

Test yourself

Objective questions.

classmate

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1. a) The molecules of each substance are identical. F
- b) The inter molecular forces are effective at all distances 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) The liquids are less viscous than the gas. F
2. a) 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 gasses.
- c) The molecular motion in liquid and gas is in zigzag path.

d) In a solid, the molecules vibrate to and fro but they remain at their ^{positions} fixed ~~points~~.

e) The inter molecular ~~space~~ forces are weakest in gases.

f) A solid exerts pressure downwards on its base.

g) The gases are least dense.

h) A solid is most ~~very~~ rigid.

3a) The diameter of a molecule is approximately

ans- 3×10^{-10} m

b. The inter molecular forces are strongest in -

ans- solids.

c) The molecules -

ans-3) in a liquid, move freely within its boundary.

d) The solids are ~~is~~

ans. 1) more dense

e) The inter-molecular forces in liquids are

ans. 2) weaker than ⁱⁿ solids.

Q4. Column - A

Column B

a) A molecule is composed of

i) does not exist free in nature

b) Ice, water and vapour.

ii) can vibrate only upto about 10% from their mean positions.

c) An atom

iii) atoms

d) Gases

iv) are three states of water.

e) The molecules of a solid.

v) occupy space

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

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

Ex - wood, stone, iron, ice, etc.

Liquids - Liquid has a definite volume but no definite shape.

ex. Water, juice, milk, oil, etc.

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Gases - A gas has definite shape nor definite volume.

Ex - Air, hydrogen, oxygen, water vapour, etc.

3. What is a molecule?

ans. The smallest unit of matter is ~~called~~ ^{which} can exist ^{independently} ~~freely~~ is called molecule.

Ex - 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 ($\approx 10^{-10}$ cm).

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 $\frac{10^{-3} \text{ m}^3}{6.02 \times 10^{26}} = 1.6 \times 10^{-30} \text{ m}^3$.

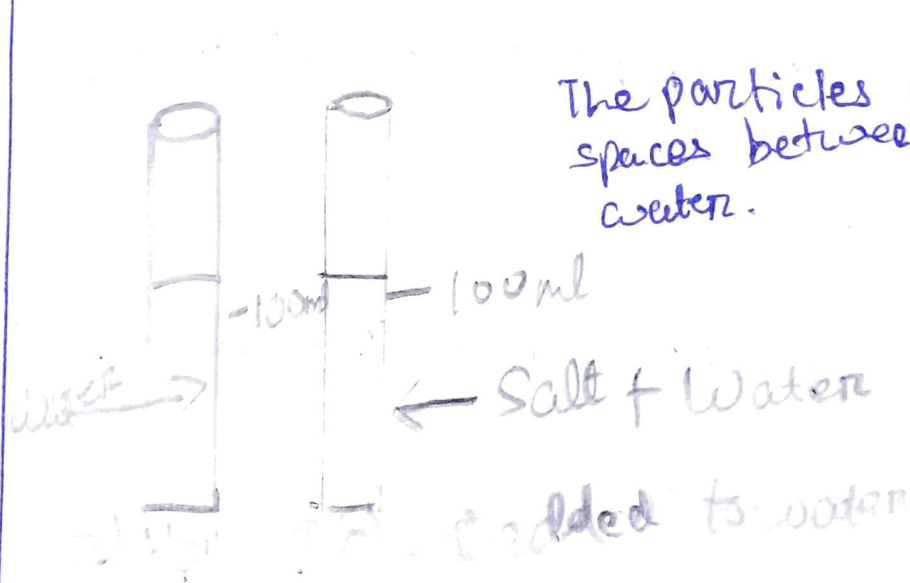
Thus the diameter of a molecule is nearly $1.27 \times 10^{-9} \text{ m}$.

6. What do you mean by inter molecular spacing?

ans. Inter molecular space - The space between any two constituent molecules of a matter substance is called Inter molecular spacing.

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

ans. Take 100 ml of water in a measuring cylinder, Add 20g 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.



9. What are the forces of cohesion and adhesion?

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

Ex. The forces between water molecules. together.

This force of cohesion keep the molecules of the substance bind together. The force of attraction between ~~different~~ ^{different} types of molecules is called the force of adhesion.

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

10. State three characteristics of molecules of matter?

ans. The particles of matter are called molecules, have the following characteristics:

1. ~~Character~~ They are very small in size.
2. They have spaces between them.
3. They are in constant random motion.

11. State the approximate spacing between two molecules of a matter.

ans. The spacing between the particles of a matter is called intermolecular spacing.

12. How do the solids, liquids and gases differ in their following properties -

- Size
- Shape
- Density

	Solids	Liquids	Gases
Size	They have definite size	Indefinite	Indefinite
Shape	They have a definite shape	Indefinite	Indefinite
Density	Highly dense	Less dense than solids	Less dense than liquids and solids

13. The molecules in a substance are not at rest & in motion. ~~and~~ what type of path ^{do they follow?} ~~move randomly in all possible directions~~

ans. The particles in a substance are not at rest. In motion and they move randomly in all possible directions in a zig-zag 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 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 a table~~ ^{Place it on a microscope} ~~through a microscope~~ ^{under 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 shown in figure below.



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15. Write down 5 general properties of solids, liquids and gases.

ans: Solids: 1. The molecules here are very tightly packed having negligible or very less intermolecular space.

2. They have the strongest inter-molecular force of attraction.

3. The molecules have very small vibrations about their mean positions 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 ~~in~~ are less tightly packed.

2. The inter-molecular 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.

6. Gases:

1. The force of attraction between the molecules is the least.

2. The inter-molecular force is the largest.

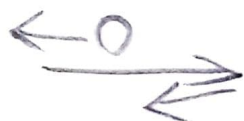
3. Neither have a definite shape nor a definite volume.

4. The molecules move independently.

5. ~~are~~ Worst conductors of heat.

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

ans-



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

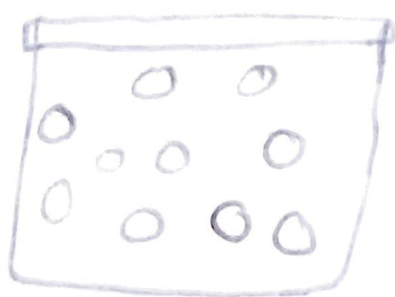
Describe the molecular model of a liquid. How does it explain that a liquid has no definite shape, but has a definite volume?



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 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.

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

ans Here molecules are far apart from each other and have the greatest intermolecular distance which leads to 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.



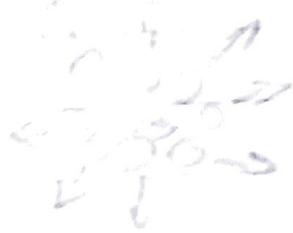
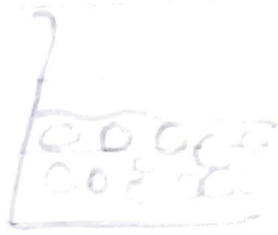
19. Distinguish between the three states of matter, solid, liquid and gas on the basis of their molecular models

ans Solids:



Here the molecules are 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 freely about their mean positions and thus solids have definite shape and volume.

Liquids:



Here the molecules are less tightly packed as compared to solids and also there is lesser force of inter-molecular force of attraction. The 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.

Gases

Here the molecules are far apart from each other i.e., have the greatest inter-molecular 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.

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

- (a) ~~So~~ Compressibility.
- (b) Fluidity.
- (c) ~~rigid~~ rigidity
- (d) Expansion on heating

ans.		Solid	Liquid	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.