



SCIENCE CLASS IX

CHAPTER-1 MATTER IN OUR SURROUNDING

Q.1. What happens to the sugar when it is dissolved in water?

Ans. When sugar is dissolved in water, its tiny particles break off from the solid sugar crystals.

Q.2. Where does the sugar go?

Ans. The sugar particles go into the spaces present between the particles of water and mix with them to form sugar solution.

Q.3. What conclusion do you get about the nature of matter from the dissolution of sugar in water?

Ans. The dissolution of sugar in water tells that

- (i) The matter (sugar and water) is made up of small particles.
- (ii) The particles of matter (water) have spaces between them.

Q.4. Is there any change in water level after dissolving sugar/salt in it.

Ans. There is no change in water level after dissolving sugar/salt in it.

Q.5. What conclusion can you draw after adding 2-3 crystals of KMnO_4 in water?

Ans. It means a crystal of KMnO_4 is made up of millions of tiny particles. They keep dividing themselves into smaller and smaller particles.



Q.6. When someone opens a bottle of perfume in one corner of a room, its smell spread in the whole room quickly. Why?

Ans. This happens because the particles of perfume (gas) move rapidly in all the directions and mix with the moving particles of air in the room.

Q.7. Why honey in step 3 dissolves at a slower rate ?

Ans. In step 3 honey dissolves at a slower rate because it is more viscous and has strong intermolecular forces of attraction.

Q.8. In which states diffusion is applicable ?

Ans. Diffusion is applicable in gaseous and liquid states.

Q.9. A sample of water under study was found to boil at 102°C , at normal temperature and pressure. Is the water pure? Will this water freeze at 0°C ?

Comment.

Ans. The boiling point of pure water is 100°C . The given sample, boiling at 102°C , indicates that it contains dissolved impurities. Thus it is not pure. No, the water will not freeze at 0°C . Instead, it will freeze below 0°C .

Q.10. Why are liquids more compressible than solids?

Ans. Interparticle forces are less strong while interparticle space is more in liquids as compared to solids. Therefore, liquids are more compressible than solids.

Q.11. Why a gas cylinder cannot be half-filled?

Ans. Particles of gas can move (diffuse) to all the space available to them at a very fast speed. Therefore, the gas cylinder cannot be half-filled according to volume.



Q.12. Why water is a liquid at room temperature?

Ans. The boiling point (or boiling temperature) of water at one atmospheric pressure is 100°C . Therefore, water is a liquid at room temperature which is below its boiling point.

Q.13. Give full forms of LPG.

Ans. LPG Liquefied Petroleum Gas.

Q.14. Why is an iron rod solid at room temperature?

Ans. An iron rod is solid at room temperature because

- (i) It has definite shape and volume.
- (ii) Its melting point is higher than the room temperature.
- (iii) It has high density.

Q.15. Which characteristics of a gas is used in supplying oxygen cylinder to hospitals?

Ans. Gases are compressible in nature and can be liquefied. Due to these properties, gases are used in supplying cylinder to hospitals.

Q.16. At what temperature, do solid ice and liquid water co-exist together?

Ans. At 0°C or 273 K (melting point of ice or freezing point of water), both solids ice and liquid water can co-exist.

Q.17. Mention two ways to liquefy atmospheric gases.

Ans. The two ways to liquefy atmospheric gases are



- (i) Increasing pressure
- (ii) Decreasing temperature.

Q.18. How do three states of matter arise?

Ans. Three states of matter arise mainly due to the different types of arrangement of particles in them.

Two factors responsible for this are

- (i) Interparticle attraction force and
- (ii) Interparticle space.

Q.19. Why should wet clothes be spread while drying?

Ans. On spreading wet clothes, the surface area exposed to air increases and evaporation becomes faster. Thus, they dry quickly.

Q.20. Why do liquids take up the shape of the container in which they are kept?

Ans. Interparticle force of attraction is not very strong in liquids that is necessary to maintain their shape. Therefore, they acquire the shape of the container in which they are kept.

Q.21. Name SI unit of measuring temperature. The boiling point of water is 100°C under normal atmospheric pressure. Convert this temperature to SI units.

Ans. SI unit of temperature is Kelvin(k).



$$100^{\circ}\text{C} = 100 + 273 \text{ K} = 373 \text{ K}$$

Q.22. Name three states of matter. Which state of matter is rigid and why?

Ans. Three states of matter are solid, liquid and gas. Solid state is the most rigid since the particles are packed closely by strong forces of attraction.

Q.23. What is the name of the phenomenon of changing a liquid into its vapours at a temperature below its boiling point?

Ans. Evaporation is the name of the phenomenon of changing a liquid into its vapours below its boiling point.

Q.24. How does the smell of the cooked food reach our nostrils even without our entering the kitchen?

Ans. The particles of aroma of food mix with the particles of air through diffusion and reach our nostrils. Thus, we get aroma of the food without entering in kitchen.

Q.25. List any two properties of particles of matter?

Ans. The two properties of particles of matter are

- (i) Particles of matter are very small in size.
- (ii) Particles of matter are in a state of continuous movement.

Q.26. Convert 370 K into Celsius scale.

Ans. $\text{K} - 273 = ^{\circ}\text{C}$; $370 - 273 = 97^{\circ}\text{C}$



Q.27. What is the full form of CNG? Mention its one property which makes it so important.

Ans. The full form of CNG is Compressed Natural Gas.

It is a lean fuel which does not create pollution on combustion.

Q.28. What is plasma ?

Ans. It is the fourth state of matter. It consists of super energetic and super excited particles.

Q.29. Why does the level; of water not change when sugar is dissolved in water ?

Ans. Sugar particles are very small and occupy the space between water molecules, therefore volume remains the same. i.e., the level of water do not changes when sugar is dissolved in it.

Q.30. Rubber band changes its shape. Is it solid ?

Ans. Rubber band changes its shape under forces and regain its shape after removing the force. Thus, it is a solid.

Q.31. What is meant by volatile liquid? Give some examples.

Ans. The liquids which are easily vaporizable i.e., can easily be converted into vapours are called volatile liquids. For example, acetone, ethanol etc.

Q.32. Why do liquids show the phenomenon of diffusion to more extent than solids?



Ans. Since kinetic energy because of speed of liquids is more than that of solids, they show diffusion to more extent than solids.

Q.33. Why do liquids flow?

Ans. Since, kinetic energy of liquids is more which can overcome intermolecular forces of attraction; hence, they flow.

Q.34. What is meant by latent heat of vaporisation?

Ans. It is the amount of heat required to convert 1 kg of liquid into vapours at its boiling point.

Q.35. A sponge can be compressed. Is it solid or not?

Ans. Sponge has minute holes in which air is trapped. On pressing this, air is expelled out and then it gets compressed. Thus, it is solid.

Q.36. Why do liquids have mostly lower density than solids?

Ans. Liquids have less force of attraction i.e., less mass and more volume as compared to solids thus, they have less density than solids.

Q.37. What would be the effect of temperature on the rate of diffusion of liquids?

Ans. On increasing temperature, the rate of diffusion of liquids increases.

Q.38. Why is boiling called a bulk phenomenon?

Ans. Since boiling starts from the bulk i.e., inside the liquid, therefore, it is bulk phenomenon.



Q.39. Why do gases exert more pressure on the walls of the container than the solids?

Ans. In gases, the particles move randomly at high speed and they collide with each other and also with the walls of container. Thus, they exert more pressure on the walls of container than solids.

Q.40. Name the process by which a drop of KMnO_4 spreads in a beaker of water?

Ans. Diffusion is the process by which a drop of KMnO_4 spreads in a beaker of water.

Q.41. What happens to the boiling point of a liquid when atmospheric pressure decreases?

Ans. Boiling point decreases when atmospheric pressure decreases because boiling point is the temperature at which vapour pressure of a liquid becomes equal to atmospheric pressure.

Q.42. What happens to the melting point of ice when pressure is increased?

Ans. When pressure is applied on the surface of ice, the change into liquid is assisted. Thus, melting point decreases.

Q.43. What happens to the melting point of solids with the increase in pressure?

Ans. Generally for solids, melting point increases with the increase in pressure.

Q.44. What is the latent heat of fusion of ice?



Ans. $3.34 \times 10^5 \text{ J/kg}$

Q.45. Seema visited a Natural Gas Compressing Unit and found that the gas can be liquefied under specific conditions of temperature and pressure. While sharing her experience with friends she got confused. Help her to remember the correct set of conditions

Ans. On applying low temperature, the kinetic energy of the particles decreases and the particles come closer. Increased pressure also brings the particles closer, so the gases liquefy. Hence, the conditions are low temperature and high pressure.

Q.46. Which conditions will increase the evaporation of water ?

Ans. Evaporation of water increases with increase in temperature because high temperature increase the kinetic energy of water molecules so water molecules present at the surface leave the surface faster.

Q.47. Benzene is a liquid. At 80°C , liquid benzene is in equilibrium with its vapours. It is found that particles of benzene vapours are more energetic than particles of liquid benzene. Explain the observation.

Ans. Particles of benzene vapours are more energetic because these have absorbed extra energy in the form of latent heat of vaporisation

Q.48. Name the two gases which are supplied in compressed form in homes and hospitals.

Ans. Liquefied Petroleum Gas (LPG) and oxygen in liquefied form.



Q.49. (i) Conversion of solid to vapours is called sublimation. Name the term used to denote the conversion of vapours to solid.

(ii) Conversion of solid state to liquid state is called fusion, what is meant by latent heat of fusion?

Ans. (i) It is also known as sublimation.

(ii) The amount of heat energy required to change 1 kg of a solid into liquid at atmospheric pressure at its melting point is known as the latent heat of fusion.

Q.50. Osmosis is a special kind of diffusion. Comment.

Ans. Diffusion is the process in which molecules of a substance move from the place of (their) higher concentration to the place of lower concentration. (1) but during osmosis, the water (or solvent) molecules move from (their) higher concentration to the place of their lower concentration through a semipermeable membrane. Thus, osmosis is termed as a special kind of diffusion.

Q.51. Water as ice has cooling effect, whereas water as steam may cause severe burns. Explain these observations.

Ans. When ice melts, it absorbs the energy equal to the latent heat of fusion from the surroundings therefore causes cooling effect. But steam releases the extra heat (equal to the latent heat of vaporisation) which it has absorbed when water was converted into steam. So, steam produces severe burns.

Q.52. Carbon dioxide (CO₂) is a gas. Justify the given statement by two reasons.



Ans. The two reasons to justify that carbon dioxide is a gas are

- (i) Carbon dioxide does not have a fixed volume. It can be compressed on applying pressure.
- (ii) Carbon dioxide does not have a fixed shape. It can take the shape of the container in which it is filled.

Q.53. Ramesh took two beakers A and B containing hot water and cold water respectively. In each beaker, he dropped a crystal of copper sulphate. He kept the beakers undisturbed. After sometime what did he observe and why?

Ans. The solutions of both the beakers turned blue after some time. But the colour change was observed earlier in beaker A containing hot water as compared to beaker B containing cold water. This happened due to the faster rate of diffusion at a higher temperature.

Q.54. With the help of an activity show that the rate of evaporation increases with increase in surface area.

Ans. Take approximately 50 ml of hot tea or water in a cup and also the same quantity of the same hot liquid in a saucer too.

It is observed that the liquid in the saucer cools faster than that in the cup. This happened due to increase in the surface area of the liquid in the saucer as compared to the cup. This proved that rate of evaporation increases with increase in surface area.



Q.55. Explain, which one will cause more severe burns-boiling water at 100°C or steam at 100°C ?

Ans. Steam causes more severe burns than boiling water. The reason is that it releases the extra amount of heat (latent heat) which it has already absorbed during vaporisation (at the time of formation of steam from water)

Q.56. How will you change water from gaseous state to liquid state? Suggest a simple activity.

Ans. (i) Water can be changed from gaseous state to liquid state by passing the water vapour through a water condenser as used in case of simple distillation.

(ii) Activity Take ice cold water in a glass. Observe the outer surface of the glass. You find small droplets of water on it. These water droplets are the result of condensation of water vapour present in the air to form liquid water.

Q.57. Sodium salt and sugar have similar appearance. Why are these classified as different substances?

Ans. The substances are not classified only by their appearance. These are classified by their properties conductivity, thermal capacity and other chemical properties. Sugar and sodium chloride have different physical and chemical properties and so are they different substance.

Q.58. Give one similarity and one dissimilarity between a liquid and a gas.

Ans. Similarity : Both liquids and gases are fluids and assume the shape of the container.



Dissimilarity : A gas can be compressed easily whereas a liquid cannot. A small quantity of gas can fill an entire given container. Also large quantity of a gas can be contained in a small space. A given amount of a liquid has a fixed volume at a given temperature.

Q.59. Divide the following substances into two groups

(i) With high intermolecular forces

(ii) With low intermolecular forces

Ice, sulphur, vapour, nitrogen, sugar, copper, air, salt, plastic.

Ans. High intermolecular forces ice, sugar, copper, salt, plastic.

Low intermolecular forces sulphur, vapour nitrogen, air.

Q.60. It is not proper to regard the gaseous state of ammonia as vapours.

Explain.

Ans. The gaseous state of a substance can be regarded as vapours only in case it is a liquid at room temperature. Since ammonia is a liquid at room temperature, its gaseous state cannot be regarded as vapours.

Q.61. Give the conditions in which the distance between the molecules of hydrogen gas would increase.

Ans. The conditions in which the distance between the molecules of hydrogen gas would increase are given below

- (i) Hydrogen leaking from the container leave some vacant space inside the container, thus distance between the molecules increases.



- (ii) If volume of the container is increasing, then also gas molecules will get some more space as gaseous molecules occupy all the space available to them.

Q.62. Out of two gases carbon dioxide (CO₂) and methane (CH₄) which gas would diffuse rapidly?

Ans. Lighter gases diffuse faster.

Molecular mass of CO₂ = 12 + 2 × 16 = 44u

Molecular mass of CH₄ = 12 + 4 × 1 = 16u

So, methane (CH₄) gas would diffuse faster.

Q.63. Give two ways in which melting and boiling points can be useful.

Ans. Two ways in which melting and boiling point can be useful are

- (i) To check whether the substance is pure or not and
(ii) To identify and characterise the substance.

Q.64. Name the state of matter in which

(i) Layers of particles can slip and slip and slide over each other.

(ii) Particles just move around randomly, because of very weak force of attraction.

Ans. (i) In liquid state, layers of particles can slip and slide over each other.

(ii) In gaseous state, particles just move around randomly because of very weak force of attraction.



Q.65. Alka was making tea in a kettle, Suddenly she felt intense heat from from the puff of steam gushing out of the spout of the kettle. She wondered whether the temperature of the steam was higher than that of the water boiling in the kettle. Comment.

Ans. The temperature of both boiling water and steam is 100°C , but steam has more energy (due to latent heat of vaporisation) in comparison to boiling water.

Q.66. (i) Dry ice is compressed under high pressure. What happens to it when the pressure is released?

(ii) Define

(a) Melting point

(b) Fusion

Ans. (i) On releasing the pressure, dry ice sublimates to vapour state without undergoing liquid state.

(ii) (a) melting point the definite temperature at which a solid starts melting is called the melting point of that solid. e.g., melting point of ice is 0°C or 273.16 K .

(b) Fusion The process of conversion of a solid into liquid state on heating is called fusion or melting.



Q.67. Classify the following into osmosis/diffusion.

- (i) Swelling up of a raisin on keeping in water.**
- (ii) Spreading of virus on sneezing.**
- (iii) Earthworm dying on coming in contact with common salt.**
- (iv) shrinking of grapes kept in thick sugar syrup.**
- (v) preserving pickles in salt.**
- (vi) Spreading of smell of cake being baked throughout the house.**
- (vii) Aquatic animals using oxygen dissolved in water during respiration.**

Ans. Osmosis

- (i) Swelling up of a raisin on keeping in water.**
- (iii) Earthworm dying on coming in contact with common salt,**
- (iv) Shrinking of grapes kept in thick sugar syrup.**
- (v) Preserving pickles in salt.**

Diffusion

- (ii) Spreading of virus on sneezing.**
- (vi) Spreading of smell of cake being baked throughout the house.**
- (vii) Aquatic animals using oxygen dissolved in water during respiration.**

Q.68. Tarun got an invitation to attend a party. On coming to his place, he found that both his shirt and pant were wet. What step he would take to dry them quickly?

Ans. Tarun can take following steps to dry his cloths quickly.



- (i) By spreading them in air under sun so that the water may evaporate (increasing the surface area).
- (ii) By spreading them under a fan in a room (increasing the wind speed).
- (iii) By ironing the cloth (increasing the temperature).

Q.69. It is a hot summer day. Priyanshi and Ali are wearing cotton and nylon clothes respectively who do you think would be more comfortable and why?

Ans. Priyanshi would be more comfortable the reason is that cotton absorbs sweat from the body and provides it a larger surface area for evaporation which causes more cooling effect.

Nylon does not absorb sweat so the sweat does not evaporate and Ali would feel uncomfortable.

Q.70. (i) What determine the state of a substance?

(ii) Convert 30°C into Kelvin.

(iii) Water droplets are observed on the outer surface of a glass tumbler containing ice cold water. Give reason.

Ans. (i) Temperature and pressure determine the state of substance.

(ii) $30^{\circ}\text{C} = 273 + 30 = 303 \text{ K}$

(iii) Water droplets are observed on glass tumbler because water vapours get contents on the cold surface of the glass.

Q.71. (i) Arrange the following substance 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?

Ans. (i) Hydrogen < Water < Sand

(ii) This is because heat equal to latent heat of fusion is used to overcome interparticle force of attraction.

(iii) Gases can be easily compressed and liquefied.

Q.72. One day, when Heena was playing with her mother's cosmetics, she felt cold, when a liquid bottle break and some liquid fall on her hand. She got worried. She wash suddenly her hand and ask her mother why she felt cold. Her mother gave her scientific explanation which satisfied her.

Read the above passage and answer the following questions.

(i) Can you guess what was that liquid ?

(ii) Why Heena felt cool when liquid fall on her hand ?

(iii) What values are shown by Heena's mother?

Ans. (i) The liquid is nail paint remover which contains ether or acetone.

(ii) Ether evaporates by taking heat energy from the hand (body). That's why she felt cool.



(iii) Heena's mother is knowledgeable, careful and educated mother.

Q.73. How do you differentiate between solids, liquids and gases on the basis of their melting and boiling points.

Ans. Solids have melting and boiling points above room temperature.

Liquids have melting points below room temperature and boiling points above room temperature.

Gases have both melting and boiling points below room temperature.

Q.74. The coverplate is removed from the gas jars shown in the diagram.

After several days, the colour of the gas is the same in both jars. Why does this happen? Explain.

Ans. Diffusion has occurred in the jars. Bromine molecules move from a region where they are of higher concentration to region of lower concentration in the gas jar above. Oxygen molecules move from a region where they are of higher concentration to a region of lower concentration to a region of lower concentration in the gas jar below. Diffusion continues until both gas jars have uniform distribution of bromine and oxygen molecules.

Q.75. Meera had some guests visiting one Sunday afternoon. While serving them tea from the kettle, a gush of steam suddenly burns her fingers and she feels intense pain. Her mother asks her to keep her fingers under running tap water. After sometime the pain subsides.

Answer the following questions based on the above information.



- (a) What could be the possible reason for the intense pain felt by Meera?
(b) Why does her mother ask her to keep her fingers under tap water ?
(c) What value are promoted by Meera's mother?

Ans. (i) The temperature of steam is very high because of which the skin tissues burn and meera felt the intense pain.

(ii) By keeping the fingers under tap water the temperature of the fingers will decrease and the skin tissue will not be damaged further. That's why, mother of Meera asked her to do so.

(iii) Values promoted by Meera's mother are presence of mind and caring nature.

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