Q1. Covert the following temperatures into Celsius scale:

(a) 293K **(b) 470K**

Answer:

(a) $0^oC = 273K$

$300k = (300 – 273)^oC = 27^oC$

(b) $470K = (470– 273)^oC = 197^oC$

Q2. Convert the following temperatures to Kelvin scale.

(a) 25°C **(b) 373°C**

Answer:

(a) $0^oC = 273K$

$25^oC = (25 + 273)K = 298K$

$373^oC = (373 + 273)K = 646K$

Q3. Give reasons for the following observations:

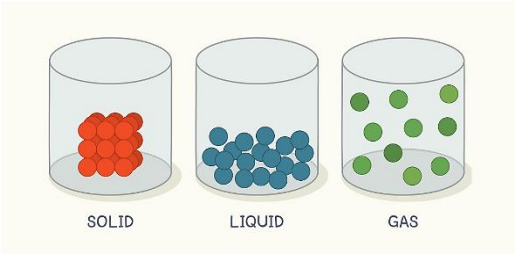
(a) Naphthalene balls disappear with time without leaving any solid

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

Answer (a): Naphthalene balls disappear with time without leaving any solid, because naphthalene balls sublime and directly changes into vapour state without leaving any solid.

Answer (b): We can get the smell of perfume sitting several metres away because perfume contain volatile solvent and diffuse faster and can reach people sitting several metres away.

Q4. Arrange the following substances in increasing order of forces of attraction between the particles – water, sugar and oxygen.



Answer: Oxygen (gas) < water (liquid) < sugar (solid)

Q5. What is physical state of water at

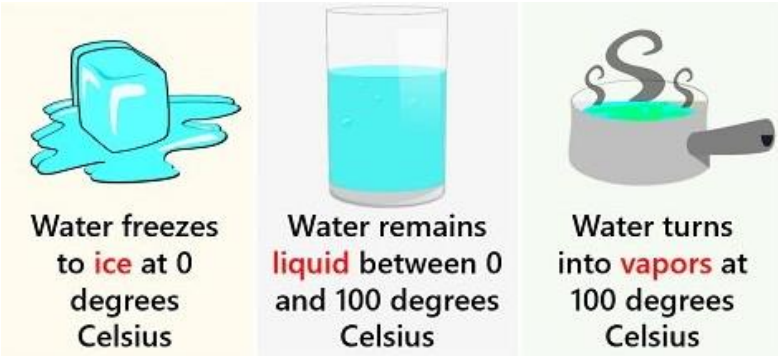
(a) 25°C **(b) 0° C** **(c) 100° C**

Answer:

(a) At 25°C, the water will be in liquid form (normal room temperature)

(b) At 0°C, the water is at its freezing point, hence both solid and liquid phases are observed.

(c) At 100°C, the water is at its boiling point, hence both liquid and gaseous states of water (water vapour) are observed.



Q6. Give two reasons to justify –

(a) Water at room temperature is a liquid

(b) An iron almirah is a sold at room temperature

Answer:

(a) Water at room temperature is a liquid because its freezing point is 0°C and boiling point is 100°C.

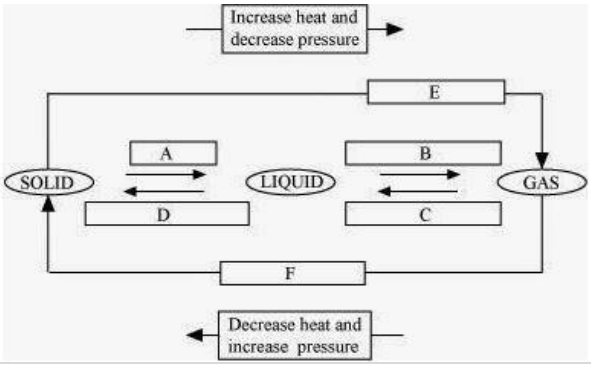
(b) An iron almirah is a solid at room temperature because it's melting and boiling points are above room temperature, an iron almirah is a solid at room temperature.

Q7. Why is ice at 273 K more effective in cooling then water at the same temperature?

Answer: Ice at 273 K will absorb heat energy or latent heat from the medium to overcome the fusion to become water. Hence, the cooling effect of ice is more than the water at same temperature because water does not absorb this extra heat from the medium.

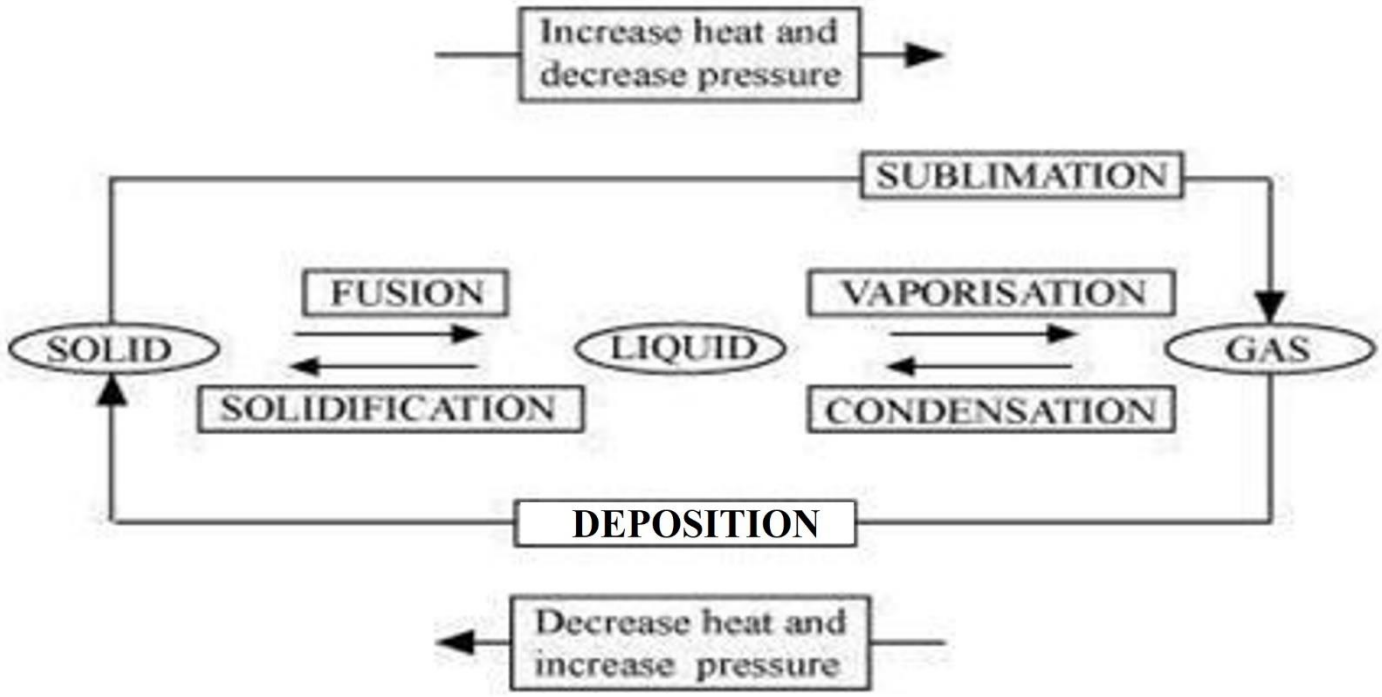
Q8. What produces more severe burns, boiling water or steam?

Answer: Steam will produce more severe burns than boiling water because steam has more heat energy than water due to its latent heat of vaporisation.



Q9. Name A, B, C, D, E and F in the following diagram showing change in its state.

Answer:



A. Fusion: Fusion is the process in which a solid is heated up to a point where the intermolecular force of attraction breaks and the solid is converted to liquid.

B. Vaporization: Vaporization is the process in which a liquid state changes into a gaseous state by applying heat.

C. Condensation: Condensation is the reverse of vaporization. In condensation, the gaseous state of a substance changes to the liquid state.

D. Solidification: Solidification is the reverse of fusion. In solidification, the liquid state of a substance changes into the solid-state.

E. Sublimation: Sublimation is the phenomenon of converting the solid state of a substance directly to the gaseous state without passing through the intermediate liquid state.

F. Deposition: Deposition is the phenomenon of converting the gaseous state of a substance directly to the solid state without passing through the intermediate liquid state.

Thus, **A-fusion, B-vaporisation, C-condensation, D-solidification, E-sublimation and F-deposition**.

Note: Remember the terms fusion, vaporisation, condensation, solidification, sublimation and deposition. ***Fusion, evaporation and sublimation can be done by increasing in heat***

and decreasing the pressure. And ***condensation, solidification and deposition can be done by decreasing the heat and increasing the pressure***.

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1. Which of the following are matter?

Chair, air, love, smell, hate, almonds, thought, cold, lemon water, the smell of perfume.

Answer: The following substances are matter:

- Chair
- Air
- Almonds
- Lemon water

The smell of perfume (Smell is considered as a matter due to the presence of some volatile substances in air that occupy space & have mass.)

2. Give reasons for the following observation:

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

Answer: The smell of hot sizzling food reaches severed meters away, as the particles of hot food have more kinetic energy and hence the rate of diffusion is more than the particles of cold food.

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

Answer: A diver can cut through water in a swimming pool. The property of matter observed are: This shows that the particles of matter have spaces between them. The intermolecular forces of attraction between liquid particles are not very strong, hence the diver's force is enough to overcome these forces.

4. What are the characteristics of the particles of matter?

Answer:

The characteristics of particles of matter are as follows:

(a) Presence of intermolecular spaces between particles

(b) Particles have intermolecular force.

(c) Particles are in constant motion

(d) All matter is composed of very small particles which can exist independently.

5. The mass per unit volume of a substance is called density. (Density= mass / volume). Arrange the following in the order of increasing density – air, exhaust from the chimneys, honey, water, chalk, cotton and iron.

Answer: Increasing density:

air < exhaust from chimneys < cotton < water < honey < chalk < iron.

6. Answer the following.

a) Tabulate the differences in the characteristics of matter.

b) Comment upon the following: rigidity, compressibility, fluidity, filling a gas container, shape, kinetic energy and density.

Answer:

(a) The difference in the characteristics of the three states of matter.

Characteristics	Solid	Liquid	Gas
Shape	Fixed shape	No Fixed shape	No Fixed shape
Volume	Fixed volume	Fixed volume	No Fixed volume
Intermolecular force	Maximum	Less than solids	Very less
Intermolecular space	Very less	More than solids	maximum
Rigidity/Fluidity	Rigid/cannot flow	Can flow/not rigid	Can flow/not rigid
Compressibility	negligible	compressible	Highly compressible

(b)

(i**) Rigidity:** The tendency of a substance to retain/maintain their shape when subjected to outside force.

(ii**) Compressibility:** The matter has intermolecular space. The external force applied on the matter can bring these particles closer. This property is called compressibility. Gases and liquids are compressible.

(iii) **Fluidity:** The tendency of particles to flow is called fluidity. Liquids and gases flow.

(iv) **Filling of a gas container:** Gases have particles which vibrate randomly in all the directions. The gas can fill the container.

(v) **Shape:** Solids have maximum intermolecular force and definite shape. Whereas liquids and gases takes the shape of container.

(vi) **Kinetic energy:** The energy possessed by particles due to their motion is called kinetic energy. Molecules of gases vibrate randomly as they have maximum kinetic energy.

(vii) **Density:** It is defined as mass per unit volume, the solids have highest density.

7. 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 the air, but to do the same through a solid block of wood, we need a karate expert.

Answer:

(a) The molecules of gas have high kinetic energy due to which they keep moving in all directions and hence fill the vessel completely in which they are kept.

(b) A gas exerts pressure on the walls of the container because the molecules of the gas are in constant random motion due to high kinetic energy. These molecules constantly vibrate, move and hit the walls of the container thereby exerting pressure on it.

(c) The molecules / particles of wooden table are tightly packed with each other, there is no intermolecular space, it cannot be compressed, it cannot flow, all these characteristics are of solid. So 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. It is because the molecules of air has less force of attraction between

them and a very small external force can separate them and pass through it. But in case of solids, the molecules have maximum force of attraction, the particles are tightly bound due to this force. Hence large amount of external force is required to pass through solid.

8. Liquids generally have a lower density than solids. But you must have observed that ice floats on water. Find out why.

Answer: Ice is a solid but its density is lower than water due to its structure. The molecules in ice make a cage like structure with lot of vacant spaces, this makes ice float on water.

9. **Convert the following temperature to Celsius scale:**

a. 300K b. 573K

Answer:

a. 0°C=273K

300K= (300-273)°C = 27°C

b. 573K= (573-273)°C = 300°C

10. What is the physical state of water at:

a. 250°C **b. 100**°C ?

Answer:

(a) At 250°C – Gaseous state since it is beyond its boiling point.

(b) At 100°C – It is at the transition state as the water is at its boiling point. Hence it would be present in both liquid and gaseous states.

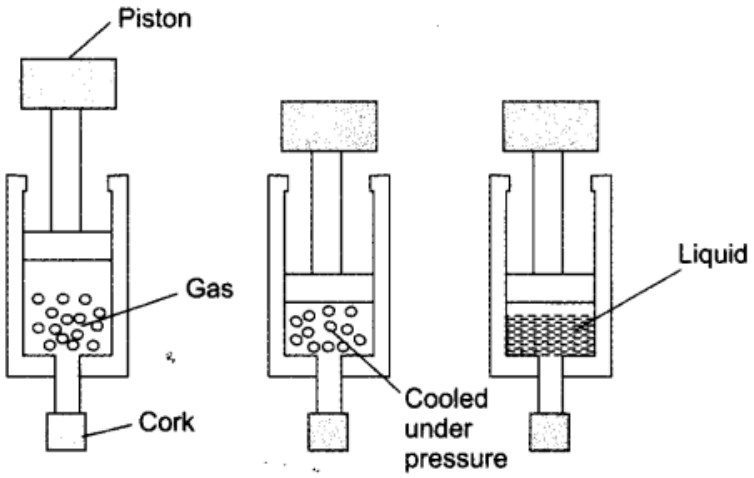
11. For any substance, why does the temperature remain constant during the change of state?

Answer: During the change of state of any matter heat is supplied to the substance. The molecules of this matter use heat to overcome the force of attraction between the particles, at this period of time, temperature remains constant. This extra heat is acquired by the molecules in the form of hidden heat called latent heat to change from one state of matter to the other state.

12. Suggest a method to liquefy atmospheric gases.

Answer: It can be achieved by either increasing the pressure or decreasing the temperature, which ultimately leads to the reduction of spaces between molecules.

The atmospheric gases are taken in a cylinder with piston fitted on it. By cooling and applying pressure on them, the gases can be liquefied.



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

Answer: The outer walls of the cooler get sprinkled by water constantly. This water evaporates due to hot dry weather. Evaporation causes cooling of inside air of cooler. This cool air is sent in the room by the fan.

14. How does the water kept in an earthen pot (matka) become cool during summer?

Answer: The earthen pot is porous with lot of pores on it, the water oozes out through these pores and the water gets evaporated at the surface of the pot thereby causing cooling effect. This makes the pot cold and the water inside the pot cools by this process.

15. Why does our palm feel cold when we put some acetone or petrol or perfume on it?
Answer: Acetone, petrol, and perfume are volatile substances that evaporate when they come in contact with air. Evaporation is facilitated as it uses energy from the palm, hence leaving a cooling effect on our palms.

16. Why are we able to sip hot tea or milk faster from a saucer rather than a cup?
Answer: Tea in a saucer has larger surface area than in a cup. The rate of evaporation is faster with increased surface area. The cooling of tea in saucer takes place sooner than in a cup. Hence we are able to sip hot tea or milk faster from a saucer rather than a cup.

17. What type of clothes should we wear in summer?

Answer: In summer, it is preferred to wear light-coloured cotton clothes because light colour reflects heat and cotton materials have pores that absorb sweat, facilitating evaporation, and hence causing a cooling effect on the skin.