

Book Exercise

A. Objective Questions

1. True / False

(a) The molecules of each substance are ~~identical~~ identical. False

(b) The inter-molecular forces are effective at all distances between the two molecules. False

- (c) The molecules in a substance are in random motion. True
- (d) In a gas, the molecules can move anywhere in space. True
- (e) Liquids are less viscous than ~~gas~~ gases. False

2. Fill in the blanks

- (a) All the molecules of a substance are ~~not~~ identical.
- (b) The inter-molecular spacing is least in solids more in liquids and still more in gases.
- (c) The molecular motion in liquid and gas is in zig-zag path.
- (d) In a solid, the molecules vibrate on either sides of their mean positions but they remain at their fixed positions.
- (e) The inter-molecular forces are the weakest in gases.
- (f) A solid exerts pressure downwards on its base.
- (g) Gases are least dense.
- (h) Solids are most rigid.

3. MCQ

(a) The diameter of a molecule is approximately
(i) 1 cm (ii) 10 cm (iii) 10^{-10} m (iv) 1 m

(b) The inter-molecular forces are strongest in

- (i) solids (ii) liquids (iii) gases (iv) both (i) and (ii)

(c) The molecules
(i) in solid, liquid and gas, move freely anywhere.

(ii) in a solid, move freely within its boundary.

(iii) in a liquid, move within its boundary.

(iv) in a gas, move only within its boundary.

(d) Solids are

(i) more dense (ii) less dense (iii) least dense

(iv) highly compressible

(e) The inter-molecular forces in liquids are

(i) as strong as in solids

(ii) stronger than in solids

(iii) weaker than in solids

(iv) weaker than in gases

4. Matching

Column A

Column B

- (a) A molecule is composed of - (iii) atoms.
- (b) Ice, water and water vapour - (iv) are the three states of water.
- (c) An atom - (i) does not exist free in nature.
- (d) Gases - (v) ~~or~~ occupy space.
- (e) The molecules of a solid - (ii) can vibrate only up to about 10^{-10} m from their mean positions.

B. Q/A

1. Define matter. What is its composition?

Ans:- Matter is defined as anything which occupies space and has mass. It can be perceived by our sense of smell, touch, sight, hearing and taste.
Matter is composed of tiny particles known as atoms.

2. The three ~~state~~ states of matter are solids, liquids and gases.

Solids - A solid has a definite shape and definite volume.

Example - wood, stone, iron, ice etc.

Liquids - A liquid has a definite volume but not definite shape.

Example - water, juice, milk, oil etc.

Gases - A gas neither has definite shape nor a definite volume.

Example - air, hydrogen, oxygen, water vapour etc.

3. The smallest unit of matter which can exist independently is called molecule.

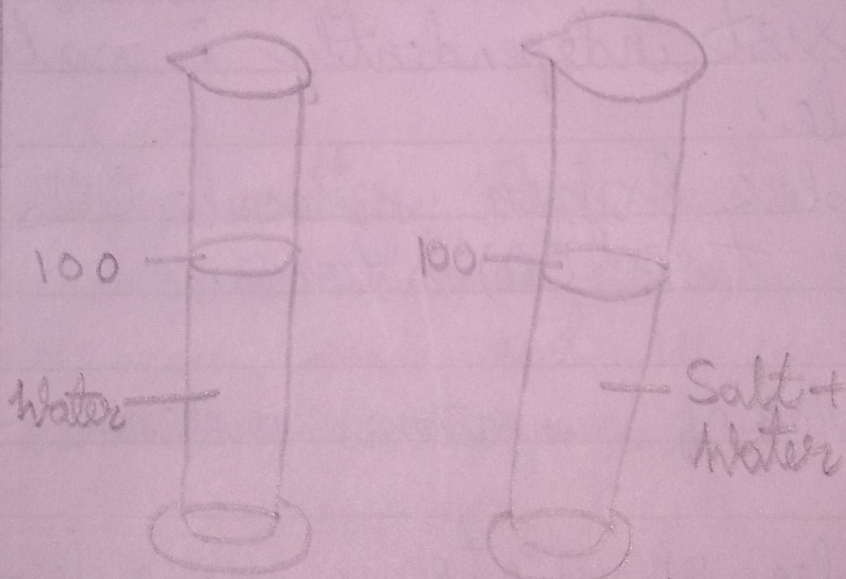
Example: Oxygen molecule (O_2) made up of two (O) atoms.

4. Examples of monoatomic molecules - Argon, Neon.

Examples of diatomic molecules - Oxygen, Hydrogen.

5. Intermolecular space - The space between and two consecutive molecules of a substance is called intermolecular space.

6. Take 100 ml of water in a measuring ~~eye~~ cylinder. Add 20 gram of ~~salt~~ salt in water gently and stir it well so as to dissolve the salt well in water. It is noticed that the level of water does not change. It shows that the particles of salt occupy spaces between the particles of water.



(a) Water alone

(b) salt added to water

Particles of salt occupy the spaces between the particles of water.

between any substance

measuring salt well so water of water the between

7. The force of attraction between the molecules of a substance is called inter-molecular force of attraction.

8. The force of attraction between the molecules of similar kind is called force of cohesion.

Example: The forces between water molecules.

This force of attraction cohesion kept the molecules of the substance bind together.

The force of attraction between different types of molecules is called force of adhesion.

Example: When a glass filled with water is emptied, some particles remain stuck to the glass due to the adhesion between water molecules and glass.

9. Three characteristics of molecules of matter which determine its solid, liquid and gaseous state are -

- (i) inter-molecular space.
- (ii) force of attraction between the molecules.

(iii) movement of molecules.

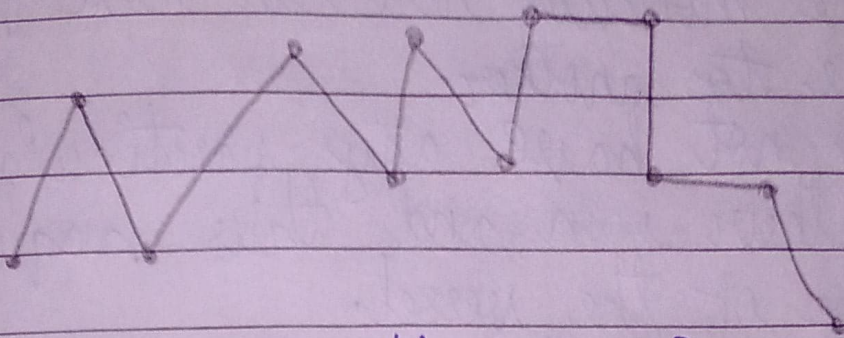
10.	Solids	Liquids	Gases
(i) Size	They have definite size.	Indefinite.	Indefinite.
(ii) Shape	They have definite shape.	Indefinite.	Indefinite.
(iii) Density	Highly dense.	Less denser than solids.	Less denser than liquids and solids.

X11. The particles in a substance are in motion. What type of path do they

11. The particles in a substance are not at rest (in motion), and they move randomly in all possible directions in a zig-zag path.

12. Take a beaker. Fill it partly with water. Add some lycopodium powder in the beaker with a glass rod. Take out few drops of this suspension on a

glass plate. Place the plate on the table and illuminate it with a table lamp. Observe the glass plate through a microscope. It is found that the fine particles of lycopodium powder move rapidly in a random manner and their path is zig zag as so which is shown in the figure below.



Zig zag path of fine particles of lycopodium powder.

13. Solids :

1. The molecules here are very tightly packed having negligible or very less intermolecular space.
2. They have the strongest intermolecular force of attraction.
3. The molecules have very small vibration about their mean position i.e. small amplitude.

4. They have a definite shape and volume.
5. They are generally hard and rigid.
6. They are good conductors of heat.

Liquids:

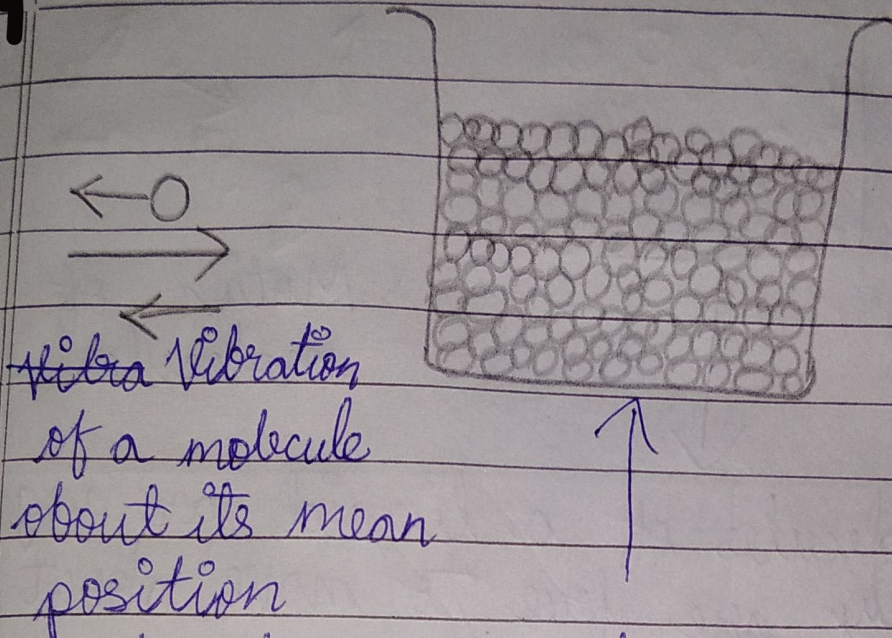
1. Molecules are less tightly packed.
2. The intermolecular force of attraction is less than that of solids.
3. The molecules here can move from one place to another.
4. Do not have any particular shape of their own and thus acquire the shape of the vessel.
5. A particular quantity of a liquid has a definite volume at a given temperature.

Gases:

1. The force of attraction between the molecules is the least.
2. The intermolecular space is the largest.
3. Neither have a definite shape nor a definite volume.
4. The molecules move independently.

5. Worst conductors of heat.

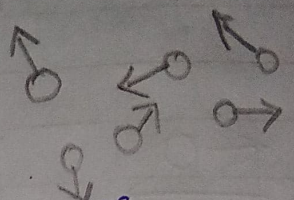
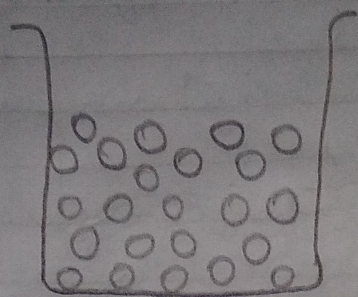
14.



Molecules of a solid arranged closely and in a definite manner, not free to move about.

Here the molecules are very tightly packed that there is no or very less intermolecular space and there is high intermolecular force of attraction (force of cohesion). The molecules do not move about their mean position and thus solids have a definite shape and volume.

15.



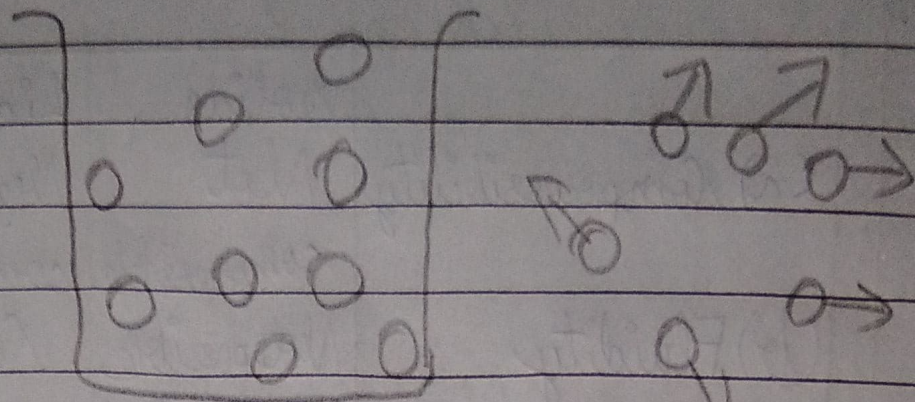
Motion of
molecules

Molecules of a liquid arranged less closely are free to move about, within the liquid.

Here the molecules are less tightly packed as compared to ~~so~~ solids and also there is lesser force of intermolecular attraction. The ~~interm~~ intermolecular distance is greater than that in the solids. Thus, they do not have a definite shape but acquire the shape of the vessel in which they are contained but have a definite volume at a given temperature.

16.

16.



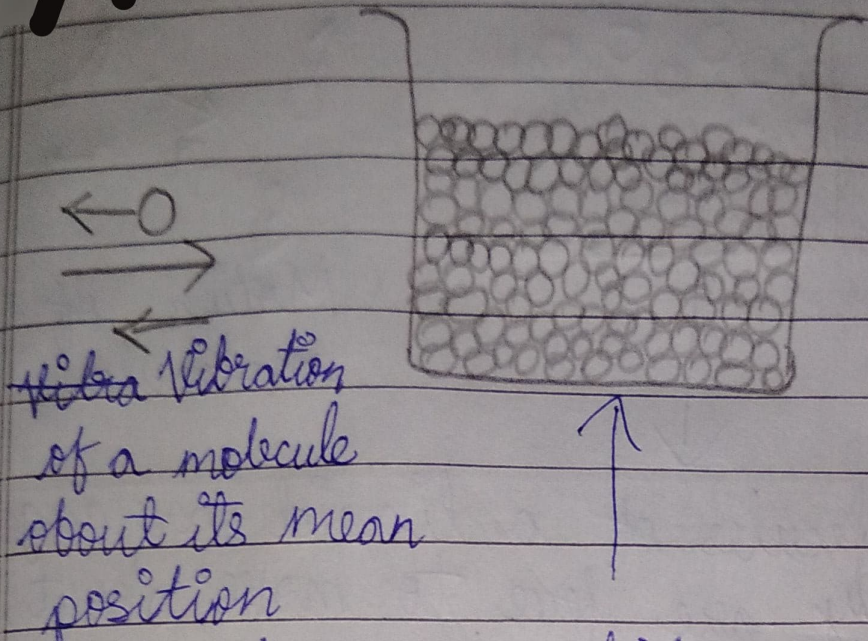
Random motions
of molecules

Molecules of a gas are far apart and are free to move about.

Here the molecules are far apart from each other i.e. have the greatest intermolecular distance which result into the weakest intermolecular forces of attraction. The molecules are not bound by any strong force move about freely and thus gases do not have a definite shape and also do not have any definite volume.

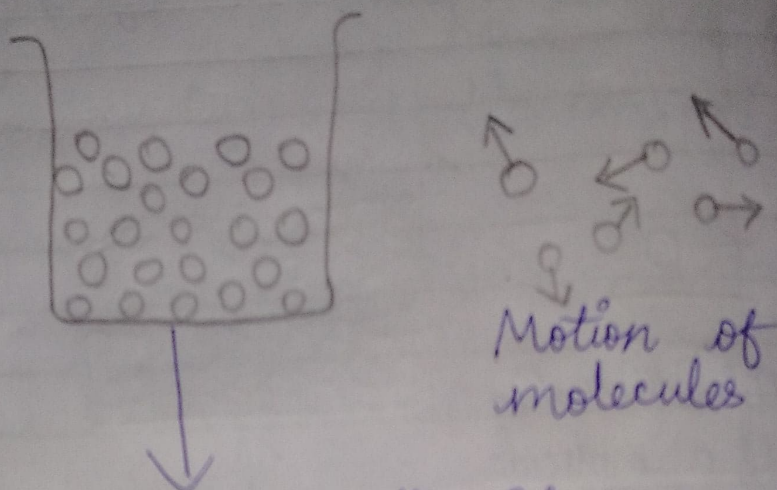
5. Worst conductors of heat.

17.



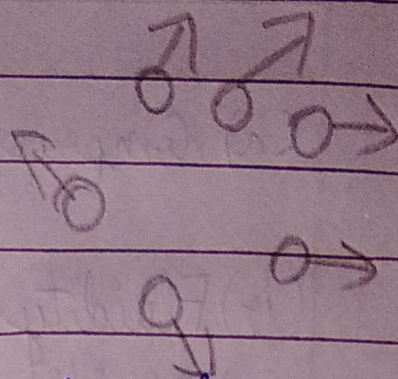
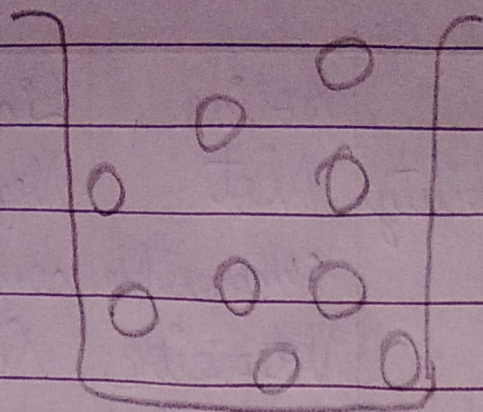
Molecules of a solid arranged closely and in a definite manner, not free to move about.

Here the molecules are very tightly packed that there is no or very less intermolecular space and there is high intermolecular force of attraction (force of cohesion). The molecules do not move about their mean position and thus solids have a definite shape and volume.



Molecules of a liquid arranged less closely are free to move about, within the liquid.

Here the molecules are less tightly packed as compared to ~~so~~ solids and also there is lesser force of intermolecular attraction. The ~~intermolecular~~ intermolecular distance is greater than that in the solids. Thus, they do not have a definite shape but acquire the shape of the vessel in which they are contained but have a definite volume at a given temperature.



Random motions
of molecules

Molecules of a gas are far apart and are free to move about.

Here the molecules are far apart from each other i.e. have the greatest intermolecular distance which result into the weakest intermolecular forces of attraction. The molecules as are not bound by any strong force move about freely and thus gases do not have a definite shape and also do not have any definite volume.

18.

	Solids	Liquids	Gases
(a) Compressibility	Not compressible	Negligibly compressible	Highly compressible
(b) Fluidity	Not possible	Can flow	Can flow
(c) Rigidity	Highly rigid	Less rigid	Not rigid
(d) expansion on heating	Low	More than solids	More than liquids

vaporisation
Liquid \rightarrow Gas

20. (a) Solid
(b) Liquid

19.

The change in state of matter of a substance from solid to liquid or from liquid to gas is brought by imparting heat energy to it at a constant temperature.

(a) The process of change of a substance from solid state into its liquid state on absorption of heat at a ~~particular~~ particular temperature, called the melting point, is called ~~not~~ melting or fusion i.e. solid $\xrightarrow[\text{Heat absorption}]{\text{Melting}}$ Liquid.

(b) The process of change of a substance from a liquid state to its gaseous state at a particular temperature, called the ~~boiling~~ boiling point, is called boiling or

vaporisation, i.e.

Liquid $\xrightarrow[\text{Heat absorbed}]{\text{Boiling}}$ Gas.

20. (a) Solid $\xrightarrow[\text{Heat absorption}]{\text{Melting}}$ Liquid.

(b) Liquid $\xrightarrow[\text{Heat absorption}]{\text{Boiling}}$ Gas.