Important Questions for Class 9

Science

Chapter 1 – Matter in Our Surroundings

Very Short Answer Questions **1 Mark**

1. Which of the following are matter?

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

Ans: As we can define matter as any 'physical substance', hence almonds, air,chair, smell of perfume, cold drink and smell can be considered as matter.

2. Convert the following temperature to Celsius scale:

i) The temperature is $300\ K$.

Ans: When we use: $K = 273 + {}^{o}C$:

$${}^{o}C = K - 273$$
$$= 300 - 273$$
$$= 27{}^{o}C$$

ii) The temperature is $573\ K$

Ans: When we use: $K = 273 + {}^{o}C$:

$${}^{o}C = 573 - 273$$
$$= 300{}^{o}C$$

3. What is the physical state of water at:

(a) A temperature of $250{}^{o}C$

Ans: The boiling point of water is $100{}^{o}C$, hence the physical state of water at $250{}^{o}C$ will be gaseous.

(b) A temperature of $100^{\circ}C$

Ans: The boiling point of water is $100^{\circ}C$, hence at $100^{\circ}C$ water is in the gaseous state.

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

Ans: The reason behind the temperature of substance or matter remaining constant during change of state is that during the change of state all of the heat or energy provided to particles of matter is utilized to take the particles of matter apart from each other.

5. Suggest a method to liquefy atmospheric gases.

Ans: One method to liquefy atmospheric gases is to decrease the temperature and increase the pressure.

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

Ans: The order of increasing forces of attraction between the particles is as follows:

Oxygen< water< sugar.

7. What is the physical state of water at-

(a) A temperature of $25^{\circ}C$ **?**

Ans: The physical state of water at $25^{\circ}C$ is liquid.

(b) A temperature of $0^{\circ}C$ **?**

Ans: The physical state of water at $0^{\circ}C$ is solid.

(c) A temperature of $100^{\circ}C$ **?**

Ans: The physical state of water at $100^{\circ}C$ is gas.

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: The correct option is (a) decrease.

9. Which of the following statements 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: The correct option is (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: The correct option is (b) increase.

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

(a) solid

(b) liquid

(c) gases

(d) plasma

Ans: The correct option is (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: The correct option is (c)**,** remain the same.

13. What will be the corresponding temperature in degree centigrade for 300 K :

(a) $30^{o}C$

(b) $300^{o}C$

(c) $27^{o}C$

(d) $673^{o}C$

Ans: The correct option is (c), $27^{o}C$.

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: The correct option will be (a)**,** vaporization and condensation.

15. Physical state of water at is respectively

(a) liquid, solid and gas

(b) solid, liquid and gas

(c) solid, gas and liquid

(d) gas, solid and liquid

Ans: The correct option is (a), liquid, solid and gas.

Short Answer Questions **2 Marks**

1. Give reasons for the following observation:

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

Ans: When it is higher temperature the diffusion rate (movement) of particles will be very fast when compared to the diffusion rate of particles at lower temperature and since the temperature of hot sizzling food is higher than cold food, the smell of hot sizzling food will be reaching us from several meters away.

2. The mass per unit volume of a 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: The correct order of increasing densities of the substances is as follows:

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 floats on water since there is a large empty space inside the 3D structure of ice due to which it becomes less in weight as compared to water and can float on water.

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

Ans: In a desert cooler, when hot air enters through the straw mates it evaporates the water at a fast rate because the rate of evaporation is faster on a hot dry day. And because of the faster evaporation rate it cools the air more conveniently than on a dry hot day.

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

Ans: Evaporation happens through the small pores on it causing a cooling effect,

in an earthen pot. Therefore water kept in an earthen pot becomes cool during summer because of continuous evaporation.

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

Ans: As perfume, petrol and perfume are volatile liquids, if put on our palm they will be absorbing 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: When we use a saucer instead of a cup the surface for evaporation to occur will be increased resulting in faster evaporation of particles of tea or milk and allowing it to cool faster and taking a sip becomes easier.

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

Ans: We must wear the type of clothes which allow easy evaporation since evaporation causes cooling. And as the cotton absorbs sweat well and allows easy evaporation, we must prefer wearing cotton clothes in summer.

9. Convert the following temperatures to the Celsius scale.

a) The temperature is 293 K

Ans: When we use: $^{o}C = K - 273$

$= 293 - 273$

$= 20^{o}C$

b) The temperature is 470 K

Ans: When we use: $^{o}C = K - 273$

$= 470 - 273$

$= 197^{o}C$

10. Convert the following temperatures to the Kelvin scale.

a) The temperature is $25^{o}C$

Ans: When we use: $K = {}^{o}C + 273$

$= 25 + 273$

$= 298\ K$

b) The temperature is $373^{o}C$

Ans: When we use: $K = {}^{o}C + 273$

$= 373 + 273$

$= 656\ K$

11. Give reason for the following observations.

a) Naphthalene balls disappear with time without leaving any solid.

Ans: Sublimation can be defined as the conversion between the solid and the gaseous phases of matter, with no intermediate liquid stage. Naphthalene balls will be having the property of sublimation because of which they directly vary from solid to gaseous state without a conversion into liquid. Hence, naphthalene balls will be vanishing with time leaving no solid.

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

Ans: Volatile substances such as perfumes change from liquid state to gaseous state very fast which allows them to diffuse and mix up with the air particles to reach our nostrils. Therefore we get the smell of perfume sitting several metres away.

12. Give two reasons to justify —

a) Water at room temperature is a liquid.

Ans: For a temperature of $<0^{o}C$ water is in solid state, for $0^{o}C \rightarrow 100^{o}C$ water is in liquid state and for temperature $>100^{o}C$ water is in gaseous state. Since room temperature always lie between $0^{o}C$ and $100^{o}C$ and within this range the physical state of water is liquid so water is liquid at room temperature.

b) An iron almirah is a solid at room temperature.

Ans: Since the room temperature is very less than the melting point of iron hence an almirah made up of iron will be a solid at room temperature.

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

Ans: Ice will be producing more intense cooling effect as compared to water at 273 K because at 273 K ice will be absorbing latent heat of melting from the surroundings and will be getting converted into water. Therefore ice at 273 K is more effective in cooling than water at the same temperature.

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

Ans: When the steam gets converted into boiling water it releases latent heat of water which results more severe burns when we compare to the boiling water.

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

Ans: Evaporation can be defined as the process of conversion of a substance from its liquid state to gaseous state at any temperature below its boiling point.

Evaporation will be dependant on the factor below:

a) Surface area
b) Temperature
c) Humidity
d) Wind speed

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

Ans: Pressure can be defined as the force applied per cross-sectional area. Therefore when we apply pressure to the particles of matter, the force applied brings the particles closer to each other.

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

Ans: The heat energy required to change 1 kg of a substance from its liquid state to gaseous state at atmospheric pressure without changing its temperature is known as latent heat of vaporization.

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

Ans: The temperature at which a substance changes its state from solid to liquid is called its melting point. At a temperature below melting point, the substance

will be in solid state. Therefore, if the melting point of an object A is high then the object will be in solid state.

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

Ans: When we increase the temperature of the solid, we are giving energy to it. That energy is utilized in increasing the kinetic energy of the particles and as a result the speed of the particles is increased and they vibrate more freely. Once the particles overcome the force of attraction between them they 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 energy increases the kinetic energy of the particles which allows the particles to overcome the forces of attraction and start moving more freely and changing the state from solid to liquid.

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

Ans. If we increase the speed of wind, then they will be blowing away with them. The water vapours in the air are blown away when the speed of wind is increased, making room for more water vapours increasing the rate of evaporation.

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

Ans: Only the particles at the surface of the liquid absorb energy and get converted into vapours, therefore evaporation is called a surface phenomenon.

Long Answer Questions **3 Marks**

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

Ans: It is given that a diver is able to cut through water in a swimming pool. This is representing that the particles of water will be held together by weak forces of attraction between them and when any external force is applied the particles can be separated.

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

Ans: The particles of matter have the following characteristics:

i. The particles of matter are in continuous motion.
ii. There are gaps between the particles of matter.
iii. There is a force of attraction between the particles of matter which keeps them together.

3.

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

Ans: Tabular difference of characteristic of matters are given below:

Solid	Liquid	Gas
Particles of matter in solid state are rigid and incompressible.	Particles of matter in liquid state are not rigid but are compressible to some extent.	Particles of matter in gaseous state are not rigid at all and are more compressible than particles of solid or liquid.
The particles will be having a definite shape and volume.	The particles have a definite volume but their shape is not defined.	The particles don't have a definite shape or volume.
The particles cannot flow.	The particles can easily flow from higher level to lower level.	The particles can flow freely in all possible directions.
Stone, wood, diamond etc. are a few examples.	Water, cold drinks, milk, etc. are a few examples.	Smoke, oxygen, nitrogen etc. are some examples.

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

Ans: Rigidity→ The property of matter to maintain its shape when external forces are applied to it is known as rigidity. Solids have this property.

Compressibility → The property of matter to allow compression when high pressure is applied to it is known as compressibility. Some Liquids and all gases have this property.

Fluidity → The property of matter to flow and change in its shape when external forces are applied to it is known as fluidity. Both liquids and gases have this property.

Filling a gas container → Gases are fluid in nature and are highly compressible which allows them to be filled within a vessel at high pressure. A large volume of gas can be filled in a container of less volume making it suitable and more cost efficient for transportation.

Shape→ Only solid objects have well defined shape while liquids can acquire any shape depending on the container they are kept in and gases don't have any shape.

Kinetic energy → The particles of a matter are continuously in motion and thus have kinetic energy. As the particles in solids have the least movements, the kinetic energy of solids is the least. The particles of gases have the freest movements and hence they have the highest kinetic energy. The order of kinetic energies for different type of matters is: solid < liquid < gas

Density → Density of any substance can be explained as Mass per unit volume i.e. density = mass/volume.

4. Give reasons

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

Ans: The particles of gas have negligible attraction force between them because

of which the particles move freely in all directions filling the whole container the gas is kept in.

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

Ans: The particles of gas move freely due to which they collide with the container walls continuously and randomly. Therefore the collision of particles on the container walls exerts pressure on the walls.

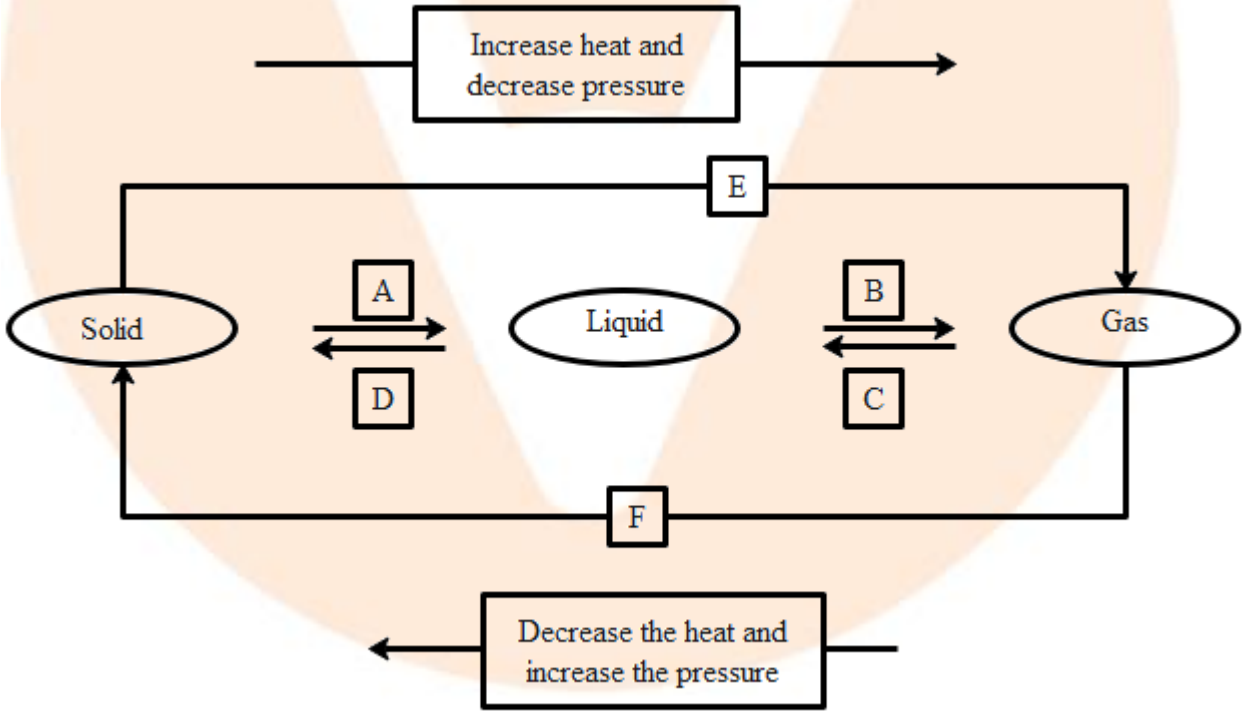
(c) A wooden table should be called a solid.

Ans: Solids have rigid and fixed particles and have a definite shape and clear boundaries. Since a wooden table possesses all the qualities of a solid, it should be called a solid.

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

Ans: Since air is a gas and the forces of attraction between the particles of gas are very less which makes it easy to separate the particles with the help of an external force and hence we can easily move our hand in air. Whereas in case of solids the forces of attraction are very strong and we need very high force to separate the particles of a solid and hence we need a karate expert for it.

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



Ans: A is fusion or heating or melting.

B is vapourisation.

C is cooling or Condensation.

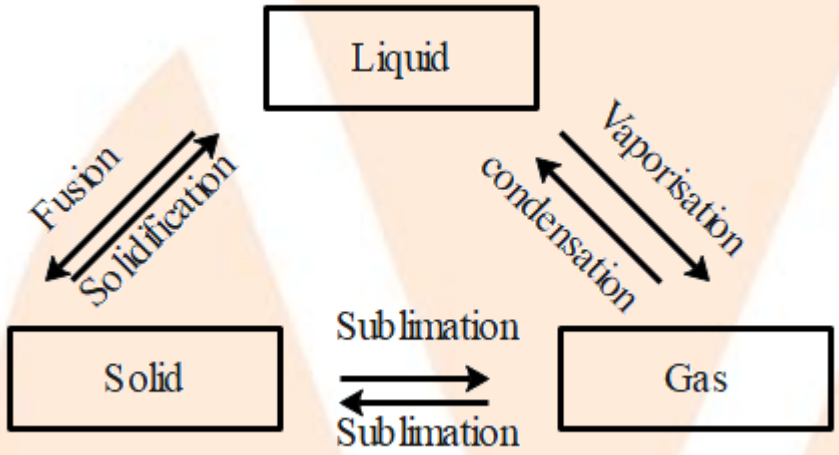
D is cooling or solidification.

E is sublimation.

F is solidification.

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

Ans: Yes, the three states of matter can be converted into each other.



The three states of matter are interconvertible as shown below:

a) By heating we can convert solids into liquids and by cooling we can convert liquids into solids.

b) We can convert liquids into gases by vaporization and we can convert gases to liquids by condensation.

c) Using sublimation we can convert solids into gases and vice versa and using condensation we can convert liquids into solid.

7. How does evaporation cause cooling?

Ans: During evaporation the particles of a liquid absorb the heat from the surface and are converted into vapours utilizing the absorbed heat. This absorption of heat from the surface will be producing a cool surface.

8. Why should we wear cotton clothes in summer?

Ans: Since cotton is a good absorbent of water, it absorbs all the sweat from our body and allows easy and fast evaporation. The sweat absorbs heat from our body

and evaporates which makes us feel cooler during a hot summer day. That is why we should wear cotton clothes in summer.

9. Differentiate between physical and chemical change?

Ans: The difference physical and chemical change is given below

Physical change	Chemical change
Physical change is not permanent and can be reversed easily.	Chemical change is permanent and cannot be reversed easily.
Physical change does not result in new substances.	Chemical change produces new substances.
There is no change in mass is a physical change.	Change of mass is observed in a chemical change.
The energy changes in a physical change are quite small.	The changes in energy are large in a chemical change.

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

Ans: The given concentration of the solution is 40%.

Therefore, 100 gm of the solution contains 40 g of H_2SO_4

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

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

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

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

So, $= \frac{100}{1.3}$ of the solution contains $40\ g$ of H_2SO_4

Therefore, $100\ ml$ of solution will contain

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

$= 52\ g$ of H_2SO_4

Therefore, the concentration is $52\%(m/v)$.

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

Ans: In a solid, the forces of attraction between the particles are very high and hence the particles of a solid will be very close to each other and the inter particle distance is least.

In a liquid, the forces of attraction between the particles are very weak and therefore the particles of a liquid will not be closely packed with each other and the inter particle distance is large.

In a gas, the forces of attraction between the particles are almost negligible or extremely weak and therefore the particles of a gas are very loosely packed and are very far from each other and the inter particle distance is largest.

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

Ans: When the particles are at higher temperature, their movements are fast and therefore they can travel up to several meters. Hence the hot food's smell will be reaching us several meters away.

At lower temperatures, the movements of particles are not very fast and particles do not have enough kinetic energy to travel a distance of several meters. Therefore we have to go close to smell cold food.

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

Ans: A wooden chair is a rigid object, the particles of a wooden chair are tightly packed with each other, the chair has a definite shape and the chair has negligible compressibility. Since a wooden chair possesses all the properties of a solid and not of a liquid, it should be called a solid not a liquid.

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

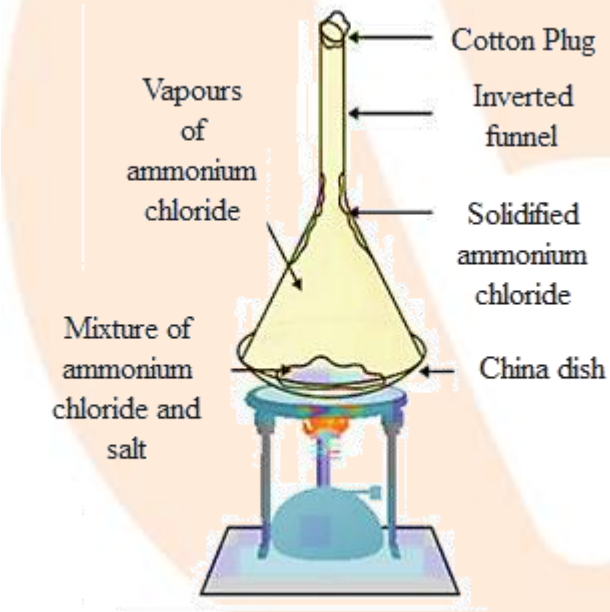
Ans: Experiment for representing the sublimation of ammonium chloride (NH_4Cl):

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

b) With the help of a burner, heat the ammonium chloride (NH_4Cl) crystals.

c) When the ammonium chloride (NH_4Cl) crystal is heated, vapours of (NH_4Cl) and the Ammonium chloride (NH_4Cl) which is solidified along the walls at the beaker's upper end is observable.

d) This experiment shows that solid ammonium chloride (NH_4Cl) undergoes solidification. It directly changes to vapour state from solid state, it does not convert into liquid.



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

Ans: The process of distillation is used for separating the components of a mixture containing two liquids, having different boiling points and both liquids boil without decomposition.

The process of fractional distillation is used for separating the components of a mixture containing more than two liquids having boiling point difference less than $25\ K$.

The basic property that separates these two methods is:

Using distillation we can separate only those components which have a significant difference in their boiling points. While fraction distillation is used when the difference in boiling points is less.