the characteristics of states of matter.

Answer:

(a) The differences in the characteristics of states of matter are given in the following table.

S. No.	Solids	Liquids	Gases
1	Definite shape and volume.	No definite shape. Liquids attain the shape of the vessel in which they are kept.	Gases have neither a definite shape nor a definite volume.
2	Incompressible	Compressible to a small extent.	Highly compressible
3	There is little space between the particles of a solid.	These particles have a greater space between them.	The space between gas particles is the greatest.
4	These particles attract each other very strongly.	The force of attraction between liquid particles is less than solid particles.	The force of attraction is least between gaseous particles.
5	Particles of solid cannot move freely.	These particles move freely.	Gaseous particles are in a continuous, random motion.

(b) Comment upon the following: rigidity, compressibility, fluidity, filling a gas container, shape, kinetic energy and density.

Answer:

- (i) **Rigidity** The property due to which an object retains its shape and size is known as rigidity. Solids are rigid whereas liquids and gases are not.
- (ii) **Compressibility** Compressibility is the property due to which a substance can be compressed, *i.e.*, its volume can be decreased. Gases are compressible whereas solids and liquids are not.
- (iii) **Fluidity** The property due to which a substance tends to flow is called fluidity. Gases and liquids are fluids, solids are not.
- (iv) **Filling a gas container** A gas can be filled in a gas container by compressing it under high pressure. The property of compressibility (of gases) helps them in this regard.
- (v) **Shape** The property of having a definite geometry is called shape of a particular substance. Solids have a definite shape whereas gases and liquids do not have.
- (vi) **Kinetic energy** The energy possessed by an object or by the molecules of an object due to its state of motion is called kinetic energy. Molecules of gases possess highest kinetic energy. Increasing the temperature also increases the kinetic energy of a substance (or its molecules).