Assignments in Science Class IX (Term I)

1 The Matter in Our Surroundings

IMPORTANT NOTES

1. **Matter :** Anything which occupies space and has mass is called matter.
2. **Theory of molecular structure of matter.**
   (i) Matter (elements or compounds) consists of extremely small particles which are not visible to the unaided eye. The smallest particle of matter which can exist independently is known as **molecule.**
   (ii) The molecules are in the state of continuous motion, which does not stop with time. Due to the continuous motion all molecules have **kinetic energy.**
   (iii) The kinetic energy of the molecules **increases** with the **rise in temperature.**
   (iv) The kinetic energy of the molecules in the solids is **least**, in liquids **more than solids** and in gases **maximum.**
   (v) The spaces in between the molecules are called **intermolecular spaces**. The intermolecular spaces are **least** in case of solids, **more** in case of liquids and **maximum** in case of gases.
   (vi) The molecules attract each other with a force which is commonly called **intermolecular force.** It is **maximum** in case of solids and **least** in case of gases.
   (vii) The intermolecular forces **decrease** with the **increase in intermolecular spaces** and vice versa.
3. **Properties of Solids :**
   (i) They have definite shape and definite volume.
   (ii) They cannot be compressed easily.
   (iii) They are generally heavy and have high densities.
   (iv) They do not flow, but can be heaped.
   (v) They can have any number of free surfaces and do not need a vessel to contain them.
4. **Properties of Liquids :**
   (i) They have definite volume, but no definite shape. They take the shape of the containing vessel.
   (ii) They cannot be compressed easily.
   (iii) They are usually less dense than the solids.
   (iv) They do not fill the entire volume of a container.
   (v) They can flow and hence need a vessel to contain them.
5. **Properties of Gases :**
   (i) They have neither definite shape nor definite volume. They always acquire the shape and volume of the vessel containing them.
   (ii) They can be compressed easily.
   (iii) They are very, very light and hence have very low densities.
   (iv) They fill the entire volume of a container.
   (v) They can flow and hence need a vessel to contain them.
6. **Explanation of solids on the basis of kinetic model :** The molecules in a solid have very small kinetic energy and very small intermolecular spaces. Because of very small intermolecular spaces, they attract each other with very large intermolecular forces, such that they cannot change their positions. Thus, solids are rigid and have definite shape and definite volume. Furthermore, they cannot be compressed and have high densities.
7. **Explanation of liquids on the basis of kinetic model :** The molecules in a liquid have more kinetic energy and more intermolecular spaces as compared to solids. Because of large intermolecular spaces, they do not attract one another with strong intermolecular forces. Thus, molecules can change their positions within the liquid. So, liquids have definite volume, but not definite shape. They can flow and always take the shape of the containing vessel.
8. **Explanation of gases on the basis of kinetic model :** The molecules in a gas have very large intermolecular spaces and high kinetic energy as compared to solids and liquids. Because of very large intermolecular spaces, they do not

experience intermolecular forces. Thus, the molecules can move in all possible directions and fill the entire space of the containing vessel. So, gases have neither definite shape nor definite volume.

9. **Diffusion :** Intermixing of particles of two or more substances on their own is known as diffusion.

10. **Homogeneous material :** A material which has the same composition and same properties throughout is called a homogeneous material.

11. **Heterogeneous material :** A material which has different composition and different properties in different parts is called a heterogeneous material.

12. **Interconversion of matter :** The phenomenon due to which matter changes from one state to another state and back to the original state, by altering the conditions of temperature and pressure, etc. is known as interconversion of matter.

13. **Melting or fusion :** The process due to which a solid changes into the liquid state at a constant temperature by absorbing heat energy is known as melting or fusion.

14. **Freezing or solidification :** The process due to which a liquid changes into the solid state at a constant temperature by giving out heat energy is known as freezing or solidification.

15. **Melting point :** The constant temperature at which a solid changes into the liquid state by absorbing heat energy is called melting point.

16. **Freezing point :** The constant temperature at which a liquid changes into the solid state by giving out heat energy is called freezing point.

17. **Vaporisation or boiling :** The process due to which a liquid changes into the gaseous state at constant temperature by absorbing heat energy is known as vaporisation or boiling.

18. **Condensation or liquefaction :** The process due to which a gas changes into the liquid state at a constant temperature by giving out heat energy is known as condensation or liquefaction.

19. **Boiling point :** The constant temperature at which a liquid rapidly changes into the gaseous state by absorbing heat energy is known as boiling point.

20. **Liquefaction point :** The constant temperature at which a gas rapidly changes into its liquid state by giving out heat energy is known as liquefaction point.

21. **Sublimation :** The process due to which a solid directly changes into the gaseous state on heating without changing first into the liquid state and a gaseous state directly changes into the solid state on cooling is called sublimation.

22. **Sublime :** A gaseous form directly formed from a solid on heating is known as sublime.

23. **Sublimate :** A solid state of matter formed directly from its gaseous state on cooling is called sublimate.

24. **Boiling** is a bulk phenomenon in which particles from the whole of the liquid change into gaseous state.

25. **Evaporation :** It is a surface phenomenon in which energetic particles close to the surface of a liquid overcome intermolecular forces and atmospheric pressure and hence escape in air.

26. **Rate of evaporation increases** with (1) increase in surface area, (2) increase in the temperature of a liquid, (3) increase in the temperature of the surroundings (4) decrease in humidity (5) increase in the motion of air.

27. Evaporation takes place at **all temperatures below** the boiling point of a liquid.

28. Evaporation always causes **cooling.**

29. **Specific latent heat of fusion :** It is the amount of heat energy required to change 1 kg of a solid at its melting point into the liquid state, without rise in temperature at normal atmospheric pressure.

30. **Specific latent heat of vaporisation :** It is the amount of heat energy required to change of 1 kg of a liquid at its boiling point into the gaseous state, without rise in temperature at normal atmospheric pressure.

31. **Plasma :** It is the fourth state of matter, which is formed at extremely high temperature and consists of charged ions.

ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

I. VERY SHORT ANSWER QUESTIONS (1 Mark)

PREVIOUS YEARS' QUESTIONS

1. Why evaporation is called surface phenomenon? **[2010 (T-I)]**
2. List two processes from which it may be concluded that the particles of a gas move continuously. **[2010 (T-I)]**
3. At what temperature does solid ice and liquid water co-exist together? **[2010 (T-I)]**
4. What is common among the three states of matter? **[2010 (T-I)]**
5. Which property of gas is used in supplying oxygen cylinders to hospitals? **[2010 (T-I)]**

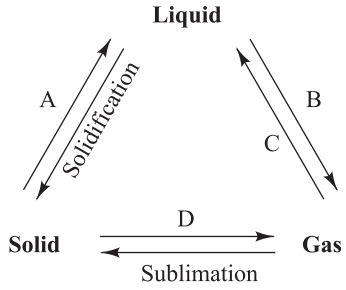
OTHER IMPORTANT QUESTIONS

1. Solid ⟶ Gas
   What is the above conversion called?
2. What is the gaseous form of a substance which exists as a liquid at room temperature known as?
3. Which entity is measured by the movement of the gas particles inside a vessel?
4. The phenomenon due to which the smell of perfume reaches us is known as _____.
5. Convert 300 K into degree Celsius.
6. What is the S.I unit of pressure?
7. Why are nylon clothes not preferred during summer?
8. "A fast process which involves a change of state from liquid to vapour in the entire mass of the liquid". Which process is described in the above statement?
9. Name the state of matter which consists of super energetic and super excited particles in the form of an ionised gas.
10. Why is water considered as a liquid and not a solid or a gas?
11. Steam at 373 K contains more heat energy than water at 373 K. Explain.
12. State the characteristic property of matter due to which it does not need a container for holding it.
13. When a swimmer cuts through the water in a swimming pool, which property of matter does it show?
14. Amongst the three states of matter, which state has the least kinetic energy?
15. What is the fifth state of matter known as?
16. Convert 373ºC to Kelvin temperature.
17. What is the physical state of water at 100ºC?
18. Why can a gas be compressed easily?
19. Napthalene balls disappear without leaving behind any residue. What is this conversion known as?

II. SHORT ANSWER QUESTIONS – I (2 Marks)

PREVIOUS YEARS' QUESTIONS

1. Name the SI unit of measuring temperature. The boiling point of water is 100°C under normal atmospheric pressure. Convert this temperature in SI units. **[2010 (T-I)]**
2. The following triangle exhibits interconversion of the three states of matter. Complete the triangle by labelling the arrows marked A, B, C and D.



[2010 (T-I)]

3. Give reasons for the following :

(a) Gases fill completely the vessel in which they are kept.

(b) Gases exert pressure on the walls of the containing vessel. **[2010 (T-I)]**

4. Convert the following temperatures to : **[2010 (T-I)]**

(a) Celsius scale (i) 313 K (ii) 370 K

(b) Kelvin scale (i) 23° C (ii) 73° C

5. List three states of matter. Which state of matter is rigid? Why? **[2010 (T-I)]**

6. What is the effect of the following on the rate of diffusion? **[2010 (T-I)]**

(a) temperature (b) density of liquid

7. Predict the physical state of matter in each case from the following characteristics.

(a) It has a definite volume but no definite shape.

(b) It is rigid and highly incompressible.

(c) Kinetic energy of particles is minimum in this state.

(d) It represents the most highly compressible form of matter. **[2010 (T-I)]**

8. Give reasons for the following : **[2010 (T-I)]**

(a) Water at room temperature is a liquid.

(b) A gas cylinder cannot be half filled.

9. (a) Convert 359 K to Celsius scale (°C).

(b) What is the value of boiling point of water on Kelvin scale of temperature ? **[2010 (T-I)]**

10. (a) Convert 30°C into kelvin.

(b) Define latent heat of fusion. **[2010 (T-I)]**

11. Give reasons for each of the following :

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

(b) We smell perfume sitting a few metres away. **[2010 (T-I)]**

12. (a) The melting points of 2 substances A & B are 280 K and 320 K respectively. Are these substances liquid at room temperature? Justify your answer.

(b) Give an example that shows the state of matter can be changed into another state by changing the temperature. **[2010 (T-I)]**

13. Why should we wear cotton clothes during summer? **[2010 (T-I)]**

14. Which gas is called dry ice? Why? **[2010 (T-I)]**

15. Why does the smell of hot sizzling food reach you several metres away but to get the smell from cold food you have to go close ? **[2010 (T-I)]**

16. State four characteristics of solids. **[2010 (T-I)]**

17. Why does a desert cooler cool better on a hot dry day? **[2010 (T-I)]**

18. CO_2 is a gas. Justify the given statement by two reasons. **[2010 (T-I)]**

19. Why people sprinkle water on the roof after a hot sunny day? **[2010 (T-I)]**

20. What will happen when we start putting pressure and compress a gas enclosed in a cylinder? Do you think that increasing or decreasing the pressure and temperature can change the state of matter. Justify your answer with an example. **[2010 (T-I)]**

21. (a) How do three states of matter arise?

(b) Give reasons for the following (1 each)

(i) liquids take up the shape of the container in which they are kept.

(ii) liquids are more compressible than solids. **[2010 (T-I)]**

OTHER IMPORTANT QUESTIONS

1. Why do liquids have a definite volume but no definite shape?

2. State the factors which determine the rate of diffusion of a liquid in another liquid.

3. What is the difference between a gas and a vapour?

4. What do you understand by the term sublimation?
Give four examples of sublimable substances.

5. Why is cooling caused by evaporation?

6. How will you prove the presence of diffused air in freshwater?

7. State two characteristics of the particles of matter.

8. What is plasma? How is it formed?

9. State two uses of the interconversion of matter.

III. SHORT ANSWER QUESTIONS – II (3 Marks)

PREVIOUS YEARS' QUESTIONS

1. A gas jar containing air is placed upside down on a gas jar of bromine vapour. It is observed that after some time, the gas jar containing air also becomes completely reddish brown.
(a) Explain why this happens.
(b) Name the process involved. **[2010 (T-I)]**

2. "We can easily move our hand in air but not through any solid material." Justify the statement by giving any three possible reasons. **[2010 (T-I)]**

3. (a) What is meant by evaporation?
(b) Define latent heat of fusion.
(c) Why should the wet clothes be spread out while drying? **[2010 (T-I)]**

4. With the help of a diagram explain in brief an activity to show that particles of matter are very small. **[2010 (T-I)]**

5. Give reasons for the following : **[2010 (T-I)]**
(a) Thermometer reading remains constant for a while during melting of a solid even though we continue to heat the solid.
(b) We are able to sip hot tea faster from a saucer rather than a cup.
(c) Earthen pitchers are used to cool water.

6. How does the following affect the rate of vaporisation of a liquid?
(a) surface area (b) temperature
(c) humidity. **[2010 (T-I)]**

7. Give reasons for the following : **[2010 (T-I)]**
(a) A sponge is a solid but can be easily compressed.
(b) Clothes dry faster on a windy day.
(c) Smell of perfume travels a few yards away.

8. In a tabular form distinguish between solids, liquids and gases under the following characteristics : **[2010 (T-I)]**
(a) density (b) volume (c) compressibility

9. (a) What happens when acetone is poured on the palm? **[2010 (T-I)]**
(b) Name the process involved in the following changes :
(i) liquid→solid (ii) gas→liquid
(iii) solid→gas (iv) solid→liquid

10. (a) Define evaporation. **[2010 (T-I)]**
(b) Explain how the following factors affect the rate of evaporation of a liquid.
(i) temperature of the liquid.
(ii) area of the exposed surface.
(iii) moisture in the surrounding air.
(iv) increase in wind speed.

11. (a) Convert the following to Celsius scale (i) 400 K (ii) 373 K.
(b) Convert the following to Kelvin scale (i) 27°C (ii) 70°C
(c) What does the melting point of a solid indicate? **[2010 (T-I)]**

12. Answer the following questions :
(i) Arrange the following substances in increasing order of force of attraction between the particles.
(a) water (b) hydrogen (c) sand
(ii) Why does the temperature remain constant at the melting point?
(iii) Which property of gases makes it possible to fill large volume of gases in small cylinders? **[2010 (T-I)]**

13. Define the following terms. **[2010 (T-I)]**
(a) Latent heat of fusion.
(b) Melting point (c) Fusion.

14. (a) How will you show the presence of water vapour in air? **[2010 (T-I)]**
(b) Give the full forms of (i) LPG (ii) CNG

15. (a) Define boiling point.
(b) Express the boiling point of water in Celsius as well as Kelvin scale.
(c) A diver is able to cut through water in a swimming pool. Which property of matter does the observation show? **[2010 (T-I)]**

16. Show by an activity that the gases are highly compressible as compared to solids and liquids. **[2010 (T-I)]**

17. Explain any three factors which affect the rate of evaporation. **[2010 (T-I)]**

18. Give reasons :
(a) Water kept in an earthen pot becomes cool after some time.
(b) Ice at 0°C is more effective in cooling than water at 0°C. **[2010 (T-I)]**

19. Give reasons :

(a) Steam produces more severe burns as compared to boiling water.

(b) Temperature of a liquid does not change during evaporation. **[2010 (T-I)]**

20. Evaporation is a surface phenomenon. Explain this by giving an example. **[2010 (T-I)]**

21. Why gases are compressible but not liquids? **[2010 (T-I)]**

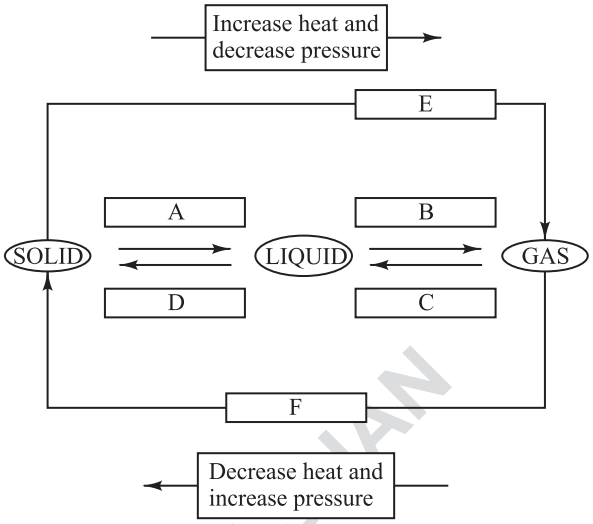
22. How a solid changes into liquid state on increasing temperature? **[2010 (T-I)]**

23. What is latent heat of vaporization? What produces more severe burns, boiling water or steam? **[2010 (T-I)]**

24. With the help of a labelled diagram describe a activity to show that nature of matter is particulate and not continuous :

Use the following material : beakers/glass, spoon, glass rod and sugar. **[2010 (T-I)]**

25 Name A, B, C, D, E and F in the following diagram showing change in its state. **[2010 (T-I)]**



26. Distinguish between evaporation and boiling (3 points). **[2010 (T-I)]**

OTHER IMPORTANT QUESTIONS

1. Explain why the heat becomes unbearable after the rains during summer.

2. What do you observe when ammonium chloride is heated in a hard glass test tube?

What is the special name given to the above change?

3. A sample of water boils at 101ºC at normal temperature and pressure.

Is the given sample of water pure? Will this water freeze at 0ºC?

4. What does the boiling point of a liquid indicate?

How does the boiling point change with :

(a) increase or decrease in pressure.

(b) the presence of impurities in the liquid.

5. In what way does a liquid differ from :

(a) a solid

(b) a gas

IV. LONG ANSWER QUESTIONS (5 Marks)

PREVIOUS YEARS' QUESTIONS

1. Compare in tabular form properties of solids, liquids and gases with respect to :

(i) Shape

(ii) Volume

(iii) Compressibility

(iv) Diffusion

(v) Fluidity or Rigidity **[2010 (T-I)]**

2. (i) What is meant by evaporation of a liquid? Water kept in an earthen pot become cool during summer. Why?

(ii) With the help of a labelled diagram describe in brief an activity to show sublimation of ammonium chloride. **[2010 (T-I)]**

3. (a) Define matter. Name the state of matter in which the forces between the constituent particles are (i) Strongest, (ii) Weakest.

(b) Give reasons for the following :

(i) A liquid generally flows easily.

(ii) Ice at 0°C appears colder to the mouth than water at 0°C. Why?

(iii) Doctors advise to put strips of wet cloth on the forehead of a person having high temperature. **[2010 (T-I)]**

4. Account for the following : **[2010 (T-I)]**

(a) For any physical state, the temperature remains constant during the change of state.

(b) Water kept in an earthen pot becomes cool in summer.

(c) We are able to sip hot tea from a saucer rather than a cup.

(d) An iron rod is solid at room temperature.

(e) When sugar crystals dissolve in water, the level of water does not rise appreciably.

OTHER IMPORTANT QUESTIONS

1. The temperature of ice remains constant for some time when it changes from the solid state to the liquid state. Explain

2. Give reasons for the following :

(i) The molecules of a solid have the strongest intermolecular forces.

(ii) A gas can be easily compressed.

(iii) Plasma is found in the stars.

(iv) During summer, water is sprinkled on the roof tops as well as on the ground.

(v) Hot water kept in a plate cools down faster than when kept in a glass.

3. What is the special name given to the following conversions?

(i) Solid→Liquid (ii) Liquid→Solid

(iii) Liquid→Gas (iv) Gas→Liquid

(v) Gas → Solid

4. Explain giving reasons :

(i) Ice at 0ºC is more effective in cooling than water at 0ºC.

(ii) Steam produces more severe burns than boiling water even though the temperature of both are 100ºC.

(iii) A gas can be liquefied easily.

(iv) Wet clothes do not dry easily in the rainy season.

(v) One feels cold after taking a hot shower.

5. (i) How does the rate of diffusion of the following change?

(a) Diffusion of a solid in a liquid on heating.

(b) Diffusion of a gas in a liquid on heating.

(ii) Gases diffuse faster than liquids and solids.

(iii) Name the process due to which water kept in an earthen pot oozes out of its pores.

ASSIGNMENTS FOR FORMATIVE ASSESSMENT

A. Science Quiz

1. Whenever heat energy is supplied to a substance, its temperature rises in proportion to the quantity of heat supplied', Raj told Kamal.

   'This is not true. I can give two examples from our daily life where this rule is not obeyed', said Kamal. Can Kamal prove what he stated?

2. On entering the house, Tanu asked if her mother had coffee with a lady visitor. Her mother replied in the affirmative. How did Tanu make her deductions?

3. Rhea, Runa and Janet were given a spoon each made of plastic, wood and brass respectively. Each of them were asked to dip their respective spoons in a container of boiling water and hold them for a minute. One of the girls could not carry out the instruction. Why?

B. Group Activity

1. To demonstrate the following change of state of matter.

   Solid → Liquid → Gas

   (i) Divide the class into three unequal groups. Place maximum number of students in group I, a little less than the previous one in group II and minimum number of students in group III.

   (ii) Draw three 2 m × 2 m squares on the field.

   (iii) Ask the students of each group to space themselves out in the three squares.

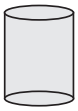
   (iv) Which arrangement will represent a solid, which one will represent a liquid and which one a gas?

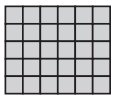
C. Do it at home

To make ice candy without using a freezer.

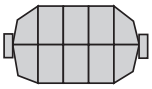
You will need :


A large bowl

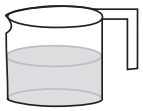

A glass

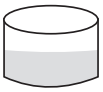

A towel


A spoon


Few ice cubes


Salt


Water


Sugar


Orange Squash

Method

(i) Fill half the glass with water, add two teaspoonfuls of sugar and two teaspoonfuls of orange squash.

Use the spoon to mix the ingredients well.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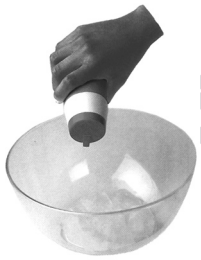
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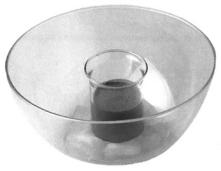
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(ii) Put a layer of ice cube in the bowl and sprinkle 2-3 teaspoonfuls of salt.

(iii) Place the glass on the layer of ice and salt.

(iv) Pack the space between the glass and the bowl with more ice cubes and salt.

(v) Place a towel over the bowl. Leave the mixture for about an hour, stirring after every few minutes.

(vi) Remove the glass from the bowl. What a surprise !!! You have made ice candy without using a freezer.

Explanation

The presence of impurities lower the melting point of ice. The mixture of salt and ice has a melting point which is lower than 0ºC. The change from ice to water needs heat. This heat is drawn from the mixture in the glass and hence, the mixture freezes.

D. Visits

Visit the nearest rice seller and find out :

1. Why is paddy spread in the sun before selling?
2. What harm is caused, if the paddy is not dried?
3. Why is paddy dried in the sun and no other alternative methods of drying are followed?

E. Classroom Discussions

Ask the following questions to the students and get their response.

1. Why is water used as a coolant in motor car radiators?
2. Why does it becomes very cold after a hail storm?
3. Why do wet clothes dry more quickly when spread in the sun?
4. Why do wet clothes dry quickly on a windy day?
5. Why is a wet bandage placed on the forehead of a person suffering from high fever?
6. Why are burns caused by steam more severe than those caused by boiling water?
7. Why do we have a burning sensation, if we hold a few cubes of ice in our hand for more than 2 minutes?
8. Why is it important to know the melting point of a substance?
9. Why does the temperature remain zero in an ice and water mixture till all the ice melts?
10. Why is no dew formed on a windy day or when the sky is cloudy?
11. What is the base material of freshners, used in toilets and rooms? How does it work?

12. Why is low pressure necessary for the formation of clouds in the rainy season?

F. Demonstration

Objective

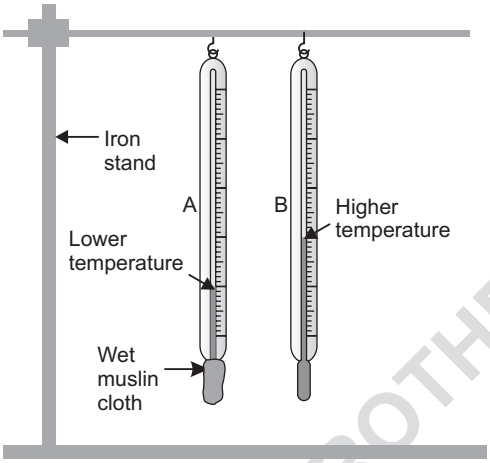
To prove that cooling is caused by evaporation.

Materials Required

An iron stand with clamp, two Celsius thermometers, a small piece of muslin cloth, water.

Method

1. Suspend the Celsius thermometers A and B from the clamp of an iron stand as shown in the diagram. Read and record the temperature from each thermometer. You will observe that both the thermometers read the same.



Now tie a small piece of muslin cloth to the bulb of the thermometer A. Pour a few drops of water on the muslin cloth. Gently flow air on the muslin cloth from your lungs for a minute.

Read the temperature of both the thermometers. You will observe that the temperature shown by thermometer A is less than the temperature shown by thermometer B. It is because, the evaporation of water causes cooling. Thus, the activity clearly proves that cooling is caused by evaporation.

Repeat the experiment by using (i) four drops of ether, (ii) four drops of alcohol. Record the temperatures for 5 minutes.

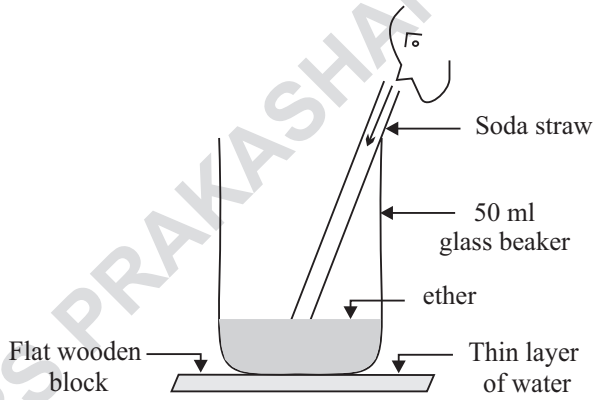
Now answer the following questions.

(i) In which case, the drop in temperature is (1) maximum (2) minimum.

(ii) Suggest an explanation for the above observations.

2. (i) Take a smooth and flat wooden block and place it on the table.

(ii) Over the wooden block pour some water, such that a thin layer of it stays over the block.



(iii) Over the layer of water place a 50 ml beaker.

(iv) Pour about 5 ml of ether in the beaker. With the help of a soda straw gently blow air in the ether, till it evaporates.

(v) Try to lift the beaker. What do you observe?

Ask the class to answer the following questions :

(i) Why does the wooden block stick to the beaker?

(ii) Why is icy frost formed around the beaker?

Precaution

Ether vapours are highly inflammable. Please see that no flame is around while you demonstrate the experiment.

Class IX Chapter 1 – Matter in Our Surroundings Science

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.

No.	Solid state	Liquid state	Gaseous state

S.			

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.

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.

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.

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?

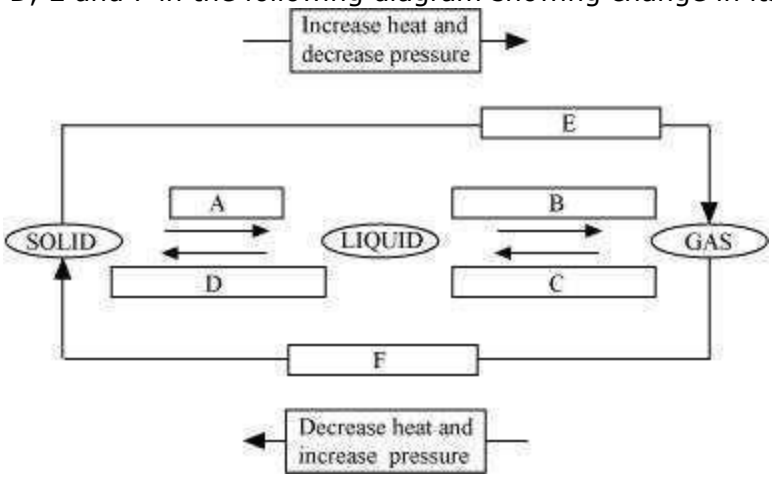
Answer:

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

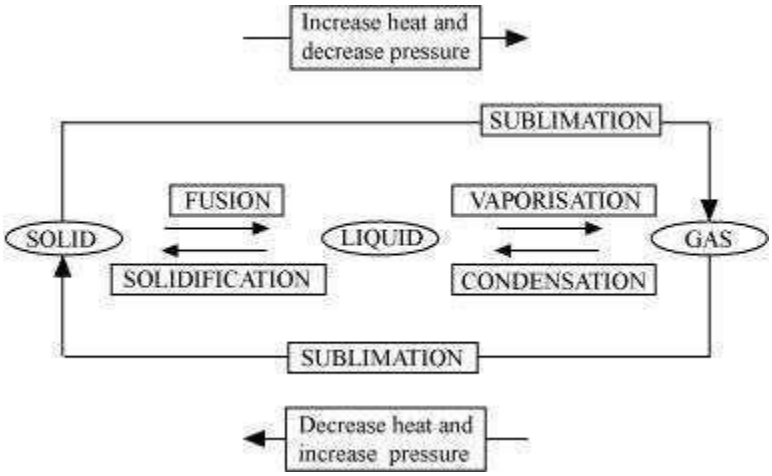
produced by boiling water.

Question 9:

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



Answer:


Increase heat and decrease pressure
SUBLIMATION
FUSION
VAPORISATION
SOLID
LIQUID
GAS
SOLIDIFICATION
CONDENSATION
SUBLIMATION
Decrease heat and increase pressure

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