Question 1:

Which of the following are matter?

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

Answer:

Anything that occupies space and has mass is called matter. Matter can exist in three physical states—solid, liquid, and gaseous.

Chair and almond are forms of matter in the solid state.

Cold drink is a liquid state of matter.

Air and smell of perfume are gaseous states of matter.

Note: The sense of smell is not matter. However, the smell or odour of a substance is classified as matter. The smell of any substance (say, perfume) is the gaseous form of that substance which our olfactory system can detect (even at very low concentrations). Hence, smell of perfume is matter.

Question 2:

Give reasons for the following observation:

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

Answer:

Solids diffuse at a very slow rate. But, if the temperature of the solid is increased, then the rate of diffusion of the solid particles into air increases. This is due to an increase in the kinetic energy of solid particles. Hence, the smell of hot sizzling food reaches us even at a distance, but to get the smell from cold food we have to go close.

Question 3:

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

Answer:

The ability of a diver to cut through water in a swimming pool shows that matter is made up of particles.

Question 4:

What are the characteristics of particles of matter?

Answer:

The characteristics of particles of matter are**:**

(i) Particles of matter have spaces between them.

(ii) Particles of matter are continuously moving.

(iii) Particles of mater attract each other.

Exercise:

Question 1:

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 chimney, honey, water, chalk, cotton, and iron.

Answer:

The given substances in the increasing order of their densities can be represented as:

Air < Exhaust from chimney < Cotton < Water < Honey < Chalk < Iron

Question 2:

(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.

Answer:

(a) The differences in the characteristics of states of matter are given in the following table.

S. No.	**Solid state**	**Liquid state**	**Gaseous state**
1.	Definite shape and volume.	No definite shape. Liquids attain the shape of the vessel in which they are kept.	Gases have neither a definite shape nor a definite volume.
2.	Incompressible	Compressible to a small extent.	Highly compressible
3.	There is little space between the particles	These particles have a greater space between	The space between gas particles is the

	of a solid.	them.	greatest.
4.	These particles attract each other very strongly.	The force of attraction between liquid particles is less than solid particles.	The force of attraction is least between gaseous particles.
5.	Particles of solid cannot move freely.	These particles move freely.	Gaseous particles are in a continuous, random motion.

(b) **Rigidity** can be expressed as the tendency of matter to resist a change in shape.

Compressibility is the ability to be reduced to a lower volume when force is applied.

Fluidity is the ability to flow.

By **filling a gas container** we mean the attainment of shape of the container by gas.

Shape defines a definite boundary.

Kinetic energy is the energy possessed by a particle due to its motion.

Density is mass per unit volume.

Question 3:

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.

Answer:

(a) There is little attraction between particles of gas. Thus, gas particles movefreely in all directions. Therefore, gas completely fills the vessel in which it is kept.

(b) Particles of gas move randomly in all directions at high speed. As a result, theparticles hit each other and also hit the walls of the container with a force. Therefore, gas exerts pressure on the walls of the container.

(c) A wooden table has a definite shape and volume. It is very rigid and cannot be compressed i.e., it has the characteristics of a solid. Hence, a wooden table should be called a solid.

(d) Particles of air have large spaces between them. On the other hand, wood has little space between its particles. Also, it is rigid. For this reason, we can easily move our hands in air, but to do the same through a solid block of wood, we need a karate expert.

Question 4:

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

Answer:

The mass per unit volume of a substance is called density (density = mass/volume). As the volume of a substance increases, its density decreases.

Though ice is a solid, it has large number of empty spaces between its particles. These spaces are larger as compared to the spaces present between the particles of water. Thus, the volume of ice is greater than that of water. Hence, the density of ice is less than that of water. A substance with lower density than water can float on water. Therefore, ice floats on water.

Question 1:

Convert the following temperature to Celsius scale:

(a) 300 K

(b) 573 K

Answer:

(a) 300 K = (300 − 273)°C

= 27°C

(b)573 K = (573 − 273)°C

= 300°C

Question 2:

What is the physical state of water at:

(a) 250°C

(b) 100°C

Answer:

(a) Water at 250°C exists in gaseous state.

(b) At 100°C, water can exist in both liquid and gaseous form. At this temperature, after getting the heat equal to the latent heat of vaporization, water starts changing from liquid state to gaseous state.

Question 3:

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

Answer:

During a change of state, the temperature remains constant. This is because all the heat supplied to increase the temperature is utilised in changing the state by overcoming the forces of attraction between the particles. Therefore, this heat does not contribute in increasing the temperature of the substance.

Question 4:

Suggest a method to liquefy atmospheric gases.

Answer:

By applying pressure and reducing the temperature, atmospheric gases can be liquefied.

Question 1:

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

Answer:

When a liquid evaporates, the particles of the liquid absorb energy from the surroundings to compensate the loss of energy during evaporation. This makes the surroundings cool.

In a desert cooler, the water inside it is made to evaporate. This leads to absorption of energy from the surroundings, thereby cooling the surroundings. Again, we know that evaporation depends on the amount of water vapour present in air (humidity). If the amount of water vapour present in air is less, then evaporation is more. On a hot dry day, the amount of water vapour present in air is less. Thus, water present inside the desert cooler evaporates more, thereby cooling the surroundings more. That is why a desert cooler cools better on a hot dry day.

Question 2:

How does water kept in an earthen pot (*matka)* become cool during summers?

Answer:

There are some pores in an earthen pot through which the liquid inside the pot evaporates. This evaporation makes the water inside the pot cool. In this way, water kept in an earthen pot becomes cool during summers.

Question 3:

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

Answer:

When we put some acetone or petrol or perfume on our palm, it evaporates. During evaporation, particles of the liquid absorb energy from the surrounding or the surface of the palm to compensate for the loss of energy, making the surroundings cool. Hence, our palm feels cold when we put some acetone or petrol or perfume on it.

Question 4:

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

Answer:

A liquid has a larger surface area in a saucer than in a cup. Thus, it evaporates faster and cools faster in a saucer than in a cup. For this reason, we are able to sip hot tea or milk faster from a saucer than a cup.

Question 5:

What type of clothes should we wear in summers?

Answer:

We should wear cotton clothes in summers. During summers, we sweat more. On the other hand, cotton is a good absorber of water. Thus, it absorbs sweat from our body and exposes the liquid to the atmosphere, making evaporation faster. During this evaporation, particles on the surface of the liquid gain energy from our body surface, making the body cool.

Question 1:

Convert the following temperatures to Celsius scale.

(a) 300 K

(b) 573 K

Answer:

Kelvin is an SI unit of temperature, where 0°C = 273.16 K (approximately 273 K)

(a) 300 K = (300 − 273) °C

= 27 °C

(b) 573 K = (573 − 273) °C

= 300 °C

Question 2:

Convert the following temperatures to Kelvin scale.

(a) 25°C

(b) 373°C

Answer:

Kelvin is an SI unit of temperature, where 0°C = 273.16 K (approximately 273 K)

(a) 25 °C = (25 + 273) K

= 298 K

(b) 373 °C = (373 + 273) K

= 646 K

Question 3:

Give reason for the following observations.

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

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

Answer:

(a) Naphthalene undergoes sublimation easily i.e., the change of state of naphthalene from solid to gas takes place easily. Thus, naphthalene balls disappear with time without leaving any solid.

(b) Gaseous particles possess high speed and large spaces between them. Particles of perfume diffuse into these gaseous particles at a very fast rate and reach our nostrils. This enables us to smell the perfume from a distance.

Question 4:

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

Answer:

Sugar is a solid; the forces of attraction between the particles of sugar are strong. Water is a liquid; the forces of attraction here are weaker than sugar. Oxygen is a gas; the forces of attraction are the weakest in gases.

Thus, the increasing order of forces of attraction between the particles of water, sugar and oxygen is

Oxygen < Water < Sugar

Question 5:

What is the physical state of water at−−

(a) 25°C

(b) 0°C

(c) 100°C

Answer:

(a) Water at 25°C is present in the liquid state.

(b) At 0 °C, water can exist as both solid and liquid. At this temperature, after getting the heat equal to the latent heat of fusion, the solid form of water i.e., ice starts changing into its liquid form i.e., water.

(c) At 100 °C, water can exist as both liquid and gas. At this temperature, after getting the heat equal to the latent heat of vaporization, water starts changing from its liquid state to its gaseous state, i.e., water vapours.

Question 6:

Give two reasons to justify−

(a) water at room temperature is a liquid.

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

Answer:

(a) At room temperature (25 °C), water is a liquid because it has the following characteristic of liquid:

(i) At room temperature, water has no shape but has a fixed volume that is, it occupies the shape of the container in which it is kept.

(ii) At room temperature, water flows.

(b) An iron almirah is a solid at room temperature (25 °C) because:

(i) it has a definite shape and volume like a solid at room temperature.

(ii) it is rigid as solid at room temperature.

Question 7:

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

Answer:

Ice at 273 K has less energy than water (although both are at the same temperature). Water possesses the additional latent heat of fusion. Hence, at 273 K, ice is more effective in cooling than water.

Question 8:

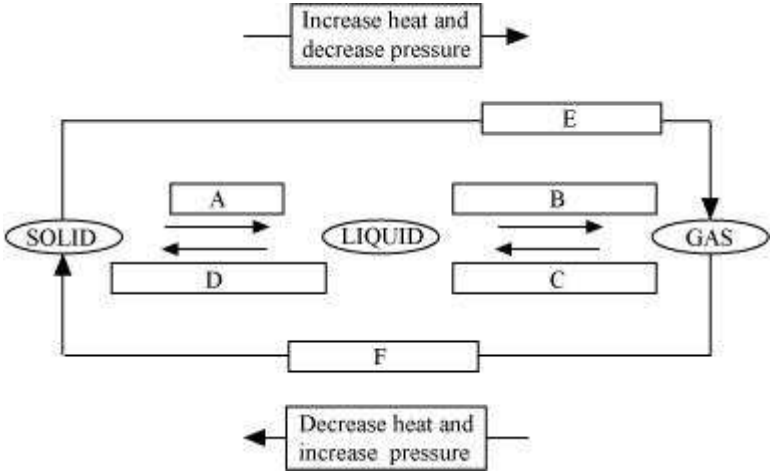
What produces more severe burns, boiling water or steam?

Answer:

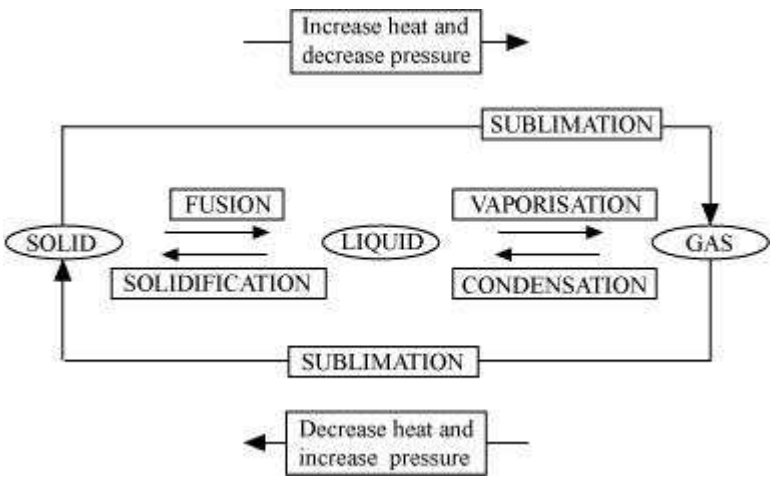
Steam has more energy than boiling water. It possesses the additional latent heat of vaporization. Therefore, burns produced by steam are more severe than those produced by boiling water.

Question 9:

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



Answer:



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