

TEST YOURSELF

A. Objective Questions.

1) Write true or false for each statement :

- a) The molecules of each substance are identical. **F**
- b) The intermolecular forces are effective at all distance between the two molecules. **F**
- c) The molecules in a substance are in random motion. **T**
- d) In a gas, the molecules can move anywhere in space. **T**
- e) Liquids are less viscous than gases. **F**

2. Fill in the blanks :

- a) All the molecules of a substance are identical.
- b) The inter-molecular spacing is least in solids, more in liquids and still more in gases.

c. The molecular motion in liquids and ~~zigzag~~ gas is in zig-zag path.

d) In a solid, the molecules vibrate on either side but they remain at their fixed position.

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. Select the correct alternative:

a) The diameter of a molecule is approximately

Ans-iii) 10^{-10} m

b) The intermolecular forces are strongest in,

i) Solids.

6) The molecules

are free to move within its boundary.

are

more dense

The inter molecular forces in liquids are.

weaker than in solids.

4) match the following columns:

Column A

Column B

a) A molecule is composed of

b) Ice water and water vapour

c) An atom

d) Gases

e) The molecules of solid

i) does not exist free in nature.

ii) can vibrate only up to about 10^{-10} m from their mean position.

iii) atoms.

iv) are the three states of water.

v) occupy space

B. Short/Long answer questions.

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. Name the three states of matter.

Ans- There are three states of matter: solids, liquids and gases.

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

Example - wood, stone, iron, ice etc.

Liquid - A liquid has a defined 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. What is a molecule?

Ans. The smallest unit of matter which can exist independently is called molecule.
Example: Oxygen molecule (O_2) made up of two (O) atoms.

4. What is the approximate size of a molecule?

Ans. Matter is made up of molecules which are very small in size ($\sim 10^{-9} m$)

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

Ans. The size of a particle or molecule of matter is very small. 1 litre of water has 6.02×10^{26} molecules, so the volume of a particle of water is $\frac{10^{-3} m^3}{6.0 \times 10^{26}} = 1.6 \times 10^{-30} m^3$

Thus the diameter of a water molecule is nearly 1.27×10^{-9} metre.

6. What do you mean by inter-molecular spacing?

Ans. Intermolecular space - The space between any two consecutive molecules of a substance is called intermolecular space.

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

Ans. 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 occupy spaces between the particles of water.

8. What do you mean by inter-molecular forces?

Ans. Intermolecular force of attraction - The force of attraction between the molecules (like molecules or unlike molecules) is called intermolecular force of attraction.

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

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

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

Ans- Take a beaker, fill it partly with water. Add some ~~the~~ lycopodium powder in the beaker containing water, stir the contents of the beaker with a glass rod. Take out few drops of this suspension on a glass plate, place it on the table and illuminate it with a table lamp. Observe the glass plate through a microscope. ~~It on the~~ It is found that the fine particles of lycopodium powder move rapidly in a random manner and their path is zigzag as shown in figure below.

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

Ans: Solids:

- 1) The molecules here are very tightly packed having ~~negligible~~ negligible or very less intermolecular space.
- 2) They have the strongest intermolecular ~~force~~ force of attraction.
- 3) The molecules have very small vibration about their mean position i.e. small amplitude.
- 4) They have 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 vessels.
5. A particular quantity of a liquid has a definite volume at a given temperature.

Characteristics:

- 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. ~~worst~~ The molecules move independently.
5. ~~worst~~ conductors of heat.

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

Ans- Here the molecules are very tightly packed that there is no or a 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 ~~the molecules are very tightly packed that there is no or a very less intermolecular space and there is high intermolecular force of attraction~~ thus solids have a definite shape and volume.

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

Ans- Here the molecules are less tightly packed as compared to solid and also there is lesser force of intermolecular attraction. The intermolecular distance is greater than that in the solids. Thus, they don't 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.

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

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

19. ~~Dist~~ Distinguish between the three states of matter - solid, liquid and gas on the basis of their molecular models.

Solids:

~~that~~ Here the molecules are very tightly packed that there is no or very less intermolecular 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.

Liquids

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

Gases

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 shape and also do not have any definite volume.

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

- Compressibility
- Fluidity
- Rigidity
- Expansion on heating

Ans.	Solid	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 liquid