

CBSE Class 9 Science
Important Questions
Chapter 1
Matter in Our Surrounding

3 Marks Questions

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

Ans. If diver has ability to cut through water in a swimming pool then it shows that the particles of matter have a kind of force working between them. Because of this force the particles of matter remain together till some external force is applied.

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

Ans. The characteristics of particles of matter are as follows:

- i) particles of matter have gap between them.
- ii) particles of matter are in continuous motion
- iii) particles of matter have an attraction force between them to keep them together.

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

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

Ans. (a)

Solid	Liquid	Gas
Particles are rigid and incompressible.	Particles are not rigid but can be compressed to limited extent.	Particles are not at all rigid and can be compressed easily.
They possess a definite shape and volume.	They have only a definite volume but acquire shape of container in which they are kept.	They don't have a definite shape or volume.
They don't have the ability to flow.	They can easily flow from higher to the lower level.	They can flow in all the possible directions.
Example: salt, sugar, chalk, gold, silver etc.	Example: water, alcohol, diesel, petrol etc.	Example: air, CNG, smoke etc.

(b) Rigidity→ It is the property of matter to maintain its shape even if external forces work and the solids show this property.

Compressibility → It is the property of matter to allow compression under high pressure and the gases show this property.

Fluidity → It is the property of a substance to easily flow and allow change in its shape under external forces and this property is exhibited by both liquids and gases.

Filling a gas container → Gases can be compressed easily hence they can be filled within a vessel at high pressure. This property of gases allows their convenient filling into a small container or cylinder and that also in a large volume. It also allows their easy transport from one place to the other eg CNG.

Shape→ According to the type of matter shape differs depending upon location of particles like Solids have definite shape while Liquids acquire the shape of their container and gases as such don't have any shape.

Kinetic energy → It is the kind of energy present in an object when it is under motion as the particles of that object/matter are continuously moving therefore matter has kinetic energy. However greater is the movement more will be the kinetic energy and vice a versa i.e. solid < liquid < gas
Density → Mass per unit volume of a substance/matter is known as its density i.e. $\text{density} = \text{mass}/\text{volume}$.

4. Give reasons

(a) A gas fills completely the vessel in which it is kept.

(b) A gas exerts pressure on the walls of the container.

(c) A wooden table should be called a solid.

(d) We can easily move our hand in air but to do the same through a solid block of wood we need a karate expert.

Ans. (a) Since the attraction force between particles of a gas is negligible i.e. extremely less hence particles freely move/flow in all possible directions as a result gas fills completely the

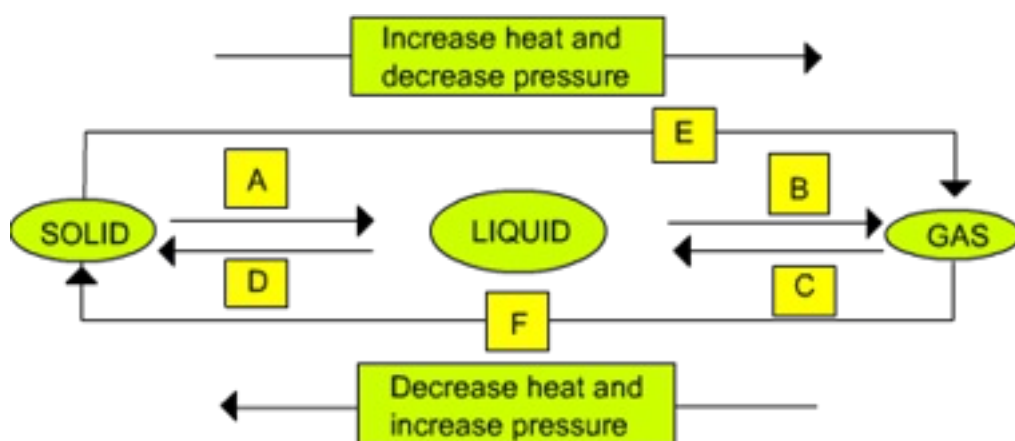
vessel in which it is kept.

(b) Freely moving particles of gas hit the walls of its container continuously and randomly therefore such random and erratic motion of gas particles exerts pressure on the walls of the container.

(c) A wooden table particles are quite rigid, have a fixed location and also possess a definite shape and volume. Due to all these properties we should call a wooden table a solid substance.

(d) Air is a mixture of gases and since particles of gas are far apart so same is true for air therefore we can easily move our hand in air. But a solid block of wood is hard and rigid that resists any change in location of its particles hence we need a karate expert in case of a solid block of wood.

5. Name A,B,C,D,E and F in the following diagram showing change in its state.



Ans. A – Fusion (Heating – Melting)

B – Vapourisation

C – Cooling – Condensation (Liquefaction)

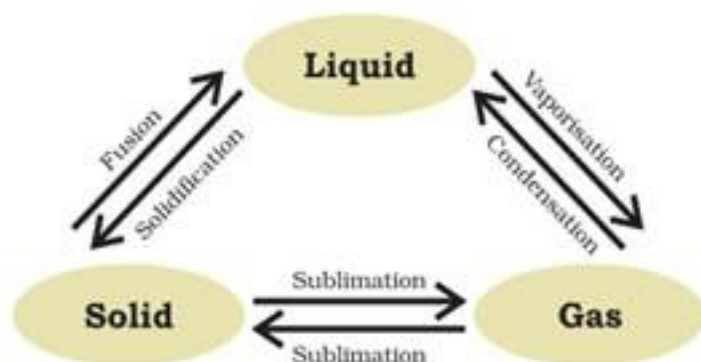
D – Cooling – Freezing (Solidification)

E – Sublimation

F – Solidification

6. Are the three state of matter inter-convertible? How can they interconnect?

Ans. Yes, three states of matter are inter-convertible.



(a) Solid can be changed into liquid by boiling and liquid can be changed to solid by cooling it i.e. by solidification.

(b) Liquid can be changed to gas by vaporization by heating it and gas can be changed to liquid by condensation i.e. subjecting it to low temperature.

(c) Solid can be changed to gaseous form/state by sublimation and liquid can be changed to solid by condensation.

7. How does evaporation cause cooling?

Ans. When a substance evaporates from a surface, it absorbs heat from the surface and change into vapour state. So, the particle of liquid absorbs energy from the surface and the absorption of heat from makes the surface cool.

8. Why should we wear cotton clothes in summer?

Ans. During summer, we perspire more and the particles at the surface of the liquid gain energy from the surrounding or body surface and change into vapour. Now, cotton being an absorber of water helps in absorbing the sweat and exposed it to atmosphere for easy evaporation and we feel cool.

9. Differentiate between physical and chemical change?

Ans.

	Physical change		Chemical change
1)	It is not permanent and can easily be reversed.	1)	It is permanent and cannot be easily reversed.
2)	It does not lead to formation of new substances.	2)	It leads to the formation of new substances.
3)	No change in mass is noticed.	3)	There is a change in mass of reactants and products.
4)	The energy changes observed are small.	4)	Large energy changes are observed.

10. A solution of H_2SO_4 is labeled 40%. The density of the solution is 1.3gm/l. what is the concentration of the solution in % (m/v)?

Ans. Concentration of the solution is 40%

This means that

100 gm of the solution contains 40g of H_2SO_4

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$1.3 \text{ gm/l} = \frac{100 \text{ g}}{\text{volume}}$$

$$\text{Volume of the solution} = \frac{100}{1.3}$$

$$= \frac{100}{1.3} \text{ ml}$$

$$\frac{100}{1.3} \text{ ml of solution contains } 40 \text{ g of } H_2SO_4$$

\therefore 100ml of the solution will contain

$$\frac{100 \times 40 \times 1.3}{100} \text{ g } H_2SO_4$$

$$= 52 \text{ g } H_2SO_4$$

The concentration is 52%(m/v)

11. What is the state of inter particle distance inside a solid, liquid and gas?

Ans. In solids, the particles are very close to each other and are bonded by strong forces of attraction so inter particle distance is least. In liquid, the particles are far away from each other and are bonded by weak forces of attraction, so inter particle distance is large. In gases, particles are very far apart from each other and are bonded by very weak forces of attraction so, inter particle distance is a largest.

12. Why it is that to smell cold food, we have to go close but smell of hot food reaches us several meters away?

Ans. In hot food, the particles are at high temperature so quickly changes to vapour and hence the vapours have greater kinetic energy so travel faster and travel to far off distances.

Whereas in cold food, because of temperature being low, particles do not change to vapour state and hence cannot travel faster so the smell does not reaches to a person sitting far away.

13. Why is it that a wooden chair should be called a solid and not a liquid?

Ans. A wooden chair should be called a solid not a liquid because the particles of wooden chair are very close to each other, it has negligible compressibility and it maintains its shape when subjective to outside force.

14. Give an experiment to show that ammonium chloride undergoes sublimation.

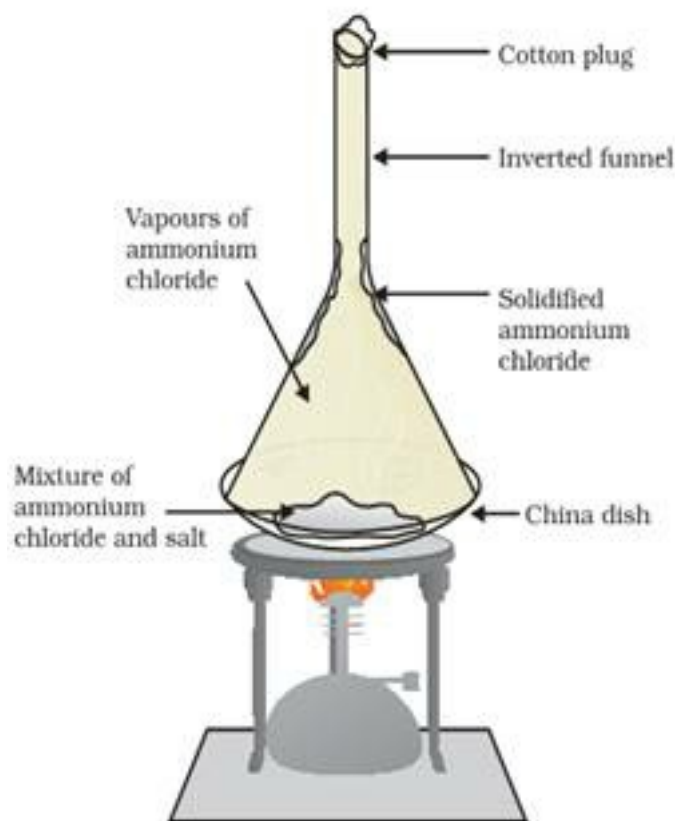
Ans. Experiment to show that ammonium chloride (NH_4Cl) undergoes sublimation:

(a) Take an inverted funnel and inside it china dish with crystal of ammonium chloride (NH_4Cl).

(b) Heat the crystals with the help of a burner.

(c) As soon as the crystal is heated, we observe the vapours of (NH_4Cl) and the solidified Ammonium chloride (NH_4Cl) along the walls at the upper end of the beaker.

(d) This shows that solid ammonium chloride does not undergo liquid state but directly changes to vapour state which then solidifies i.e. it undergoes sublimation (solid changes directly to gases without undergoing liquid state).



15. What is distillation and fractional distillation? What is the basic property that separates the two methods?

Ans. Distillation is used for the separation of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points. Fractional distillation is used for the separation of components of a mixture containing more than two miscible liquids for which the difference in their boiling points is less than 25K.

The property that separates the two processes is difference in the boiling points of the components of the mixture i.e. if difference in boiling points is large then we use distillation but if difference in boiling points is less, we use fractional distillation.