Lakhmir Singh solutions for class 9 chemistry Chapter 1 Matter and Surroundings

Question 1:

What are the conditions for 'something' to be called 'matter'?

ANSWER:

The main conditions for something to be matter are, it should:
(a) occupy space and
(b) have mass

Question 2:

Name two processes which provide the best evidence for the motion of particles in matter.

ANSWER:

Diffusion and Brownian motion, provide the best evidence about the random motion of particles in matter.

Question 3:

Which single term is used to describe the mixing of copper sulphate and water kept in a beaker, on its own?

ANSWER:

Diffusion is the single term, which is used to describe the mixing of copper sulphate with water in a beaker on its own.

Question 4:

When sugar is dissolved in water, there is no increase in the volume. Which characteristic of matter is illustrated by this observation?

ANSWER:

The absence of increase in volume of water on dissolution of sugar into it, describes the following characteristics of matter:
(a) Matter is made up of very, very small particles.
(b) Particles of matter have spaces between them.

Question 5:

Even two or three crystals of potassium permanganate can impart colour to a very large volume of water. Which characteristic of particles of matter is illustrated by this observation?

ANSWER:

When crystals of potassium permanganate are placed at the bottom of a beaker of water, water in the whole beaker turns pink on its own. This process represents that matter is made up of small particles which diffuse from a region of higher concentration to a region of lower concentration. The phenomenon involved is known as diffusion.

Question 6:

When an incense stick (*agarbatti*) is lighted in one corner of a room, its fragrance spreads in the whole room quickly. Which characteristic of the particles of matter is illustrated by this observation?

ANSWER:

The spreading of fragrance of incense stick from a corner to the whole room indicates that particles of matter keep moving from higher to lower concentration.

Question 7:

A piece of chalk can be broken into small particles by hammering but a piece of iron cannot be taken into small particles by hammering. Which characteristic of the particles of matter is illustrated by these observations?

ANSWER:

Matter is made up of small particles which attract each other. This force of attraction differs from substance to substance. Chalk breaks easily on hammering while iron does not. This

shows that particles of iron attract each other with a greater force than the particles of chalk.

Question 8:

What is the scientific name of particles which make up mater?

ANSWER:

Atoms or molecules are the scientific names of particles that make up matter.

Question 9:

Name the process by which a drop of ink spreads in a beaker of water.

figure

ANSWER:

Diffusion is the process by which a drop of ink spreads in a beaker containing water.

Question 10:

What is the general name of :
(a) rigid form of matter ?
(b) fluid forms of matter ?

ANSWER:

(a) Rigid form of matter is called 'solid'.
(b) Fluid form of matter is called 'liquid' or 'gas'.

Question 11:

Out of solids, liquids and gases, which one has :
(a) maximum movement of particles ?
(b) maximum interparticle attractions ?
(c) minimum spaces between particles ?

ANSWER:

Among solids, liquids and gases;
(a) A gas has maximum movement of particles.
(b) A solid has maximum inter-particle attraction.
(c) A solid has minimum space between the particles.

Question 12:

'A substance has definite volume but no definite shape'. State whether this substance is a solid, a liquid or a gas.

ANSWER:

This substance is a liquid, as liquid has a definite volume but no definite shape.

Question 13:

Name the physical state of matter which can be easily compressed.

ANSWER:

Gases can be compressed easily into small volumes because there are large spaces between their particles.

Question 14:

'A substance has a definite shape as well as a definite volume'. Which physical state is represented by this statement?

ANSWER:

Solids are the substances which have a definite shape and a definite volume.

Question 15:

A substance has neither a fixed shape nor a fixed volume. State whether it is a solid, a liquid or a gas.

ANSWER:

Gases have neither a fixed shape nor a fixed volume; they acquire the shape and volume of the vessel in which they are kept.

Question 16:

Name two gases which are supplied in compressed form in homes and hospitals.

ANSWER:

The two gases which are supplied in compressed form are:
(i) LPG (Liquefied petroleum gas) in homes and
(ii) Oxygen in hospitals.

Question 17:

Write the full forms of the following
(a) LPG
(b) CNG

ANSWER:

LPG: Liquefied Petroleum Gas
CNG:Compressed Natural Gas

Question 18:

Which of the two diffuses faster : a liquid or a gas?

ANSWER:

Gases diffuse faster compared to liquids because the particles of gases have more space between them and have higher kinetic energy.

Question 19:

Which of the two diffuses slower : bromine vapour into air or copper sulphate into water?

ANSWER:

Copper sulphate diffuses slower in water as compared to bromine vapour in air because the rate of diffusion is faster in gases than in liquids.

Question 20:

State whether the following statement is true or false :
Red-brown bromine vapour diffuse into air in a gas jar but the colourless air molecules do not diffuse into bromine vapour.

ANSWER:

The statement given here is false. Air also diffuses into the bromine vapour but because air is colourless, we are not able to see its movement.

Question 21:

A bottle of perfume was opened in a room. The smell of its vapours spread in the entire room. Name the property of gases which is responsible for this behaviour of perfume vapours.

ANSWER:

When a bottle of perfume in opened, fragrance of perfume spreads in the whole room. This behaviour is due to larger spaces in between the tiny particles of gas and their random movements which leads to the process of diffusion.

Question 22:

If the fish is being fried in a neighbouring home, we can smell it sitting in our own home. Name the process which brings this smell to us.

ANSWER:

The vapours of the fried fish travel from one place to another through the process of diffusion.

Question 23:

Name one property of liquids and gases which tells us that their molecules are moving constantly.

ANSWER:

Diffusion is one property of liquids and gases which shows that their molecules are moving constantly.

Question 24:

Fill in the following blanks with suitable words :
(a) The best evidence that the particles of matter are constantly moving comes from the studies of ..... and .....
(b) The smell of perfume gradually spreads across a room due to .....
(c) Solid, liquid and gas are the three ..... of matter.
(d) At room temperature, the forces of attraction between the particles of solid substances are ..... then those which exist in the gaseous state.
(e) The arrangement of particles is less ordered in the ..... state. However, there is no order in the ..... state .

ANSWER:

(a) The best evidence of the particles of matter are constantly moving comes from the studies of diffusion and Brownian motion.
(b) The smell of perfume gradually spreads across a room due to diffusion.
(c) Solid, liquid and gas are the three states of matter.
(d) At room temperature, the forces of attraction between the particles of solid substances are much more than those which exist in the gaseous state.
(e) The arrangement of particles is less ordered in the liquid state. However, there is no order in the gaseous state.

Question 25:

State two characteristics of matter demonstrated by :
(a) diffusion.
(b) Brownian motion.

ANSWER:

(a) The characteristics of matter demonstrated by diffusion are :
1) Matter is made up of tiny particles.
2) The particles of matter have large space in between them.

(b) The characteristics of matter demonstrated by Brownian motion are :
1) The matter is made up of tiny particles.
2) Particles move randomly and collide with one another.

Question 26:

Name the scientist who studied the movement of pollen grains suspended in water through a microscope. What is this phenomenon known as?

ANSWER:

Robert Brown studied the movement of pollen grains suspended in water through a microscope. He observed that the pollen grains moved in a zigzag motion. This phenomenon is called Brownian motion and it provides an evidence for existence and movement of particles.

Question 27:

When a crystal of potassium permanganate is placed in a beaker, its purple colour spreads throughout the water. What does this observation tell us about the nature of potassium permanganate and water?

ANSWER:

The particles of potassium permanganate and water mix on their own without any stirring. Two conclusions can be drawn from this phenomenon. These are:
(1) Potassium permanganate and water are made up of very tiny particles.

(2) Water particles have large spaces between them which are occupied by the tiny potassium permanganate particles.

Question 28:

When a gas jar containing air is inverted over a gas jar containing bromine vapour, the red-brown bromine vapour diffuse into air. Explain how bromine vapour diffuse into air.

ANSWER:

Both air and bromine vapour are made up of tiny moving particles, which collide with each other and bounce about in all directions due to which both the gas particles mix uniformly. This is an example of diffusion.

Question 29:

Describe in your own words, what happens to the particles when salt dissolves in water.

ANSWER:

Both salt and water are made up of tiny particles that are invisible under the microscope. When salt dissolves in water, the tiny salt particles occupy the spaces between the water particles and mix with them, thus giving a salty taste to the water. When we mix salt with water there is no increase in the volume of water, as the salt particles take up the inter-molecular spaces of water.

Question 30:

Explain why, we can easily move our hand in air but to do the same through a plank of wood, we need a karate expert.

ANSWER:

We can move our hand easily in air because the force of attraction between the particles of air is very small, as there are large inter-molecular spaces in air. However, we can’t move our hand through a plank of wood because the force of attraction between the particles of wood, which is a solid substance, is very strong and the inter-molecular spaces are

negligible. That is the reason why we can't move our hand through a plank of wood and need a karate expert to do so.

Question 31:

Give one example of the diffusion of a solid in another solid.

ANSWER:

Diffusion of solid into another solid is an extremely slow process. This is because the particles of solids do not move from their fixed positions and only vibrate.
When two metal blocks are placed close to each other and are left undisturbed for a few years, the particles of one metal diffuse into the other.

Question 32:

Explain why, the diffusion of a solid in another solid is a very slow process.

ANSWER:

The diffusion of one solid into another is a very slow process because their particles do not have appreciable flow and only vibrate, as their positions are fixed.

Question 33:

Which of the following diffuses fastest and which the slowest?
Solid, Liquid, Gas
Give reasons for your answer.

ANSWER:

Gases diffuse fastest and solids diffuse slowest when we compare solids, liquids and gases.

Explanation: Gases diffuse fast because the force of attraction between their particles is very low or negligible and there are vast spaces between the particles. The force of attraction between the particles of solids is very strong and there is no space between the particles due to their compact arrangement. As a result, rate of diffusion in solids is slowest.

Question 34:

Explain the following :
When an incense stick is lighted in the corner of a room, its fragrance spreads quickly in the entire room.

ANSWER:

The fragrance of lit incense stick spreads quickly in the room because the particles of matter are continuously moving in all directions. Both air and fragrance of incense stick have large intermolecular spaces. Due to this, the particles of one can easily occupy the inter-molecular spaces of the other.

Question 35:

Name the three states of matter. Give one example of each.

ANSWER:

The three states of matter and their examples are as follows:
(a) Solid: wood
(b) Liquid: water
(c) Gas: air

Question 36:

State two characteristic properties each of :
(a) a solid
(b) a liquid
(c) a gas

ANSWER:

(1) The characteristics of solids are listed below:
(a) Solids have fixed shape and fixed volume.
(b) The particles of solid are very densely packed.

(2) The characteristics of liquids are listed below:
(a) Liquids have a fixed volume but have no fixed shape.

(b) Liquids generally flow easily.

(3) The characteristics of gases are listed below:
(a) Gases have neither a fixed shape nor fixed volume.
(b) Gases can be compressed easily into smaller volumes.

Question 37:

Why do gases have neither a fixed shape nor a fixed volume?

ANSWER:

Gases do not have fixed shape and volume because they have very small inter-molecular force of attraction and large inter-molecular space.
Since, the particles of a gas are free to move anywhere, it takes the shape and volume of the container.

Question 38:

How do solids, liquids and gases differ in shape and volume?

ANSWER:

Solids: Solids have a fixed shape and fixed volume.
Liquids: Liquids do not have a fixed shape but have a fixed volume.
Gases: Gases neither have a fixed shape nor a fixed volume.

Question 39:

Arrange the following substances in increasing order of force of attraction between their particles (keeping the substance having the minimum force of attraction first) :
Water, Sugar, Oxygen

ANSWER:

Oxygen (gas), water (liquid) and sugar (solid).
Gases have the least force of attraction between their particles while the particles of solids have the maximum force of attraction.

Question 40:

Give two reasons to justify that :
(a) Water is a liquid at room temperature.
(b) An iron almirah is a solid.

ANSWER:

(a) Water is a liquid at room temperature due to the following characteristics:
(i) Water has fixed volume, but no fixed shape.
(ii) Water flows freely.

Particles of water have large intermolecular spaces between them and intermolecular force of attraction between these particles is small. These characteristics facilitates water to behave like a liquid.

(b)An iron almirah is a solid at room temperature because:
(i) The iron almirah has fixed shape and volume.
(ii) Particles of the iron almirah do not flow freely and have fixed positions.

Particles of iron have a very little intermolecular space between themselves and intermolecular force of attraction between these particles is very strong. These characteristics facilitates iron to behave like a solid.

Question 41:

(a) When an incense stick (*agarbatti*) is lighted in one corner of a room, its fragrance quickly spreads in the entire room. Name the process involved in this.
(b) A girl is cooking some food in the kitchen. The smell of food being cooked soon reaches her brother's room. Explain how the smell could have reached her brother's room.

ANSWER:

(a) Diffusion is the process by which the smell of a lighted incense stick spreads in the entire room.
(b) The smell of food is reaching her brother’s room because the particles of matter are constantly moving from one place to another place, through the process of diffusion.

Question 42:

(a) What does the diffusion of gases tell us about their particles?
(b) Give one example of diffusion of gases in a liquid.

ANSWER:

(a) The diffusion of gases tells us that:
(1) Matter consists of tiny particles, that have space between them.
(2) The particles of matter are in constant motion.

(b) The example of diffusion of gases in liquids is:
(1) Oxygen (gas) gets dissolved in blood (liquid) during the process of respiration.

Question 43:

Give reason for the following observation :
The smell of hot sizzling food reaches us even from a considerable distance but to get the smell from cold food, we have to go close to it.

ANSWER:

The aroma of hot, sizzling food reaches us very easily even when we are far away from it, but the aroma of cold food reaches us only when we are near it because the rate of diffusion of a hot gas is faster than cold gas. When the gas is hot, the particles have greater kinetic energy and they move faster; therefore, they have a higher rate of diffusion.

Question 44:

Explain how, the smell of food being cooked in the kitchen reaches us even from a considerable distance.

ANSWER:

The smell of food cooked in the kitchen reaches us even from a considerable distance because the tiny particles of the vapour of food mix with the air and move continuously in all directions. This process is called diffusion.

Question 45:

Explain why, when a bottle of perfume is opened in a room, we can smell it even from a considerable distance.

ANSWER:

When a bottle of perfume is opened in a room, the particles of perfume, start diffusing into the air surrounding the bottle. These particles of perfume keep moving towards a region of lower concentration by the virtue of their kinetic energy. Thus, when a bottle of perfume is opened, we can smell perfume even from a distance.

Question 46:

When a crystal of copper sulphate is placed at the bottom of a beaker containing water, the water slowly turns blue. Why?

ANSWER:

When a crystal of copper sulphate is placed at the bottom of a beaker containing water, the particles or molecules of copper sulphate start diffusing into the particles or molecules of water. The particles of water have large inter-molecular spaces between themselves, which are slowly occupied by the particles of copper sulphate; thereby, turning the water blue.

Question 47:

Honey is more viscous than water. Can you suggest why?

ANSWER:

Honey is more viscous than water because inter-molecular force of attraction between honey particles is more than that of water molecules.

Question 48:

Explain why :
(a) air is used to inflate tyres.
(b) steel is used to make railway lines.

ANSWER:

(a) Air is used to inflate tyres because air can take the shape of any substance that it is pushed into, as there are large inter-molecular spaces present in air. Thus, when air is filled in a tyre, its particles distribute themselves evenly by diffusion inside the tyre, giving it a proper balance. Liquid can be filled in a tyre but it will exert more pressure than the atmospheric pressure and there will be chances of tyre getting burst. Besides, it will unnecessarily increase the weight of the vehicle.

(b) Steel is used to make railway lines because the particles of steel have fixed positions and show no free movement. This ensures that there will be no change in the shape of the railway lines, which makes it safe to travel.

Question 49:

Explain why, diffusion occurs more quickly in a gas than in a liquid.

ANSWER:

Diffusion occurs faster in a gas because the kinetic energy of particles in gaseous state is much higher than in liquid which makes the particles move faster. Thus, diffusion occurs easily and faster in gas particles.
In liquids, there is lesser space to move and also, the kinetic energy of particles is lower than gas particles. Collisions between the particles while moving, are more frequent between the molecules in liquids, resulting in a slower rate of diffusion.

Question 50:

(a) What is meant by 'diffusion'? Give one example of diffusion in gases.
(b) Why do gases diffuse very fast?
(c) Name two gases of air which dissolve in water by diffusion. What is the importance of this process in nature?

ANSWER:

(a) Diffusion: In Latin, the word “diffusion” means to “spread out”. Diffusion is the mixing of a substance with another substance due to the motion of its particles. It is one of the several transport phenomena that occur in nature. The spreading of the smell of perfume in the whole room is an example of diffusion.

(b) Gases diffuse very fast because of the presence of large spaces between the gaseous particles and high kinetic energy of these molecules. They diffuse faster than the other states of matter.

(c) The gases which dissolve in water by diffusion are carbon dioxide and oxygen. Carbon dioxide dissolved in water bodies is essential for the survival of the aquatic plants as they use this carbon dioxide to make food by photosynthesis. Oxygen dissolved in water is used by aquatic animals for breathing.

Question 51:

(a) Compare the properties of solids, liquids and gases in tabular form.
(b) Give two reasons for saying that wood is a solid.

Figure

ANSWER:

(a)

SOLID	LIQUID	GAS
Solids have a fixed shape and a fixed volume.	Liquids have a fixed volume, but no fixed shape.	Gases have neither a fixed volume nor a fixed shape.
Solids cannot be compressed.	Liquids can be compressed. Large pressure is required to compress them.	Gases can be compressed easily.
Solids have high density.	Liquids have lesser density than solids.	Gases have the least density among the three.
The force of attraction between the particles is very strong.	The intermolecular force of attraction is weaker than solids	The intermolecular force of attraction is weakest.
The space between the particles of solids is negligible.	They have considerable space between the particles.	The space between gas particles is large.

(b) Wood is a solid because it has a fixed shape and volume, and it is rigid and cannot be compressed.

Question 52:

(a) Why does a gas exert pressure?
(b) Why does a gas fill a vessel completely?
(c) Why are gases so easily compressible whereas it is almost impossible to compress a solid or a liquid?

ANSWER:

(a) When gas is stored in a container, the fast moving particles of the gas collide with each other and with the walls of the container; thus, exerting pressure on the walls of container.

(b) As we know, gases have large inter-molecular space and weak inter-molecular force of attraction. Due to these properties, gases do not have a fixed shape and volume and particles of gases move freely in the vessel. Therefore, the gas particles spread out and move away from each other filling the vessel completely.

(c) Gases are easily compressible as they have large inter-molecular spaces. The gas particles can come closer to each other when external pressure is applied on gases.
On the other hand, it is almost impossible to compress a liquid because the intermolecular spaces in liquids are small. The particles in a solid are very close to each other. So, they cannot be compressed by applying external pressure.

Question 53:

(a) Define matter. Give four examples of matter.
(b) What are the characteristics of matter?

ANSWER:

(a) Matter: Anything that occupies space and has mass is known as matter.

The examples of matter are iron, wood, air and water.

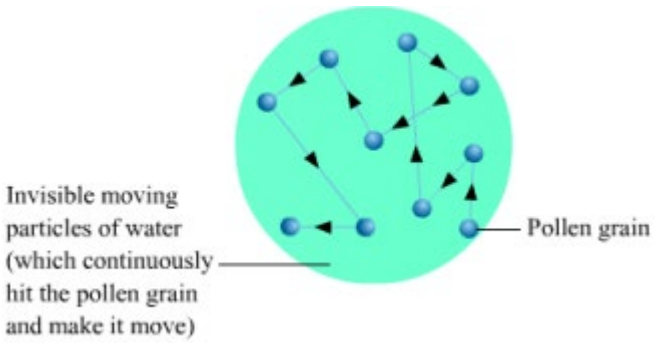
(b) The characteristics of matter are:
(i) Matter is made up of tiny particles.
(ii) The particles of matter attract each other.
(iii) The particles of matter have spaces between them.
(iv) The particles of matter are constantly moving.

Question 54:

(a) What is Brownian motion? Draw a diagram to show the movement of a particle (like a pollen grain during Brownian motion.)
(b) In a beam of sunlight entering a room, we can sometimes see dust particles moving in a haphazard way in the air. Why do these dust particles move?

ANSWER:

(a) The zigzag movement of the small particles suspended in a liquid or a gas is called Brownian motion.



(b) When a beam of sunlight enters a room, suspended dust particles are seen moving haphazardly. This is because the dust particles are constantly hit by the fast moving particles of air and due to this remain suspended despite gravity acting on them. This is an example of Brownian motion.

Question 55:

When a crystal of potassium permanganate is placed at the bottom of water in a beaker, the water in the whole beaker turns purple on its own, even without stirring. This is an example of :
(a) distribution
(b) intrusion
(c) diffusion
(d) effusion

ANSWER:

(c) Diffusion

Both water and potassium permanganate are made up of tiny particles. The particles of potassium permanganate are coloured while those of water are colourless. When the crystals of potassium permanganate are kept in water, the purple-coloured crystals of potassium permanganate break further into

smaller particles that occupy the space between the molecules of water imparting a purple colour to the water.

Question 56:

Which one of the following statement is correct in respect of fluids?
(a) only gases behave as fluids
(b) gases and solids behave as fluids
(c) gases and liquids behave as fluids
(d) only liquids are fluids

ANSWER:

(c) Gases and liquids behave as fluids

Gases and liquids behave as fluids because fluids are the substances that have the ability to flow. Gases and liquids can flow easily because their particles are free to move.

Question 57:

A few substances are arranged in the increasing order of 'forces of attraction' between their particles. Which one of the following represents the correct arrangement?
(a) water, air, wind
(b) air, sugar, oil
(c) oxygen, water, sugar
(d) salt, juice, air

ANSWER:

(c) Oxygen, water, sugar

The above order is correct because the forces of attraction is more in solids compared to liquids and gases. Forces of attraction is least in gases.

Question 58:

In which of the following conditions, the distance between the molecules of hydrogen gas would increase?

(i) increasing pressure on hydrogen contained in a closed container
(ii) some hydrogen gas leaking out of the container
(iii) increasing the volume of the container of hydrogen gas
(iv) adding more hydrogen gas to the container without increasing the volume of the container

(a) (i) and (iii)
(b) (i) and (iv)
(c) (ii) and (iii)
(d) (ii) and (iv)

ANSWER:

(c) both ii and iii

The condition in which hydrogen gas would leak out of the container or if there is an increase in volume of the container in which hydrogen is present, would bring about more distance between the molecules of hydrogen gas.

Question 59:

Out of the following, an example of matter which can be termed as fluid is :
(a) carbon
(b) sulphur
(c) oxygen
(d) phosphorus

ANSWER:

(c) oxygen

Oxygen can be considered to be a fluid because oxygen is a gas and its particles are completely free to move. So, they have the ability to flow.

Question 60:

The best evidence for the existence and movement of particles in liquids was provided by :
(a) John Dalton

(b) Ernest Rutherford
(c) J.J. Thomson
(d) Robert Brown

ANSWER:

(d) Robert Brown

The best evidence for the existence and movement of particles in liquids was provided by the Robert Brown. For this experiment, he used pollen grains in water.

Question 61:

A form of matter has no fixed shape but it has a fixed volume. An example of this form of matter is :
(a) krypton
(b) kerosene
(c) carbon steel
(d) carbon dioxide

ANSWER:

(b) Kerosene

Liquids have no fixed shape but have a fixed volume. Among the given options, only kerosene is a liquid.

Question 62:

Which of the following statement is incorrect?
(a) the particles of matter are very, very small
(b) the particles of matter attract one another
(c) the particles of some of the matter are moving constantly
(d) the particles of all the matter have spaces between them

ANSWER:

(c) The particles of some forms of matter move constantly

The statement that the particles of some forms of matter move constantly is incorrect because the particles of matter of all three states– solid, liquid and

gas –are moving constantly. Although the particles of solids are fixed at their positions, they vibrate constantly.

Question 63:

When a gas jar full of air is placed upside down on a gas jar full of bromine vapours, the red-brown vapours of bromine from the lower jar go upward into the jar containing air. In this experiment :
(a) air is heavier than bromine
(b) both air and bromine have the same density
(c) bromine is heavier than air
(d) bromine cannot be heavier than air because it is going upwards against gravity

ANSWER:

(c) Bromine is heavier than air

The process occurring here is diffusion and it is unaffected by the mass. Therefore, bromine being heavier, mixes with the colourless air.

Question 64:

When a gas jar containing colourless air is kept upside down over a gas jar full of brown-coloured bromine vapour, then after some time, the brown colour of bromine vapour spreads into the upper gas jar making both the gas jars appear brown in colour. Which of the following conclusion obtained from these observations is incorrect?
(a) bromine vapour is made of tiny particles which are moving
(b) air is made up of tiny particles which are moving
(c) the particles of bromine are moving but those of air are not moving
(d) even though bromine vapour is heavier that air, it can move up against gravity

ANSWER:

(c) The particles of bromine are moving but those of air are not moving

The statement that the particles of bromine are moving but those of air are not moving is incorrect because the particles of matter are constantly in motion. It appears as if the air molecules are not moving because air is colourless.

Question 65:

Which one of the following statements is not true?
(a) the molecules in a solid vibrate about a fixed position
(b) the molecules in a liquid are arranged in a regular pattern
(c) the molecules in a gas exert negligibly small forces on each other, except during collisions
(d) the molecules of a gas occupy all the space available

ANSWER:

(b) The molecules in a liquid are arranged in regular pattern

The above answer is not true because in liquids the molecules are not arranged in regular pattern. In liquids the molecules are loosely arranged.

Question 66:

Look at the diagram on the right side. Jar A contains a red-brown gas whereas jar B contains a colourless gas. The two gas jars are separated by a galas plate placed between them
(a) What will happen when the glass plate between the two jars is pulled away?
(b) What name is given to the phenomenon which takes place?
(c) Name the brown gas which could be in jar A.
(d) Which is the colourless gas most likely to be present in jar B?
(e) Name one coloured solid and one colourless liquid which can show the same phenomenon.

Figure

ANSWER:

(a) When the glass plate between the two jars is pulled away then the red brown gas will diffuse from jar A into colourless jar B and vice versa, due to which the red brown colour will spread into jar B.
(b) The phenomenon occurring here is diffusion.
(c) Bromine vapour.
(d) Air.
(e) Potassium permanganate (coloured solid) and water (colourless liquid) also show the same phenomenon.

Question 67:

Bromine and air take about 15 minutes to diffuse completely but bromine diffuses into a vacuum very rapidly. Why is this so?

ANSWER:

Bromine diffuses slowly in air because the motion of bromine particles is obstructed due to the collision with the moving air particles. But bromine diffuses very rapidly in vacuum because in vacuum there is no gas, and the motion of the particles of bromine gas is not obstructed by any other particle. Therefore, the diffusion rate in vacuum is high.

Question 68:

Bromine particles are almost twice as heavy as chlorine particles. Which gas will diffuse faster; bromine (vapour) or chlorine? Explain your answer.

ANSWER:

Chlorine particles will diffuse faster than bromine particles. This is because lighter molecules diffuse faster than heavier molecules.

Question 69:

Why is liquid (the hydraulic fluid) used to operate the brakes in a car?

ANSWER:

A liquid is always used to operate the brakes in a car. This is because the particles in brake oil can move freely without being compressed much and thus can transmit the applied force into pressure, which is applied on the brakes efficiently.

Question 70:

Explain why, a small volume of water in a kettle can fill a kitchen with steam.

ANSWER:

A small volume of water heated in a kettle produces water vapour, which being a gas, spreads in the room due to weak inter-molecular forces of attraction between the vapour particles and very high kinetic energy.

Question 71:

Explain why, osmosis can be considered to be a special kind of diffusion. Classify the following into
(i) osmosis, and (ii) diffusion :
(a) swelling up of a raisin on keeping in water
(b) spreading of virus on sneezing
(c) earthworm dying on coming in contact with common salt
(d) shrinking of grapes kept in thick sugar syrup
(e) preserving of pickles in salt
(f) spreading of smell of cake being baked in the kitchen
(g) aquatic animals using oxygen dissolved in water during respiration

ANSWER:

Osmosis is considered to be a special kind of diffusion because it takes place only through a semi-permeable membrane, which allows only solvent particles to pass through it.

(i) Osmosis: a, c, d and e
(ii) Diffusion: b, f and g.

Question 72:

A student placed a gas jar containing air in the upside down position over a gas jar full of red-brown bromine vapours. He observed that the red-brown colour spread upwards into the jar containing air. Based on this observation, the student concluded that it is only the bromine vapour which moves up and diffuses into air in the upper jar, the air from the upper jar does not move down by diffusion into the lower jar containing bromine vapours. Do you agree with this conclusion of the student? Give reason for your answer.

ANSWER:

No, the conclusion made by the student is wrong because the air from the upper gas jar also diffuses down into the lower gas jar containing bromine vapour. Since, air is colourless it cannot be noticed by the student.

Question 73:

An inflated balloon full of air goes down slowly (becomes smaller and smaller slowly) even though the knot at the mouth of the balloon is airtight. And after a week all the air has escaped from the balloon. Explain how the air particles got out of the balloon.

ANSWER:

The fast moving molecules of air trapped in the inflated balloon exert continuous pressure on the thin, stretched rubber sheet of balloon and keep on diffusing out through it gradually. Therefore, the air escapes out of the balloon after some time.

Question 74:

When extremely small particles X derived from the anther of a flower were suspended in a liquid Y and observed through a microscope, it was found that the particles X were moving throughout the liquid Y in a very zig-zag way. It was also observed that warmer the liquid Y, faster the particles X moved on its surface.
(a) What could particles X be ?
(b) What do you think liquid Y is ?
(c) What is the zig-zag movement of X known as ?
(d) What is causing the zig-zag movement of particles X ?
(e) Name the scientist who discovered this phenomenon.
(f) What does this experiment tell us about the nature of liquid Y?

ANSWER:

(a) The particles, 'X' are pollen grains.
(b) The fluid, 'Y' is Water.
(c) The zigzag movement of 'X' is called Brownian motion.
(d) The zigzag motion of the pollen grains occurs because the particles of water are in constant motion. These particles collide with the pollen grains and cause them to move.
(e) Robert Brown is the scientist who discovered Brownian motion.
(f) Liquid Y is made up of extremely small particles, which are moving constantly.

Question 75:

When a beam of sunlight enters a room through a window, we can see tiny particles X suspended in a gas (or rather a mixture of gases) Y which are moving rapidly in a very haphazard manner.
(a) What could particles X be ?
(b) Name the gas (or mixture of gases) Y.
(c) What is the phenomenon exhibited by particles X known as ?
(d) What is causing the movement of particles X ?
(e) What conclusion does the existence of this phenomenon give us about the nature of matter ?

ANSWER:

(a) The particles, 'X' are dust particles.
(b) Gas 'Y' is Air.
(c) This phenomenon being exhibited by 'X' particles is called the Brownian motion.
(d) The fast moving air molecules are constantly hitting the tiny dust particles, causing them to move rapidly in a very haphazard manner.
(e) The gaseous matter ‘air’ is made up of tiny particles that are constantly moving.

Question 1:

The boiling point of water is 100° C. Express this in SI units (Kelvin scale).

ANSWER:

Temp. on Kelvin scale = Temp. on Celsius scale + 273 therefore, boiling point of water :

100 + 273 = 373 K.

Question 2:

The Kelvin temperature is 270 K. What is the corresponding Celsius scale temperature ?

ANSWER:

Temp. on Celsius scale = Temp. on Kelvin scale - 273 therefore,

270 – 273 = – 3°C

Question 3:

Convert the temperature of 573 K to the Celsius scale.

ANSWER:

Temp. on Celsius scale = Temp. on Kelvin scale – 273

573 – 273 = 300° C

Question 4:

Convert the temperature of 373° C to the Kelvin scale.

ANSWER:

Temp. on Kelvin scale = Temp. on Celsius scale + 273

373 + 273 = 646 K

Question 5:

The boiling point of alcohol is 78° C. What is this temperature on Kelvin scale ?

ANSWER:

Given boiling point of alcohol = 78°C
Temperature in K scale = (Temperature in °C + 273)K

Therefore, boiling point of alcohol in K,
78 + 273 = 351 K

Question 6:

The Kelvin scale temperature is 0 K. What is the corresponding Celsius scale temperature ?

ANSWER:

Temperature in °C = Temperature in K - 273.

Therefore,
0 K = 0 - 273°C
= -273°C

Question 7:

Give the usual name for the following :
Heat required to change the state of a substance without changing the temperature.

ANSWER:

The heat required to change the state of a substance without changing its temperature is called latent heat.

Question 8:

What is the (*a*) common unit of temperature, and (*b*) SI unit of temperature ?

ANSWER:

(i) Common unit of temperature: ° Celsius.
(ii) SI unit of temperature: Kelvin.

Question 9:

Write the relation between Kelvin scale and Celsius scale of temperature.

ANSWER:

The relation between Kelvin scale and Celsius scale of temperature is:
Temp. on Kelvin scale = Temp. on Celsius scale + 273

Question 10:

What should be added to a Celsius scale reading so as to obtain the corresponding Kelvin scale reading ?

ANSWER:

273K has to be added to a Celsius scale reading to get the corresponding Kelvin scale reading as per the international standards.

Question 11:

What is meant by saying that the latent heat of fusion of ice is 3.34×10^5 J/kg ?

ANSWER:

The latent heat of fusion of ice is 3.34×10^5 J/Kg means that 3.34×10^5J of heat is required to change 1 kg of ice into water at its melting point at the same temperature.

Question 12:

What is meant by saying that the latent heat of vaporisation of water is 22.5×10^5 J/kg ?

ANSWER:

The latent heat of vaporisation of water is means that 22.5×10^5 Joules of heat is required to convert 1 kg of water into steam at its boiling point at the same temperature.

Question 13:

Name the temperature at which :
(a) a liquid changes into a gas.
(b) a solid changes into a liquid.

ANSWER:

(i) The temperature at which a liquid change into gas is called boiling point.
(ii) The temperature at which a solid change into liquid is called melting point.

Question 14:

Name one common substance which can be easily changed from one state to another by heating or cooling.

ANSWER:

Water can be easily changed from one state to another by heating or cooling.

Question 15:

What is the name of the process in which :
(a) a solid turns directly into a gas ?
(b) a gas turns directly into a solid ?

ANSWER:

The names of the processes are:
(i) Solid turns into gas – sublimation
(ii) Gas turns directly into solid – sublimation

Question 16:

Name one property which is shown by ammonium chloride but not by sodium chloride.

ANSWER:

‘Sublimation’ is the property that is shown by ammonium chloride but not by sodium chloride.

Question 17:

What is the name of the process due to which dry ice changes into carbon dioxide gas ?

ANSWER:

‘Sublimation’ causes dry ice to change into carbon dioxide.

Question 18:

What is the common name of solid carbon dioxide ?

ANSWER:

The common name of solid carbon dioxide is dry ice.

Question 19:

Why is solid carbon dioxide known as dry ice ?

ANSWER:

Solid carbon dioxide is known as dry ice because it resembles ice and does not melt on heating. When we heat solid carbon dioxide it directly gets converted to vapour without passing through the liquid state.

Question 20:

State one condition necessary to liquefy gases (other than applying high pressure).

ANSWER:

Cooling or lowering the temperature is necessary to liquefy gases, other than applying high pressure.

Question 21:

State whether the following statement is true or false :
Solid carbon dioxide is stored under low pressure.

ANSWER:

Solid carbon dioxide stored at low pressure is a false statement because at low pressure it turns into vapour.

Question 22:

What is the chemical name of dry ice ?

ANSWER:

The chemical name of dry ice is carbon dioxide. It is the solid form of CO^2.

Question 23:

Fill in the following blanks with suitable words :
(a) Gases can be liquefied by applying ..... and lowering .....
(b) When steam condenses to form water, heat is .....
(c) Temp on Kelvin scale = Temp on Celsius scale + ...
(d) Scientists say that there are actually five states of matter : solid, liquid, gas, ... and .....
(e) The state of matter called ..... makes a fluorescent tube (or neon sign bulb) to glow.

ANSWER:

(a) Gases can be liquefied by applying <u>high pressure</u>, and lowering <u>temperature</u>.
(b) When steam condenses to form water, heat is <u>released</u>.
(c) Temp. on Kelvin = Temp. on Celsius scale + <u>273</u>
(d) Scientists say that are actually five states of matter: solid, liquid, gas, <u>plasma</u> and <u>Bose Einstein condensate</u>.
(e) The state of matter called <u>plasma</u> makes a fluorescent tube (or neon sign bulb) to glow.

Question 24:

What do you understand by the term 'latent heat' ? What are the two types of latent heat ?

ANSWER:

Latent heat: The heat energy that has to be supplied to change the state of a substance without changing the temperature of the substance is called its latent heat.
The two types of latent heat are:
(i) Latent heat of fusion
(ii) Latent heat of vaporisation

Question 25:

Why is heat energy needed to melt a solid ? What is this heat energy called ?

ANSWER:

Heat energy is needed to melt a solid because heat energy increases the kinetic energy of particles, which is sufficient enough to break the attraction or bond between the particles and they start moving faster. As a result, there is a change in the state of matter from solid to liquid.
This heat energy is called latent heat of fusion.

Question 26:

Under what conditions heat can be given to a substance without raising its temperature ?

ANSWER:

When a substance is melted or vaporised, heat is constantly absorbed but the temperature doesn't rise because of latent heat of fusion or latent heat of vaporisation.

Question 27:

Why does the temperature remain constant during the melting of ice even though heat is supplied continuously ?

ANSWER:

The temperature remains constant during the melting of ice because the heat supplied to the ice is used for changing the solid ice to liquid. The latent heat absorbed by the solid ice is used for breaking the inter-molecular force rather than increasing the temperature of ice.

Question 28:

Why does the temperature remain constant during the boiling of water even though heat is supplied continuously ?

ANSWER:

This is because the heat supplied is absorbed by the water particles and this heat increases the kinetic energy of all particles, which weakens the force of attraction between the particles and they start moving freely. As a result, water is converted into gas. This heat energy is called latent heat of vaporisation.

Question 29:

Explain why, ice at 0° C is more effective in cooling than water at the same temperature.

ANSWER:

Ice at 0°C is more effective in cooling than water at the same temperature, because ice absorbs the latent heat of 3.34 × 105 joules from the substance and cools it effectively. On the other hand, water at the same temperature doesn't take any heat from the substance.

Question 30:

Would you cool a bucket of water more quickly by placing it on ice or by placing ice in it ? Give reasons for your answer.

ANSWER:

We can cool a bucket of water quicker when we keep ice inside the bucket because ice cubes absorb more and more heat from the liquid system in which it is present, cooling the liquid system quickly. But when we put water in ice, the ice comes in contact with the bucket and absorbs the latent heat from both the water and bucket. Therefore, the effectiveness of cooling is reduced.

Question 31:

Why does steam cause more severe burns than boiling water ?

ANSWER:

Steam can be more dangerous than boiling water because steam contains more heat in the form of latent heat, as compared to boiling water at the same temperature. When steam falls on skin and condenses to form water, it gives out 22.5×10^5 J/kg more heat than boiling water at the same temperature as in boiling water, heat being taken up is being used to form steam.

Question 32:

Which contains more heat, 1 kg of ice of 0° C or 1 kg of water at 0° C ? Give reason for your answer.

ANSWER:

Latent heat of fusion of ice is 3.34×10^5 J/kg. It means that 3.34×10^5 J of heat is required to change 1 kg of ice at 0°C into water at the same temperature. It means that 1 kg of water at 0°C has 3.34×10^5 J more energy than 1 kg of ice at the same temperature.

To put it simply, when water is cooled, as soon as the temperature reaches 0°C, the latent heat of fusion from water starts getting removed and it starts getting converted into ice. Water converts into ice when heat is removed, and thus, 1kg of water contains more heat than 1kg of ice at the same temperature.

Question 33:

Which contains more heat, 1 kg of water at 100° C or 1 kg of steam at 100° C ? Give reason for your answer.

ANSWER:

Latent heat of vaporisation of water is 22.5×10^5 J/kg. It means that 22.5×10^5 J of heat is required to change 1 kg of water at 100°C into steam at the same temperature. It means that 1 kg of steam at 100°C has 22.5×10^5 J more energy than 1 kg of water at the same temperature.

In other words, when the temperature of water is raised, it starts getting converted into steam, as soon as the latent heat of vaporization is achieved. Since, water gets converted into steam on gaining heat, steam has more heat than water at the same temperature, in this case, 100°C. Steam gets converted into water on loosing this heat.

Question 34:

Explain why, steam at 100° C is better for heating purposes than boiling water at 100° C.

ANSWER:

Steam at 100°C has more heat than water at the same temperature. Water gets converted into steam on gaining heat. Due to this latent heat of vaporisation, steam at 100°C is better for heating than boiling water at 100°C.

Question 35:

Which produces more severe burns : boiling water or steam ? Why ?

ANSWER:

Since, water gets converted into steam at 100°C by gaining heat equal to its latent heat of vaporization and thus, steam is hotter than water at 100°C and causes more severe burns compared to water. Steam contains more heat in the form of latent heat of vaporisation as compared to boiling water, which possesses less heat.

Question 36:

Why does the temperature of a substance remain constant during the change of state ?

ANSWER:

All substances change their state by gaining or loosing heat equal to their latent heat. On gaining heat kinetic energy of molecules increases and vice versa. During the change in state of matter, heat being absorbed or released, is utilized for bringing about a change in kinetic energy of molecules and not for rising or loosing the temperature. Therefore, the temperature of a substance remains constant during change in state.

Question 37:

What is the physical state of water :
(a) at 0°C ?
(b) at 25°C ?
(c) at 100°C ?
(d) at 250°C ?

ANSWER:

The physical states of water:
(i) at 0°C - ice

(ii) at 25°C- water
(iii) at 100°C- vapour
(iv) at 25°C- steam

Question 38:

Explain why, there is no rise in temperature of a substance when it undergoes a change of state though heat is supplied continuously.

ANSWER:

There is no rise in the temperature of a substance when it undergoes a change of state though heat is being supplied because heat is used to overcome inter-molecular force of attraction between the particles of the substance during a change in physical state.

Question 39:

Define 'melting point' of a substance ? What is the melting point of ice ?

ANSWER:

Melting point: the melting point of a substance is defined as the temperature at which a solid substance melts into a liquid at atmospheric pressure.
The melting point of ice is 0°C.

Question 40:

Define 'boiling point' of a substance ? What is the boiling point of water ?

ANSWER:

Boiling point: the boiling point of a substance is defined as the temperature at which liquid boils and changes rapidly into a gas at atmospheric pressure. The boiling point of water is 100°C.

Question 41:

Define the following terms :
(a) Melting
(b) Boiling

ANSWER:

(a) Melting: The process by which a solid changes into a liquid on heating at atmospheric pressure, is called melting.

(b) Boiling: The process by which a liquid changes into a gas rapidly on heating at atmospheric pressure, is called boiling.

Question 42:

Define the following terms :
(a) Condensation
(b) Freezing

ANSWER:

(a) Condensation: It is a process in which a gas changes into a liquid on cooling.
(b) Freezing : It is a process in which a liquid changes into a solid on cooling.

Question 43:

Explain why, naphthalene balls kept in stored clothes in our homes disappear over a period of time.

ANSWER:

Naphthalene or mothballs kept between clothes disappear over a period of time because naphthalene balls undergo sublimation and form naphthalene vapours, which disappear into the air.

Question 44:

Explain briefly, how gases can be liquefied.

ANSWER:

Gases can be liquefied by applying high pressure and lowering the temperature. Lowering the temperature decreases the kinetic energy of molecules of gas, and increasing the pressure, decreases the space between these particles. Both these effects, cause the molecules to come closer and lead to increase in the intermolecular force of attraction between these molecules. As a result, gas converts into liquid.

Question 45:

How is ammonia gas liquefied ?

ANSWER:

Ammonia gas can be liquefied by applying high pressure and lowering the temperature i.e. by compression and cooling, respectively.

Question 46:

How does applying pressure (or compression) help in the liquefaction of a gas ?

ANSWER:

We can liquefy gases either by applying pressure (compression). There is a lot of space between the particles of a gas as they have very high kinetic energy and they keep moving randomly. We reduce the spaces between the particles of a gas by compressing it. If enough pressure is applied, the particles of gases start attracting each other. This force brings about a change in the state of matter from gas to liquid.

Question 47:

How does perspiration or sweating help keep our body cool on a hot day ?

ANSWER:

High temperature in the surroundings rises our body temperature. This rise in the body temperature is accompanied with secretion of sweat from the sweat glands. This sweat absorbs the body heat to achieve its latent heat of vaporization and evaporates. In the process, body temperature decreases due to release of body heat to sweat.

Question 48:

Why does all the water of the earth not get evaporated during hot summer days ?

ANSWER:

Evaporation is a surface phenomenon and can cause vaporization only at the surface. Not all the water on earth is exposed to sun's heat as most of this water remains below the surface of various water bodies. Besides, some water on earth is in the form of ground water laying below the ground surface, where the atmospheric heat cannot cause much effect.
Moreover, not all the parts of Earth receive summers at the same time. Rate of evaporation will be slow or evaporation might be altogether absent at places where summers are yet to start. Similarly, evaporation is also effected by humidity and wind patterns which are local phenomena. Therefore, a place at a particular time might receive a rainfall while at the same time an adjacent geographic region has a high temperature and bright sun. Thus, all the water on Earth's surface cannot evaporate altogether.

Question 49:

If the back of your hand is moistened with alcohol, you will find that it rapidly becomes dry. Why is it that while it is drying, your hand feels cool ?

ANSWER:

Alcohol is a volatile liquid. It evaporates very fast by absorbing heat from surroundings. When our hand is moistened with alcohol, drops of alcohol absorb heat from the hand to achieve latent heat of vaporization and evaporate. As the hand loses heat to alcohol, it feels cool. This is an example of cooling by evaporation.

Question 50:

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

ANSWER:

A desert cooler cools better in a hot, dry day because higher temperature and dryness of air increases the rate of evaporation of water from the cooler, causing an enhanced cooling effect. When humidity is high and/or temperature is low, rate of evaporation decreases and cooling subdues or decreases.

Question 51:

How does the water kept in an earthen pot (*matka*) become cold during summer ?

ANSWER:

An earthen pot has a large number of extremely small pores on its wall. Some of the water, continuously keeps seeping through these pores. This water evaporates continuously and absorbs its latent heat, required for vaporization from the earthen pot and the remaining water in the pot. In this way, the remaining water loses heat and gets cooled.

Question 52:

What type of clothes should we wear in summer ? Why ?

ANSWER:

In summer, we should wear cotton clothes or white clothes because cotton absorbs sweat easily and exposes it to the air for evaporation. Evaporation of this sweat keeps our body cool. In addition, white colour reflects sunlight, keeping the heat away from the body.

Question 53:

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

ANSWER:

We are able to sip hot tea or milk faster from a saucer rather than from a cup because saucer has a larger surface area due to which evaporation occurs faster. The vapours take up the latent heat from hot milk or tea kept in the saucer faster, than in a cup which has a smaller surface area than the saucer and make the contents of the saucer cool down faster.

Question 54:

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

ANSWER:

Our palm feels cool when we put acetone over it because acetone takes up the latent heat of vaporisation to change into vapour from our palm.

Question 55:

How will you demonstrate that water vapour is present in air ?

ANSWER:

The presence of water vapour in air can be shown by the following experiment:

Take a steel tumbler and put some well-crushed ice into it and wipe its surface with a clean dry cloth, so as to make its surface completely dry. Allow it to stand for 5 minutes. A large number of drops of water vapour appear on the outer surface of the tumbler. This happens because the air around the steel tumbler contains water vapour in it. When this water vapour comes into contact with the cold outside surface of the steel tumbler, it condenses to form tiny drops of liquid water. The formation of tiny drops of water outside the steel tumbler containing crushed ice, shows the presence of water vapour in air.

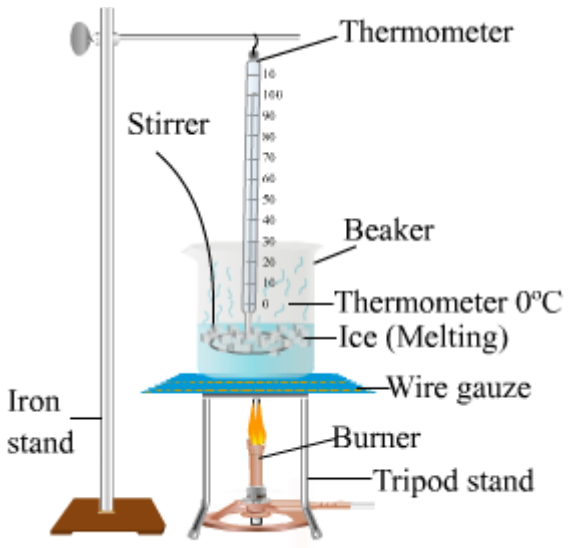
Question 56:

(a) Define the term 'latent heat of fusion' of a solid. How much is the latent heat of fusion of ice ?
(b) Draw a labelled diagram of the experimental set-up to study the latent heat of fusion of ice.

ANSWER:

(a) The latent heat of fusion of a solid is the quantity of heat in joules required to convert 1 kg of the solid into liquid, at its melting point, without any change in temperature.
The latent heat of fusion of ice is 3.34×10^5 J/kg.

(b) The diagram below shows the experiment set up to study the latent heat of fusion of ice.



Latent heat of fusion

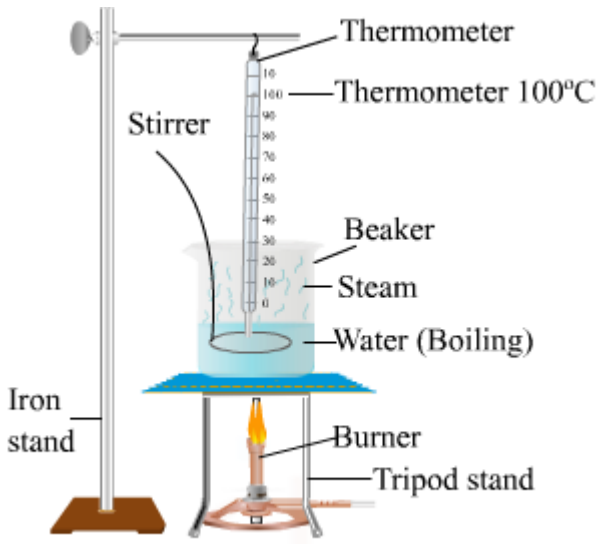
Question 57:

(a) Define the term 'latent heat of vaporisation' of a liquid. What is the value of the latent heat of vaporisation of water ?
(b) Draw a labelled diagram of the experimental set-up to study the latent heat of vaporisation of water.

ANSWER:

(a) Latent heat of vaporisation of a liquid is the quantity of heat in joules required to convert 1 kilogram of the liquid at its boiling point to gas or vapour, without any change in temperature.
The latent heat of vaporisation of water is 22.5×10^5 J/kg.

(b) The diagram below shows the experiment set up to study the latent heat of vaporisation of water.



atent heat of vaporisation

Question 58:

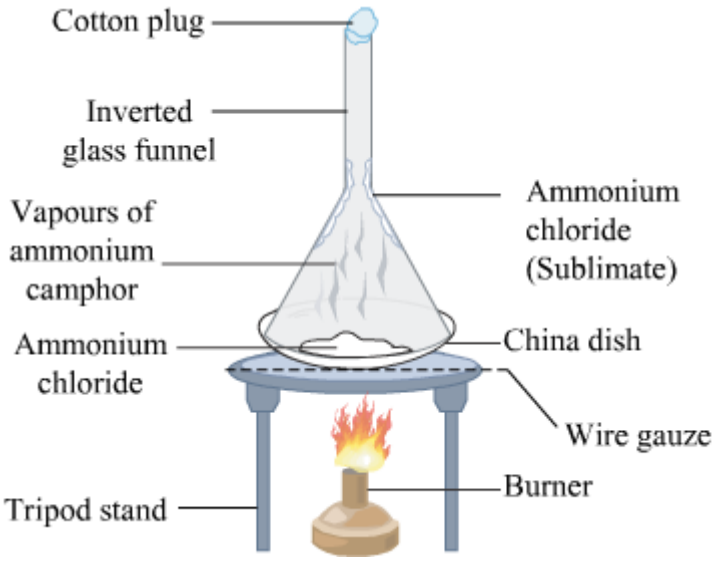
(a) What is sublimation ? Name two substances (other than ammonium chloride) which undergo sublimation.
(b) Draw a labelled diagram of the experimental set-up to demonstrate the sublimation of ammonium chloride.

ANSWER:

(a) Sublimation: The change of a solid directly into vapour on heating and of vapour into solid on cooling is known as sublimation.
Iodine and camphor are the compounds which undergo sublimation.

(b) The diagram below shows the experiment set up to study the sublimation of ammonium

chloride.

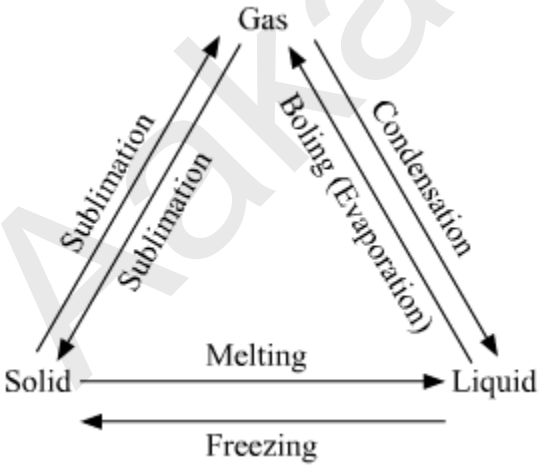


Question 59:

(a) What are the two ways in which the physical states of matter can be changed ?
(b) Draw the 'states of matter triangle' to show the interconversion of states of matter.
(c) How can the evaporation of a liquid be made faster ?

ANSWER:

(a) The physical state of the matter can be changed either by melting or boiling.
(b) The diagram below shows the “states of matter triangle” that demonstrate the inter-conversion of states of matter.



(c) The evaporation of liquids can be increased:
(1) Increasing the temperature of liquid

(2) Increasing the surface area of liquid
(3) Increasing the wind speed

Question 60:

(a) What is evaporation ? State the various factors which affect evaporation.
(b) Why does evaporation cool a liquid ?

ANSWER:

(a) Evaporation is the process by which a liquid changes into vapour form, below its boiling point. The factors that affect evaporation are:
(i) Temperature
(ii) Surface area
(iii) Humidity
(iv) Wind speed

(b) Evaporation cools the surroundings and the rest of the liquid because when a liquid evaporates, it takes up the latent heat of vaporisation from the surroundings and the rest of the liquid present below the surface with which, it is in contact.

Question 61:

Which of the following are also considered to be the states of matter ?
(i) Plasma
(ii) Platelets
(iii) BEC
(iv) BHC

(a) (i) and (ii)
(b) (ii) and (iii)
(c) (i) and (iii)
(d) (ii) and (iv)

ANSWER:

(c) (i) and (iii)

Plasma and BEC (Bose Einstein condensate) are also considered as states of matter because plasma is mixture of free atoms and ions and BEC occupies space and has mass.

Question 62:

One of the following does not undergo sublimation. This one is :
(a) iodine
(b) sodium chloride
(c) ammonium chloride
(d) camphor

ANSWER:

(b) sodium chloride
Sodium chloride does not undergo sublimation because it does not show direct change from solid state to liquid state.

Question 63:

Which of the following process/processes release heat ?
(i) condensation
(ii) vaporisation
(iii) freezing
(iv) melting

(a) only (i)
(b) only (iv)
(c) (i) and (iii)
(d) (ii) and (iv)

ANSWER:

(c) (i) and (iii)

Both condensation and freezing release heat that lead to decrease in kinetic energy of molecules. When the substance gets cool enough its particles become slower or stop their movement and change their phase into liquid and solid on condensing and freezing respectively.

Question 64:

If the temperature of an object is 268 K, it will be equivalent to :
(a) – 50°C
(b) + 50°C
(c) 368°C
(d) – 25°C

ANSWER:

(a) –5°C
We have to subtract 273 from the given value to get the answer i.e.
268 – 273 = –5 °C

Question 65:

The boiling point of ethane is – 88°C. This temperature will be equivalent to :
(a) 285 K
(b) 288 K
(c) 185 K
(d) 361 K

ANSWER:

(c) 185 K
We have to add 273 to the given value to get the answer i.e.
–88 + 273 = 185 K

Question 66:

When heat is constantly supplied by a gas burner with small flame to melt ice, then the temperature of ice during melting :
(a) increases very slowly
(b) does not increase at all
(c) first remains constant and then increases
(d) increases to form liquid water

ANSWER:

(b) does not increase at all
During melting, temperature of the ice does not change at all because the heat is used in overcoming the particle-particle attraction forces, which in turn keeps the temperature constant.

Question 67:

When water at 0°C freezes to form ice at the same temperature of 0°C, then it :
(a) absorbs some heat
(b) releases some heat
(c) neither absorbs nor releases heat
(d) absorbs exactly 3.34×10^5 J/kg of heat

ANSWER:

(b) releases some heat

At 0°C, water releases some heat to lower the speed of molecules, and when it is cool enough the molecules of water are fixed at one position and they start vibrating. Ultimately, the water molecules convert into ice (solid).

Question 68:

When heat is constantly supplied by a burner to boiling water, then the temperature of water during vaporisation :
(a) rises very slowly
(b) rises rapidly until steam is produced
(c) first rises and then becomes constant
(d) does not rise at all

ANSWER:

(d) Does not rise at all

Temperature of the water during vaporisation does not change at all because the heat is used in overcoming particle-particle attraction forces, which in turn keeps the temperature constant.

Question 69:

The latent heat of fusion of ice is :
(a) 33.4×10^5 J/kg
(b) 22.5×10^5 J/kg
(c) 33.4×10^4 J/kg
(d) 22.5×10^4 J/kg

ANSWER:

(c) 33.4×10^4J/kg

This value is fixed and is found by performing the experiment in lab.

Question 70:

The latent heat of vaporisation of water is :
(a) 2.25×10^6 J/kg
(b) 3.34×10^6 J/kg
(c) 22.5×10^4 J/kg
(d) 33.4×10^5 J/kg

ANSWER:

(a) 2.25×10^5J/kg

This value is fixed and is found by performing the experiment in the lab.

Question 71:

Which one of the following set of phenomena would increase on raising the temperature ?
(a) diffusion, evaporation, compression of gases
(b) evaporation, compression of gases, solubility
(c) evaporation, diffusion, expansion of gases
(d) evaporation, solubility, diffusion, compression of gases

ANSWER:

(c) evaporation, diffusion, expansion of gases

The rates of evaporation, diffusion and expansion of gases increases due to increase in

temperature because when temperature increases the kinetic energy of molecules increases, which breaks or weakens the interaction between the atoms and sets the molecules free.

Question 72:

Which of the following represent the suitable conditions for the liquefaction of gases ?
(a) low temperature, low pressure
(b) high temperature, low pressure
(c) low temperature, high pressure
(d) high temperature, high pressure

ANSWER:

(c) low temperature, high pressure

With the help of experiments it can be shown that at low temperature and high pressures, gases will liquefy. Because these factors affect the interaction force of molecules i.e. the molecules are able to establish a force of attraction between them on lowering the temperature and increasing pressure.

Question 73:

During summer days, water kept in an earthen pot (pitcher) becomes cool because of the phenomenon of :
(a) diffusion
(b) transpiration
(c) osmosis
(d) evaporation

ANSWER:

(d) evaporation

An earthen pot has a large number of extremely small pores on its wall. Some of the water continuously keeps seeping through these pores. This water evaporates continuously and takes the latent heat required for vaporization from the earthen pot and the remaining water. In this way, the remaining water loses heat and gets cooled.

Question 74:

On converting 25°C, 38°C and 66°C to Kelvin scale, the correct sequence of temperatures will be :
(a) 298 K, 311 K and 339 K
(b) 298 K, 300 K and 338 K
(c) 273 K, 278 K and 543 K
(d) 298 K, 310 K and 338 K

ANSWER:

(a) 298K, 311K and 339K

To convert the temperature scale from Celsius scale to Kelvin scale, just add 273K to the given values. Therefore, the temperature in Kelvin scale of 25º C, 38º C and 66º C will be 298K, 311K and 339K, respectively.

Question 75:

The conversion of a solid into vapours without passing through the liquid state is called :
(a) vaporisation
(b) fusion
(c) sublimation
(d) freezing

ANSWER:

(c) sublimation

The transformation of a solid directly into vapour, on heating, is known as sublimation.

Question 76:

The evaporation of water increases under the following conditions :
(a) increase in temperature, decrease in surface area
(b) increase in surface area, decrease in temperature
(c) increase in surface area, rise in temperature
(d) increase in temperature, increase in surface area, addition of common salt

ANSWER:

(c) increase in surface area, rise in temperature

When surface area increases and temperature rises, evaporation of water increases because the area which is exposed to the outer atmosphere is more and increasing the temperature leads to increase in the kinetic energy, due to which rate of evaporation increases.

Question 77:

On converting 308 K, 329 K and 391 K to Celsius scale, the correct sequence of temperatures will be :
(a) 33°C, 56°C and 118°C
(b) 35°C, 56°C and 119°C
(c) 35°C, 56°C and 118°C
(d) 56°, 119°C and 35°C

ANSWER:

(c) 35°C, 56°C, 118°C

Just subtract 273K from the given values to get the answer.

Question 78:

Which of the following energy is absorbed during the change of state of a substance ?
(a) specific heat
(b) latent heat
(c) heat capacity
(d) heat of solution

ANSWER:

(b) latent heat

Latent heat is absorbed because during change of state because it is the heat energy that has to be supplied to change the state of a substance.

Question 79:

Which of the following factors are responsible for the change in state of solid carbon dioxide when kept exposed to air ?
(i) increase in pressure
(ii) increase in temperature
(iii) decrease in pressure
(iv) decrease in temperature

(a) (i) and (ii)
(b) (i) and (iii)
(c) (ii) and (iii)
(d) (ii) and (iv)

ANSWER:

(c) (ii) and (iii)

Increase in temperature and decrease in pressure are the two factors responsible for the change of solid carbon dioxide into gas.

Question 80:

During respiration, glucose and oxygen enter our body cells and waste products carbon dioxide and water leave the body cells by the process of :
(a) effusion
(b) osmosis
(c) diffusion
(d) plasmolysis

ANSWER:

(c) diffusion

Because diffusion is a process in which there is a movement of particles from a region of high concentration to the one with low concentration across the cell membrane.

Question 81:

There are four substances W, X, Y and Z. The substance W is a dark violet solid having diatomic molecules. A solution of W in alcohol is used as a common antiseptic C. The substance X is a white solid which is usually recovered from sea water on a large scale. The substance Y is a whit solid which is insoluble in water and used in the form of small balls for the safe storage of woollen clothes. The substance Z is a yet another white solid which is used in making commonly used dry cells.

(a) Name (i) W (ii) X (iii) Y and (iv) Z.
(b) Out of W,X,Y and Z, which substance/substances can undergo sublimation?
(c) Which substance is organic in nature ?
(d) What is the name of substance C ?
(e) Which substance belongs to the halogen family ?

ANSWER:

(a) The names are :
(i) Iodine
(ii) Sodium chloride, which is commonly known as common salt
(iii) Naphthalene
(iv) Ammonium chloride

(b) In this 'W'-iodine, 'Y'-naphthalene and 'Z'- ammonium chloride that undergo sublimation.

(c) 'Naphthalene' is organic in nature.

(d) The name of the substance 'C' is tincture iodine.

(e) In this Iodine belongs to the halogen family.

Question 82:

The substance X normally exists in a physical state which can flow easily but does not fill its vessel completely. It also turns anhydrous copper sulphate blue. When substance X is cooled excessively, it changes into a substance Y which has a fixed shape as well as a fixed volume. If, however, the substance X is heated strongly, it changes into a substance Z which has neither a fixed shape nor a fixed volume.

(a) Name the substances (i) X (ii) Y and (iii) Z.
(b) What is the process of conversion of X into Y known as ?
(c) At which temperature X gets converted into Y ?

(d) What is the process of conversion of X into Z known as ?
(e) At which temperature X gets converted into Z ?

ANSWER:

(a) the substances X, Y and Z are water, ice and steam, respectively.
(b) The process of conversion of X into Y is known as freezing
(c) At 0°C X is converted to Y.
(d) Boiling or vaporisation is the name of the process of conversion of X to Z.
(e) At 100°C X gets converted to Z.

Question 83:

The scientists now say that there are actually five states of matter A, B, C, D and E. The state A has a fixed volume but no fixed shape. The state B can be compressed very easily by applying pressure and state C has a fixed shape as well as a fixed volume. The state D is a mixture of free electrons and ions whereas state E is named after an Indian scientist and a famous physicist.

(a) Name the physical states (i) A (ii) B (iii) C (iv) D, and (v) E
(b) Name one substance belonging to state C which can directly change into vapours on heating. What is this process known as ?
(c) Name one substance which normally belongs to state B but whose solid form changes directly into gaseous state.
(d) Name the most common substance belonging to state A.
(e) Which state of matter makes the sun and other stars to glow ?

ANSWER:

(a) The physical states are
(i) A-liquid
(ii) B-gas
(iii) C-solid
(iv) D-plasma and
(v) E-Bose-Einstein condensate (BEC).

(b) Ammonium chloride; and the name of the process is sublimation.

(c) Carbon dioxide

(d) Water

(e) Plasma is the state of matter that allows the sun and the other stars to glow.

Question 84:

When water is cooled to a temperature *x*, it gets converted into ice at temperature *x* by a process called P. And when ice at temperature *x* is warmed, it gets reconverted into water at the same temperature *x* in a process called Q.

(a) What is the value of temperature *x* in Kelvin ?
(b) What is the process P known as ?
(c) What is the name of energy released during process P ?
(d) What is the process Q known as ?
(e) What is the name of energy absorbed during process Q ?

ANSWER:

(a) 273K
(b) The name of the process is freezing.
(c) Latent heat of freezing
(d) Melting
(e) Latent heat of fusion

Question 85:

When water is heated to a temperature *x*, it gets converted into steam at temperature *x* by a process called R. And when steam at temperature *x* is cooled, it gets reconverted into water at the same temperature *x* by a process called S.

(a) How much is the value of *x* in Kelvin ?
(b) What is the process R called ?
(c) What is the name of the energy absorbed during the process R ?
(d) What is process S known as ?
(e) What is the name of energy released during the process S known as ?

ANSWER:

(a) The value of ‘x’ in Kelvin is 373K.
(b) Vaporisation or boiling
(c) Latent heat of vaporisation
(d) Condensation
(e) Latent heat of condensation