CBSE Test Paper 01

Chapter 01 Matter in Our Surrounding

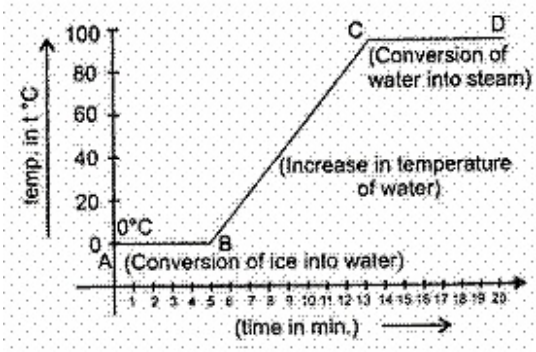
1. Name the phenomenon which causes one crystal of potassium permanganate to turn a beaker of water purple. **(1)**

   a. centrifugation
   b. filtration
   c. diffusion
   d. sedimentation

2. Name the state of matter that 'has minimum inter-particle force of attraction' **(1)**

   a. Solid
   b. Liquid
   c. gas
   d. All of these

3. The inferences drawn by the temperature versus time graph are **(1)**



   A. During the melting, temperature of substance does not change.
   B. Temperature rises after all amount of ice melts.
   C. At a specific temperature water starts boiling and temperature remains the same during the conversion of water into steam.

   Which statement is correct regarding graph?

   a. Only (C) is correct
   b. All (A), (B) and (C) are correct

c. Only (B) is correct
d. Only (A) is correct

4. When water boils, its temperature: **(1)**

   a. remains the same
   b. first increases and then decreases
   c. decreases
   d. increases

5. In the determination of boiling point of water correct reading in the thermometer is noted when : **(1)**

   a. water starts boiling
   b. temperature starts rising
   c. temperature becomes constant
   d. whole of the water evaporates

6. What happens when an inflated air balloon is pricked with a pin? Name the property of the gaseous state exhibited by this observation. **(1)**

7. Name one property which is show by naphthalene and not by sodium chloride. **(1)**

8. Which of the following are matter?Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume **(1)**

9. Which of the following diffuses faster? Water vapour, wax or, ethyl alcohol. **(1)**

10. The room temperature is 25^{O}C. What is the corresponding temperature on the Kelvin scale? **(1)**

11. Are the three states of matter inter-convertible? How can they interconnect? **(3)**

12. Why are we able to sip hot tea or milk faster from a saucer rather than a cup? **(3)**

13. How does evaporation cause cooling? **(3)**

14. Comment on the following statements: **(5)**
    a. Evaporation causes cooling.

b. Rate of evaporation of an aqueous solution decreases with increase in humidity.
c. Sponge though compressible is a solid.
d. Ice is solid at 0°C, while water is liquid at room temperature.
e. Sugar crystals dissolve faster in hot water than cold water.

15. Discuss the various factors which affect the rate of evaporation. Latent heat of evaporation of two liquids A and B is 100 J/kg and 150 J/kg respectively. Which one can produce more cooling effect and why? **(5)**

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Answers

1. c. diffusion

   Explanation: Diffusion is a mass transfer phenomenon that causes the distribution of a chemical species to become more uniform in space as time passes. Potassium permanganate diffusion in water. Beaker containing potassium permanganate (purple) and water, and a clock being used to time how long it takes for the purple colour to spread through the water as the potassium permanganate dissolves. This apparatus is used to demonstrate diffusion in a liquid. Eventually, the random motion of all the potassium permanganate particles results in the purple colour being equally dispersed throughout the water. The process appears slow as the dissolved particles collide with the water molecules and each other, slowing their progress.

2. c. gas

   Explanation: The particles of gases are away from each other. So, gas has the minimum inter-particle force of attraction.
   Solids have maximum force of attraction

3. b. All (A), (B) and (C) are correct

   Explanation:

   A. During the change of state, given heat is used to change the state. So temperature remains same. AB and CD parts show constant temperature
   B. BC part represents increase in temperature.
   C. CD is water starts boiling and temperature remains the same during the conversion of water into steam.

4. a. remains the same

   Explanation: The temperature remains constant during boiling of water even though heat is supplied constantly because all the heat energy provided is used up in changing the state of water from liquid to gaseous water vapour. Therefore all the heat energy provided increases the kinetic energy of the particles and temperature doesn't increase.

5. c. temperature becomes constant

   Explanation: Boiling point: the temperature at which the liquid boils and changes into gases state at the atmospheric pressure is called boiling point. In the determination of boiling point of water, correct reading on the thermometer is noted when temperature becomes constant.

6. The balloon bursts and the air of balloon gets diffused in air.

7. Naphthalene undergoes sublimation upon heating and directly changes into vapours. Sodium chloride (common salt) does not undergo sublimation. It melts on strong heating.

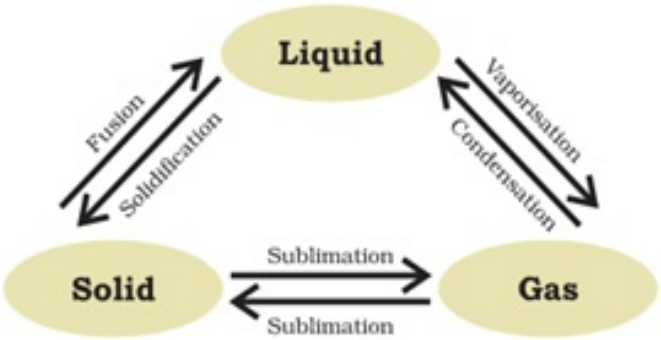
8. Chair, air, almonds, cold drink, smell of perfume

9. Water vapour

10. Kelvin temperature (K) = 273 + 25 = 298 K.

11. Yes, three states of matter are inter-convertible.

    a. Solid can be changed into liquid by boiling and liquid can be changed to solid by cooling it i.e. by solidification.
    b. Liquid can be changed to gas by vaporization by heating it and gas can be changed to liquid by condensation i.e. subjecting it to low temperature.
    c. Solid can be changed to gaseous form/state by sublimation and gas can be changed to solid by condensation.



12. Saucer has a bigger surface area as compared to cup. Since evaporation is a surface phenomenon, by using a saucer instead of cup we are increasing the surface area for evaporation to occur. Faster evaporation of particles of tea or milk allows cooling and

taking a sip becomes easier.

13. When a liquid evaporates, the particles of liquid absorb heat from the surroundings to regain the energy lost during evaporation. This absorption of energy from the surroundings
make the surroundings cold.

14. a. Evaporation produces cooling as the particles at the surface of the liquid gain energy from the surroundings and change into vapour, thereby producing a cooling effect.
    b. Air around us cannot hold more than a definite amount of water vapour at a given temperature which is known as humidity. So, if the air is already rich in water vapour, it will not take up more water; therefore, rate of evaporation of water will decrease.
    c. A sponge has minute holes in which air is trapped. Also the material is not rigid. When we press it, the air is expelled out and we are able to compress.
    d. Ice is solid at 0°C because it has a definite volume and definite shape due to strong intermolecular forces. Water is liquid at room temperature because it has definite volume and no definite shape due to weak intermolecular forces of attraction.
    e. Sugar crystals dissolve faster in hot water than cold water because hot water molecules contain more kinetic energy. Due to this, they strike faster on the particles of sugar than cold water molecules. As a result, hot water will dissolve them faster than cold water.
15. Factors affecting the rate of evaporation:
    a. **Surface area:** The rate of evaporation increases with increase in surface area.
    b. **Temperature:** The rate of evaporation increases with increase in temperature.
    c. **Humidity:** The rate of evaporation decreases with increase in humidity.
    d. **Wind speed:** The rate of evaporation increases with increase in wind speed.
    e. **Nature of the liquid:** The volatile compounds evaporate faster than less volatile compounds (liquids).
    B will produce more cooling effect because it will absorb more heat from the surroundings for evaporation.

CBSE Test Paper 02

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1. The evaporation of a liquid occur only at **(1)**

   a. all temperatures

   b. temperature less than $100^{o}C$

   c. fixed temperature

   d. temperature more than $100^{o}C$

2. Match the following with the correct response:- **(1)**

(1) Element	(A) Sugar
(2) Compound	(B) Mercury
(3) Mixture	(C) Salt solution
(4) Liquid element	(D) Gold

   a. 1-B, 2-D, 3-A, 4-C

   b. 1-D, 2-A, 3-C, 4-B

   c. 1-C, 2-B, 3-D, 4-A

   d. 1-A, 2-C, 3-B, 4-D

3. Which of the following have least inter atomic spacing? **(1)**

   a. solid

   b. plasma

   c. liquid

   d. gases

4. According to ancient Indian philosophers, matter was made up of: **(1)**

   a. Six constituents

   b. Five constituents (Panchtatvas)

   c. Three constituents

   d. Four constituents

5. The melting point of a substance is defined as the constant temperature at atmospheric pressure when: **(1)**

    a. Both the solid & liquid exist together
    b. The solid starts melting.
    c. The solid is completely changed into liquid.
    d. Only liquid is present

6. Why should we wear cotton clothes in summer? **(1)**

7. Name the process which occurs when a drop of Dettol is added to water. **(1)**

8. What is the reason for the existence of the three states of matter? **(1)**

9. Under what conditions gases can be liquefied? In which form LPG is filled in gas cylinder? **(1)**

10. Define density and give its SI unit. **(1)**

11. A glass tumbler containing hot water is kept in the freezer compartment of a refrigerator (temperature < $0^{\circ}C$). If you could measure the temperature of the content of the tumbler, which of the following graphs would correctly represent the change in its temperature as a function of time? **(3)**

12. Why are gases compressible but not liquids? **(3)**

13. Give two reasons to justify Water at room temperature is a liquid **(3)**

14. Describe an activity to determine the boiling point of water and melting point of ice. **(5)**

15. 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. **(5)**

CBSE Test Paper 02

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Answers

1. a. all temperatures

   Explanation: The process of changing liquid into gases (vapour) even below its boiling point is called evaporation. The rate of evaporation increase with the increase in temperature, surface area and wind speed.

2. b. 1-D, 2-A, 3-C, 4-B

   Explanation:

   a. Solid Element - Gold occurs in solid state.
   b. Compounds - Sugar(Cane sugar - $C_{12}H_{22}O_{11}$)is made of two or more elements (C, H and O) which are chemically combined in a fixed proportion by mass.
   c. Mixture - Salt solution consists of two or more compounds (Sodium chloride,and Water)which are not chemically combined.
   d. Liquid element - Mercury is an element which is a liquid at room temperature.

3. a. solid

   Explanation: This is because the force of attraction between the particles (or inter-particles forces) are stronger in solids, less in liquids and negligible in gases and the movement of particles (or kinetic energy of particles) is the minimum in solids, more in liquids and the maximum in gases.

4. b. Five constituents (Panchtatvas)

   Explanation: Early Indian philosopher categorized matter in five types and called them panch-tatwa (Five-elements) - Vayu (Air), Jal (Water), Agni (Fire), Prithvi (Earth) and Aakash (Sky).

5. a. Both the solid & liquid exist together

   Explanation: Melting point is defined as the constant temperature at which the solid and the liquid phases of substance coexist.

6. During summer, we perspire more and the particles at the surface of the liquid gain energy from the surrounding or body surface and change into vapour. Now, cotton

being a good absorber of water helps in absorbing the sweat and expose it to the atmosphere for easy evaporation and we feel cool.

7. When dettol is added to water, diffusion takes place.

8. The three states of matter differ with respect to the inter particle spaces and forces. The inter particle spaces are minimum in the solid state and maximum in the gaseous state while force of attraction is much stronger in solid state than gaseous state.

   Both these conditions favour 3 different categories of states of matter.

9. By applying pressure and reducing temperature, gases can be liquefied. The liquefied petroleum gas (LPG) is filled in gas cylinders in the compressed gas form.

10. Density of a substance is defined as the mass per unit volume. Its SI unit is kilogrammes per cubic metres I.e. kg/m^3.

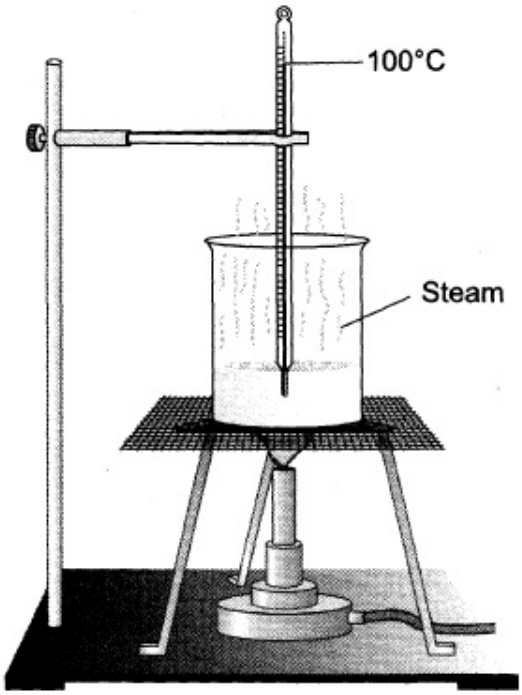
11. The water will cool initially till it reaches $0^\circ C$, the freezing point. At this stage, the temperature will remain constant till all the water will freeze due to latent heat. After this, temperature would fall again.

12. Gases are compressible because the inter-molecular space is very large and kinetic energy is higher in gases, whereas liquids are not compressible because in liquids, the inter-molecular space is less and kinetic energy is comparatively lesser.

13. Water is a liquid at room temperature (25^oC) due to the following reasons:

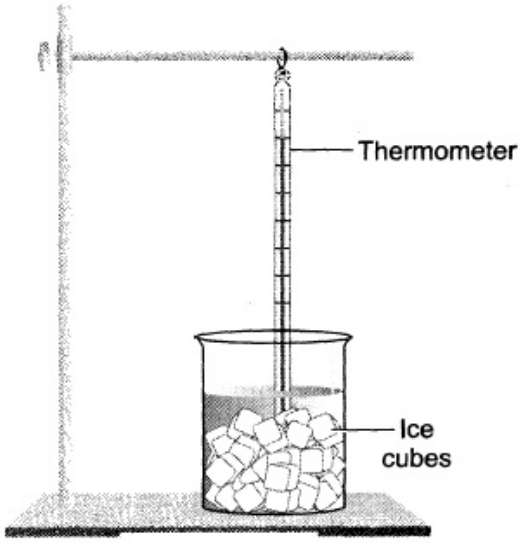
    i. When placed in a beaker, its level cannot be changed on pressing.
    ii. It can take the shape of any container in which it is placed.

14. **Determination of boiling point of water:** Boiling point of water is the temperature at which water starts boiling. Boiling point of pure water is 100^o C. It can be determined by following activity:



Determination of melting point of ice: Melting point of ice is the temperature at which it starts melting.It can be determined by following activity:

a. In a beaker take some water and seal it with an aluminum block with one hole in it.
b. Insert a thermometer in the hole of the aluminium block.
c. Put the beaker on a tripod stand as shown in figure and heat the apparatus with the help of kerosene burner slowly.
d. Observe what happens to the water.
e. You will observe a steady stream of bubbles.
f. Note the reading on thermometer .This temperature is the boiling point of water.
g. Take crushed ice in a beaker and insert a thermometer in the beaker by hanging it from the clamp of the stand in such a way that the bulb of the thermometer is completely inside the ice.
h. Wait for some time and keep recording the temperature after small intervals of time.
i. Note down the temperature when ice just starts melting.
j. Let the bulb of the thermometer remain in a mixture of ice and water for some more time and keep recording the temperature.



15.

a.

Solid	Liquid	Gas
Particles are rigid and uncompressible.	Particles are not rigid but can be compressed to limited extent.	Particles are not at all rigid and can be compressed easily.
They possess a definite shape and volume.	They have only a definite volume but acquire shape of container in which they are kept.	They don't have a definite shape or volume.
They don't have the ability to flow.	They can easily flow from higher to the lower level.	They can flow in all the possible directions.
Example: salt, sugar, chalk, gold, silver etc.	Example: water, alcohol, diesel, petrol etc.	Example: air, CNG, smoke etc.

b. **Rigidity**→ It is the property of matter to maintain its shape even if external forces work and the solids show this property.
Compressibility → It is the property of matter to allow compression under high pressure and the gases show this property.
Fluidity → It is the property of a substance to easily flow and allow change in its

shape under external forces and this property is exhibited by both liquids and gases.

Filling a gas container → Gases can be compressed easily hence they can be filled within a vessel at high pressure. This property of gases allows their convenient filling into a small container or cylinder and that also in a large volume. It also allows their easy transport from one place to the other eg CNG.

Shape → According to the type of matter shape differs depending upon location of particles like Solids have definite shape while Liquids acquire the shape of their container and gases as such don't have any shape.

Kinetic energy → It is the kind of energy present in an object when it is under motion as the particles of that object/matter are continuously moving therefore matter has kinetic energy. However greater is the movement more will be the kinetic energy and vice versa i.e. solid < liquid < gas

Density → Mass per unit volume of a substance/matter is known as its density i.e. density = mass/volume

CBSE Test Paper 03

Chapter 01 Matter in Our Surrounding

1. Identify the incorrect statement about evaporation **(1)**
   (A) It causes cooling
   (B) It increase with increase in humidity
   (C) It decreases with increase in temperature
   (D) It increases with increase in wind speed
   a. (B) and (C) are incorrect
   b. All of these
   c. (A) and (B) are correct
   d. (A), (B) and (C) are correct
2. At 0^{o}C or 273 K, the physical state of water is observed as : **(1)**
   a. solid
   b. vapour
   c. liquid
   d. both solid and liquid
3. Which of the two statements is/are true? **(1)**
   Statement A: A substance is said to be in the liquid state if under normal pressure, its melting point (M.P.) is below the room temperature.
   Statement B: The melting point of a solid and the freezing point of a liquid are different.
   a. Statement B
   b. Neither statement A nor statement B
   c. Both the statements - A and B
   d. Statement A
4. Which of the following is needed by surgeons during surgery? **(1)**
   a. Ethane
   b. Ether
   c. Acid
   d. Propanol
5. In an endothermic process heat is absorbed, in an exothermic process heat is evolved and in an athermic process no thermal change is observed. What is the nature of

evaporation of ether? **(1)**

a. First exothermic then endothermic
b. Athermic
c. Exothermic
d. Endothermic

6. Why do solid substances not diffuse? **(1)**

7. When 50 g of sugar is dissolved in 100 mL of water, there is no increase in volume. What characteristic of matter is illustrated by this observation? **(1)**

8. What is the physical state of water at-

   a. 25°C
   b. 0°C
   c. 100°C ?

9. Which of the following are matter? **(1)**
   Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume.

10. Sponge is a solid yet we are able to compress it. Why? (**1)**

11. Give an experiment to show that ammonium chloride undergoes sublimation. **(3)**

12. What is Bose-Einstein Condensate? **(3)**

13. Explain what happens to the molecular motion and energy of 1 kg of water at 273 K when it is changed into ice at same temperature. How is the latent heat of fusion related to the energy exchange that takes place during this change of state? **(3)**

14. Write in brief an activity to show the particulate nature of matter. What are the characteristics of the particles of matter? **(5)**

15. When a crystal of potassium permanganate is placed in a beaker containing water, its purple colour spreads throughout the water. What do you conclude from this observation about the nature of potassium permanganate and water? **(5)**

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Chapter 01 Matter in Our Surrounding-3

Answers

1. a. (B) and (C) are incorrect
   Explanation: The rate of evaporation increases with increase in temperature, surface area & wind speed but decrease by the increase in humidity.

2. d. both solid and liquid
   Explanation: Zero on the Celsius scale (0℃) is now defined as the equivalent to 273K, with a temperature difference of 1 deg C equivalent to a difference of 1K, meaning the unit size in each scale is the same. This means that 100℃, previously defined as the boiling point of water, is now defined as the equivalent to 373K. At 0^{o}C or 273K the water is at its freezing point, hence both solid and liquid phases are present.

3. c. Both the statements - A and B
   Explanation: The temperature at which a solid melts to become a liquid at the atmospheric pressure is called its melting point. The process of melting, that is, change of solid state into liquid state is also known as fusion. A substance is said to be in a liquid state if under normal pressure its melting point is below the room temperature. Melting point of a solid and the freezing point of a liquid are same.

   Melting point and freezing point describe the same transition of matter from liquid to solid (freezing) or equivalently, from solid to liquid (melting). while ice is freezing or melting, its temperature is not changing. It is stuck on 0°C during the entire melting or freezing process. That is, when matter is transitioning from solid to liquid (melting) or liquid to solid (freezing), its temperature is fixed at the melting/freezing point, which is the same temperature.
   So, statement A and B are correct .

4. b. Ether
   Explanation: Ether is used by surgeons during surgery. Ether is highly volatile and antiseptic in nature. It is used to make a wound sterile. It was one of the

first anesthetics used in surgery.

5. d. Endothermic
   Explanation: Evaporation of ether occurs due to absorption of heat by surrounding. So, it is an endothermic process.The chemical reaction in which heat is absorbed in called as an endothermic reaction. The reaction in which heat is evolved is called exothermic reaction and the reaction in which no thermal changes occur is called athermic process.

6. Hard solids do not diffuse due to strong inter-molecular forces between its particles.

7. This observation indicates that particles of water have spaces between them into which sugar particles got fit.

8. a. At 25°C
   water is liquid,
   b. at 0°C
   water is solid(ice),
   c. at 100°C|
   water is gas(water vapour).

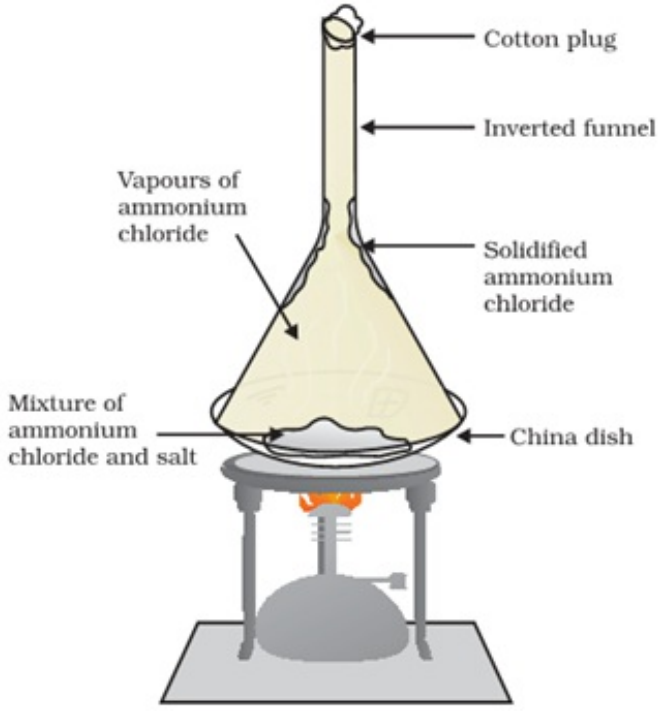
9. Chair, air, smell, almonds, cold drink and smell of perfume are matter.

10. There are minute holes in sponge in which air ir trapped which is expelled out when compresses. Thus, sponge is compressible.

11. Experiment to show that ammonium chloride (NH_4Cl) undergoes sublimation:-

    a. Take a china dish with crystals of ammonium chloride (NH_4Cl) and cover it with an inverted glass funnel with a cotton fitted at the top.
    b. Put the china dish on a burner and heat the crystals.
    c. As soon as the crystals are heated, we observe the vapours of ammonium chloride (NH_4Cl) rising in the funnel. These vapours get solidified along the walls at the upper end of the funnel which is a colder part.
    d. This shows that solid ammonium chloride does not undergo liquid state but directly changes to vapour state which then solidifies i.e. it undergoes sublimation

(solid changes directly to gases without undergoing liquid state).



12. It is a phenomenon which occurs at very low temperature. In 1995, Carle Wieman (a physicist from USA) chilled atoms of a gas of extremely low density, to the lowest temperature ever achieved, and created a new state of matter called the Bose-Einstein condensate. This effect is based on the works of the Indian physicist, Prof. Satyendra Nath Bose and Albert Einstein. They predicted the existence of the Bose Einstein condensate in 1925 and therefore, this effect is named after them. Scientists consider this as the fifth state of matter. At very low temperatures
(around 2×10^{-7} K) a Bose-Einstein condensate can be formed in which several thousand atoms become a single entity (a superatom). This effect has been observed with atoms of rubidium (Rb) and lithium (Li).

13. a. Molecular motion decreases as water gets converted into ice.
    b. Latent heat of solidification is given off.
    c. Latent heat of solidification is equal to latent heat of fusion.
14. Activity:
    i. Take a beaker and add 50 mL of water in it. Mark the level of water in the beaker.
    ii. Add 15-20 g of sugar with the help of a spatula.
    iii. Take a glass rod and stir the crystals of sugar completely.
    iv. The particles of sugar will disappear as they enter the spaces between particles of

water.

Characteristics:

i. Matter is composed of very small particles like atoms or molecules.
ii. The particles of matter have space between them.
iii. The particles of matter attract each other.
iv. The particles of matter are in constant motion.

15. When we place few crystals of potassium permanganate in a beaker containing water, we get two distinct layers—colourless water at the top and pink colour at the bottom. After few minutes, pink colour spreads and whole solution turns pink due to diffusion. Since potassium permanganate is a solid substance, it does not possess so much space. Water molecules due to a liquid state, collide with solid particles and intermix due to sufficient space between molecules.