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

---

1 Marks Questions

1. Which of the following are matter?

Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume.

Ans. Chair, air, smell, almonds, cold drink and smell of perfume are matter.

---

2. Convert the following temperature to Celsius scale:

i) 300 K

ii) 573 K

Ans. i) $K = 273 + °C$

$°C = K - 273 = 300 - 273 = 27°C$

ii) $°C = 573 - 273 = 300°C$

---

3. What is the physical state of water at:

a. $250°C$

b. $100°C$

Ans. b. $100°C$ is the boiling point of water hence at both the temperatures water is in gaseous state i.e. water vapour.

---

4. For any substance, why does the temperature remain constant during the change of state?

Ans. During the change of state the heat or energy provided to particles of matter is utilized to take the particles of matter apart from each other as a result the temperature of substance or matter remains constant during change of state.

---

5. Suggest a method to liquefy atmospheric gases.

Ans. If we decrease temperature and increasing pressure we can liquefy the atmospheric gases.

---

6. Arrange the following substances in increasing order of forces of attraction between the particles— water, sugar, oxygen.

Ans. Oxygen< water< sugar.

---

7. What is the physical state of water at—

(a) $25°C$ **(b)** $0°C$ **(c)** $100°C$ **?**

Ans. At 25°C water is liquid, at $0°C$ water is solid(ice), at $100°C$ water is gas(water vapour).

---

8. If the humidity in the air increase then the rate of evaporation:

(a) decrease

(b) increase

(c) remain same

(d) both (b) and (a) depending upon the temperature

Ans. (a) decrease

---

9. Which of the following statement is correct?

(a) boiling is a bulk phenomenon and evaporation is a surface phenomenon

(b) boiling is a surface phenomenon and evaporation is a bulk phenomenon

(c) boiling and evaporation both are surface phenomenon

(d) boiling and surface both are bulk phenomenon

Ans. (a) boiling is a bulk phenomenon and evaporation is a surface phenomenon

---

10. If the temperature of a place is increase then evaporation:

(a) decrease

(b) increase

(c) remain same

(d) none of the above

Ans. (b) increase

---

11. Which of the following have least inter atomic spacing?

(a) solid

(b) liquid

(c) gases

(d) plasma

Ans. (a) solid

12.If you decrease the surface area and increase the temperature, then the rate of evaporation

(a) increase

(b) decrease

(c) remain same

(d) may increase or decrease depending upon other factors

Ans. (c) remain same

---

13. 300k will have its corresponding temperature in degree centigrade as:

(a) 30^0c

(b) 300^0c

(c) 27^0c

(d) 673^0c

Ans. (c) 27^0c

---

14. Liquid to gas and gas to liquid changes are called:

(a) vaporization and condensation

(b) condensation and vaporization

(c) sublimation and condensation

(d) condensation and sublimation

Ans. (a) vaporization and condensation

---

15. Physical state of water at 25^0c, 0^0c and 100^0c is respectively

(a) liquid, solid and gas

(b) solid, liquid and gas

(c) solid, gas and liquid

(d) gas, solid and liquid

Ans. (a) liquid, solid and gas

2 Marks Questions

1. Give reasons for the following observation:

The smell of hot sizzling food reaches you several meters way, but to get the smell from cold food you have to go close.

Ans. Since hot sizzling food has temperature higher than cold food and at higher temperature diffusion rate (movement) of particles is very fast due to this the smell of hot sizzling reaches us from several meters away.

---

2. The mass per unit volume of substance is called density.

(density = mass/volume).

Arrange the following in order of increasing density – air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Ans. Arranging substances in their increasing order of densities:
Air< exhaust from chimneys< cotton< water< honey< chalk< iron.

---

3. Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why.

Ans. Ice represents solid state of water. If we observe its 3D structure, a large empty space is found inside ice as a result it becomes less in weight as compared to water. Due to its specific structure though solid, ice floats on water.

---

4. Why does a desert cooler cool better on a hot dry day?

Ans. On a hot dry day rate of evaporation is faster. In a desert cooler when exhaust fan is on, hot air enters through the straw mates and at this site evaporation of water takes place and that also at faster rate. It takes away heat from air so the air becomes cool even cooler on a hot dry day.

---

5. How does the water kept in an earthen pot (matka) become cool during summer?

Ans. During summers the water present on the surface of the earthen pot evaporates which causes the cooling effect. Besides earthen pot bears pores on it hence evaporation occurs continuously so is cooling.

---

6. Why does our palm feel cold when we put some acetone or petrol or perfume on it?

Ans. Some liquids get quickly vapourised and they are called volatile liquids. Acetone, petrol and perfume are also volatile liquids therefore they get heat from our palm and cause cooling.

---

7. Why are we able to sip hot tea or milk faster from a saucer rather than a cup?

Ans. Saucer has a bigger surface area as compared to cup. Since evaporation is a surface phenomenon, by using a saucer instead of cup we are increasing the surface are for evaporation to occur. Faster evaporation of particles of tea or milk allows cooling and taking a sip becomes easier.

---

8. What type of clothes should we wear in summer?

Ans. Cotton is a good absorbant of water hence it absorbs sweat quite well and pores in the fabric expose that sweat to easy evaporation hence we should prefer wearing cotton clothes in summer.

---

9. Convert the following temperatures to the celsius scale.

(a) 293 K (b) 470 K.

Ans. a) $^{\circ}C = K - 273 = 293 - 273 = 20^{\circ}C$
b) $^{\circ}C = K - 273 = 470 - 273 = 197^{\circ}C$

---

10. Convert the following temperatures to the Kelvin scale.

(a) 25° C
(b) 373° C.

Ans. a) $K = {}^{\circ}C + 273 = 25 + 273 = 298\ K$
b) $K = {}^{\circ}C + 273 = 373 + 273 = 656\ K$

---

11. Give reason for the following observations.

(a) Naphthalene balls disappear with time without leaving anysolid.

(b) We can get the smell of perfume sitting several metres away.

Ans. a) Some substances possess the property of sublimation like camphor and naphthalene balls. Such substances directly change from solid to gaseous state without changing into liquid like ice→water→water vapour does. Therefore, naphthalene balls disappear with time without leaving any solid.

b) Being a volatile substance (gets evaporated easily) perfumes change from liquid to gaseous state very fast. Those particles mix up with air particles and diffuse to reach our nostrils such that we get the smell of perfume sitting several metres away.

---

12. Give two reasons to justify—

(a) water at room temperature is a liquid.

(b) an iron almirah is a solid at room temperature.

Ans. a) The room temperature is generally always more than $0^{\circ}C$ and less than $100^{\circ}C$ and within this range water is a liquid so water at room temperature is a liquid.

b) The melting point of iron is much higher than the room temperature therefore an iron almirah is a solid at room temperature.

---

13. Why is ice at 273 K more effective in cooling than water at the same temperature?

Ans. While melting ice absorbs latent heat of melting from the surroundings and gets changed into water that makes the cooling effect more intense as compared to water at same temperature.

---

14. What produces more severe burns, boiling water or steam?

Ans. As compared to boiling water it is observed that steam produces more severe burns since as the steam changes into boiling water it releases heat of condensation which is equivalent to latent heat of water result is more severe burning.

---

15. What is evaporation? What are the factors affecting it?

Ans. Evaporation is the process by which water (liquid) changes to vapours at any temperature below its boiling point.

Factor on which evaporation depends:

(a) Surface area

(b) Humidity

(c) Wind speed

(d) Temperature

---

16. What happen when we apply pressure to the particles of matter?

Ans. When we apply pressure to the particles of the matter, then the particles come closer to each other because pressure is the force applied per cross-sectional area so the force applied brings the particle closer to each other.

---

17. Define latent heat of vaporization and latent heat of fusion.

Ans. Latent heat of vaporization is the heat energy required to change 1 kg of a liquid to gas at atmospheric pressure without changing its state.

Latent heat of fusion is the amount of heat energy required to change 1 kg of solid into liquid without changing its state.

---

18. If the melting point of an object A is high then what state you expect it to be at room temperature?

Ans. Melting point is the temperature at which a solid melts/change into a liquid state. So, if the melting point of an object A is higher means that it requires greater temperature to change into liquid the object will remain the same at room temperature because room temperature is less and the object cannot change its state.

---

19. What happens when the temperature of the solids increase?

Ans. When temperature of the solid is increased, kinetic energy of the particles increases as results particles vibrates more freely with greater speed. They overcome the force of attraction between the particles and start moving more freely.

---

20. When heat is being supplied to a solid, then what does the heat energy do to the particles of solid?

Ans. The heat supplied to the solid, helps the particles to overcome the forces of attraction between them and increases their kinetic energy, as a result of which particle break free the forces of attraction and changes to liquid state.

---

21. Why is it that on increasing the wind speed the rate of evaporation increases?

Ans. When the speed of wind increases, then they blow away with them the water vapour in the air and as results evaporation will increase because the surrounding air will be able to receive more vapours and hence evaporation increases.

---

22. Why do we say that evaporation is a surface phenomenon?

Ans. Evaporation is called a surface phenomenon because only particles of the surface of liquid gains energy and changes into vapours.

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 uncompressible.	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. density = mass/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.

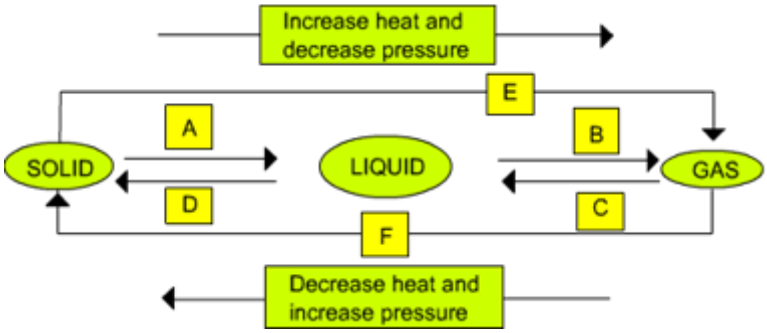
(b) Freely moving particles of gas hit the walls of its container continuously and randomly therefore such random and erratic motion of gas particles exerts pressure on the walls of the container.

(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)

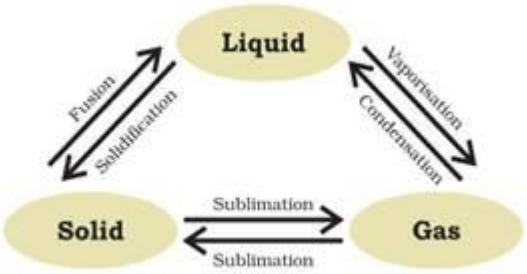
E – Sublimation

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_2 So_4

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

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

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

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

$$\frac{100}{1.3} ml\ of\ solution\ contains\ 40g\ of\ H_2So_4$$

$$\therefore 100ml\ of\ the\ solution\ will\ contain$$

$$\frac{100 \times 40 \times 1.3}{100} g\ H_2So_4$$

$$= 52g\ H_2So_4$$

$$The\ consentration\ is\ 52\%(m/v)$$

---

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.

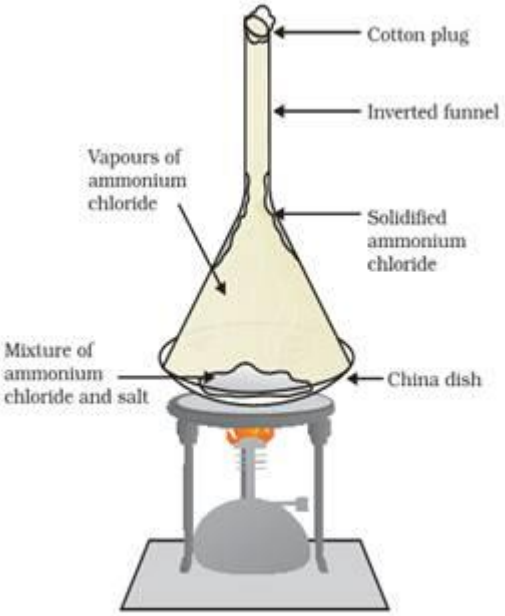
Ans. Experiment to show that ammonium chloride (NH_4Cl) undergoes sublimation:

(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 them 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 liquid 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.