

B. Short/Long answer questions — (Page-12)

Q.1. Define matter. What is its composition?

$\Rightarrow$ Matter is defined as anything which occupies space and has mass.

Matter is composed of a large number of molecules.

Q.2. Name the three states of matter.

$\Rightarrow$ The three states of matter are (i) solid, (ii) liquid and (iii) gas.

Q.3. What is a molecule?

$\Rightarrow$ A molecule is the smallest particle which can exist freely in nature by itself and it retains the properties of the substance.

Q.4. What is the approximate size of a molecule?

$\Rightarrow$ The approximate size of a molecule is 10^{-10} m.

Q.5. One litre of water has 6.02×10^{26} molecules. Estimate the size of a molecule.

$\Rightarrow$ The size of a particle (or molecule) of matter is very small. 1 litre ($= 10^{-3} \text{ m}^3$) of water has 6.02×10^{26} molecules.

So, the volume of a particle of water $= 10^{-3} \text{ m}^3$

$$= \frac{10^{-3} \text{ m}^3}{6.02 \times 10^{26}}$$

$$= 1.6 \times 10^{-30} \text{ m}^3$$

$$\text{Now, } \frac{4}{3} \pi r^3 = 1.6 \times 10^{-30} \text{ m}^3$$

$$\therefore r = 0.725 \times 10^{-10} \text{ m}$$

$$\therefore \text{Diameter} = (2 \times r) = (2 \times 0.725 \times 10^{-10}) \text{ m}$$

$$= 1.45 \times 10^{-10} \text{ m}$$

$\therefore$ The size of a molecule $= 1.45 \times 10^{-10} \text{ m}$.

(1)

Q.6. What do you mean by inter-molecular spacing?
⇒ The spacing between particles of a matter is called intermolecular spacing.

Q.7. Describe a simple experiment to illustrate the existence of inter-molecular spacing.

⇒ We take 100 ml of water in a measuring cylinder. Add 20 gram of 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 have occupied the spaces between the particles of water.

Q.8. What do you mean by inter-molecular forces?
⇒ The force of attraction between the constituent particles is called the intermolecular force of attraction.

Q.9. What are the forces of cohesion and adhesion?
⇒ The force of attraction between the molecules of the same substance is called the force of cohesion.

The force of attraction between the molecules of two different substances is called the force of adhesion.

*Q.10. State three characteristics of molecules of matter which determine its solid, liquid and gaseous state.

⇒ 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.

Q.12. How do solids, liquids and gases differ in their following properties:
(a) size (b) shape (c) density.

⇒	Solids	Liquids	Gases
(a) Size	Definite size	No definite size	No definite size.
(b) Shape	- Have a definite shape	- No definite shape	- No definite shape.
(c) Density	- Highly dense	- less than the solids	- least dense.

Q.13. The molecules in a substance are in motion. What type of path do they follow?

⇒ The molecules in a substance are not at rest and they move randomly in all possible directions in a zigzag path.

Q.14. Describe a simple experiment to illustrate that molecules are not at rest, but they constant move.

⇒ Page-5. Activity-1 (Fig. 1.2)

Q.15. Write down five general properties of solids, liquids and gases.

⇒ Five general properties of solids are—

(i) A solid can not be compressed.

(ii) A solid can not flow.

(iii) A solid is highly dense.

(iv) A solid is highly dense.

(v) A solid has a definite shape and size

(vi) A solid has strong intermolecular force of attraction.

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Five general properties of liquids —

- (i) Liquids are almost incompressible.
- (ii) Liquids can flow.
- (iii) Liquids are less rigid.
- (iv) The inter-molecular force of attraction is weak in a liquid than in a solid.
- (v) The molecules in a liquid are less closely packed.

Five general properties of gases —

- (i) Gases are highly compressible.
- (ii) Gases are not rigid.
- (iii) A gas has no free surface.
- (iv) In a gas, there is no force of attraction amongst its molecules.
- (v) In a gas, the molecules are least closely packed.

Q.16. Give the molecular model for a solid and use it to explain why a solid has a definite volume and definite shape.

⇒ Molecular model of solid state —

(i) Strong force of attraction between the molecules of a solid.

(ii) Inter-molecular space is negligible.

(iii) The molecules of a solid are arranged in a definite manner
2nd part:—

The molecules in a solid are closely packed, intermolecular force is very strong; the molecules are arranged in definite manner and the molecules vibrate on either side of their mean positions but they do not leave their positions. Therefore solids has a definite volume and definite shape.

Q.17. Describe the molecular model for a liquid. How does it explain that a liquid has no definite shape but has a definite volume?

⇒ Molecular model for liquids —

(i) The inter-molecular force of attraction is weak in a liquid than in a solid.

(ii) They are loosely packed and are not fixed.

(iii) The inter-molecular space in a liquid is greater than in a solid. and

(iv) the motion of molecules in a liquid is irregular and random within the boundary.

2nd part — The attractive force between the molecules of a liquid is not as strong as it is in solids, so they are loosely packed and are not fixed. The molecules can move over one another, within the boundary of the liquid. Thus, a liquid has a definite volume, but no definite shape.

Q.18. A gas has neither a definite volume nor a definite shape. Describe the molecular model to explain it.

⇒ In a gas, the molecules are least closely packed. There is no force of attraction amongst its molecules. The molecules are free to move in a random manner in zig-zag paths everywhere.

A gas exerts pressure on the wall of its container. Thus, a gas has neither a definite volume nor a definite shape.

Q.19. Distinguish between the three states of matter — solid, liquid and gas on the basis of their molecular models.

⇒

Solids	Liquids	Gases
(i) A solid has a definite shape and a definite size.	(i) A liquid has a definite volume, but not a definite shape.	(i) A gas has neither a definite volume nor a definite shape.
(ii) The molecules in a solid are closely packed.	(ii) The molecules in a liquid are loosely packed.	(ii) The molecules in a gas are wide apart.
(iii) The inter-molecular forces are very strong.	(iii) The inter-molecular forces are less strong.	(iii) The inter-molecular forces are weak.

Q.20. Distinguish between solids, liquids and gases on the basis of their following properties:

=>

	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.

Q.21. What do you mean by change of state of matter? Explain:

(a) the change of a solid into a liquid at a constant temperature, and

(b) the change of liquid into a gas at a constant temperature.

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

(a) The heat energy absorbed by the substance increases the amplitude of vibrations of the molecules of the solid and a stage is reached at the melting point when the molecules acquire sufficient energy to overcome the force of attraction between them and they become free to move. The solid thus changes into a liquid.

(b) Solid $\xrightarrow[\text{Heat absorbed}]{\text{Melting}}$ Liquid.

(b) The heat energy absorbed by a substance in liquid state increases the energy of its molecules due to which they begin to move randomly. Thus a liquid changes into a gas.

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

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B. Short/Long answer questions—

Q. 4. Mention one example each of a monoatomic and a diatomic molecule.

⇒ Example of monoatomic molecule—
Argon

Example of diatomic molecule—
hydrogen molecule.

Q. 20. Complete the following :

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

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

Ch.- Matter (Inside Questions)

Q.1. Differentiate between —

- (a) Fusion & Vaporisation.
- (b) Diatomic & polyatomic molecule.

Q.2. Define nanoparticle.

Q.3. Explain the fourth state of matter.

Q.4. State the four characteristics of molecule.

Q.5. Give reason: —

(a) Gases can be easily compressed.

(b) Although rubber is elastic, but it is treated as a solid.

(c) Fine dust particles in the atmosphere appear to dance zig-zag manner.

(d) Some substance can be easily broken in powder while some others can only be changed into small crystals.

(e) It is easy to move the hand through water but difficult to move in glycerine.

(f) Motion of a body in air is easier than in water.

(g) Perfume sprayed in one corner of the room spreads through out the room.

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Note :— Exclude the following two questions.

Q.4. What is the approximate size of the molecule.

Q.5. One litre of water has 6.02×10^{26} molecules. Estimate the size of the molecule.