



ST. LAWRENCE HIGH SCHOOL



A JESUIT CHRISTIAN MINORITY INSTITUTION

Sub: Physical Science

Class: 8

Date: 07.05.20

STUDY MATERIAL: CH 1 MATTER (PHYSICS)

Concepts

1. What is matter?
A: anything that has mass and occupies space is called matter.
2. What is the smallest possible unit of matter that shows all the properties of matter?
A: molecule is the smallest unit of matter that shows all the properties of matter.
3. What is the smallest possible unit of matter capable of independent existence?
A: atom is the smallest unit of matter capable of independent existence.
4. How do you identify the amount of matter present in an object?
A: mass is the amount of matter present in an object.
5. What is matter made up of?
A: matter is made up of tiny particles called atoms and molecules.
6. What do you mean by intermolecular spaces?
A: the spaces existing between molecules are called intermolecular spaces.
7. What do you mean by intermolecular forces of attraction?
A: the forces with which the molecules attract each other are called intermolecular forces of attraction.
8. What are the different types of intermolecular forces of attraction?
A: the two types of forces of attraction are adhesion and cohesion.
9. What are adhesive forces?
A: intermolecular forces of attraction between molecules of different kind are called adhesive forces.
10. What are cohesive forces?
A: intermolecular forces of attraction between molecules of the same kind are called cohesive forces.
11. Name the states of matter in the ascending order of their energy content.
A: Bose-Einstein condensates, solids, liquids, gases and plasma.
12. What happens to the energy of matter when its temperature increases?
A: the kinetic energy of the molecules increases with increase in temperature.

13. Define change of state.
A: the process of changing of a substance from one physical state to another at a definite temperature is called change of state.
14. Define melting or fusion.
A: the change of state from solid to liquid at a fixed temperature by the absorption of heat is called melting or fusion.
15. What do you mean by melting point or fusion point of a solid?
A: the temperature at which the solid changes into a liquid at the same temperature is called melting point of the solid.
16. What is the melting point of ice?
A: the melting point of ice is 0°C.
17. How can you lower the melting point of ice?
A: adding salt to ice helps lower its melting point to as low as -21 °C.
18. Define freezing.
A: the change of state from liquid to solid at a fixed temperature by the release of heat is called freezing.
19. What do you mean by freezing point of a liquid?
A: the temperature at which the liquid changes into a solid at the same temperature is called freezing point of the liquid.
20. What is the freezing point of pure water?
A: the freezing point of pure water is 0°C.
21. Define vaporization.
A: the change of state from liquid to vapour is called vaporization.
22. What is the difference between vapour and a gas?
A: The word vapour in its natural state is a solid or liquid at room temperature whereas a gas in its natural state at room temperature would still be a gas.
23. Name the two types of vaporization.
A: the two types of vaporization are boiling and evaporation
24. Define boiling.
A: the change of state from liquid to vapour at a fixed temperature by the absorption of heat is called boiling
25. What do you mean by boiling point of a liquid?
A: the temperature at which the liquid changes into a vapour at the same temperature is called boiling point of the liquid.
26. What is the boiling point of pure water?
A: the boiling point of pure water is 100°C.

27. Define evaporation.
A: the slow and gradual conversion of a liquid into its gaseous state at any temperature is called evaporation.
28. Define condensation or liquefaction.
A: the change of state from gaseous to liquid state at a fixed temperature by the release of heat is called condensation or liquefaction.
29. What do you mean by condensation point or liquefaction point of a gas?
A: The temperature at which the gas or vapour changes into a liquid at the same temperature is called condensation point or liquefaction point of the liquid.
30. What is the liquefaction point of pure steam?
A: The liquefaction point of pure steam is 100°C.
31. Define sublimation.
A: The change of state from solid to vapour at a fixed temperature by the absorption of heat is called boiling
32. What are sublimates?
A: Solids that undergo sublimation are called sublimates.
33. Give some examples of sublimates.
A: Examples of sublimates are Iodine, Naphthalene, Ammonium Chloride, Camphor, Dry ice.
34. Define Deposition or Solidification
A: The change of state from vapour to solid directly is called Deposition or solidification.
35. What do you mean by the Kinetic motion of molecules?
A: The continuous motion of particles in matter is known as Kinetic motion of molecules.
36. If we spray a perfume in a corner of a room, which property of gases is responsible for spreading the smell of the perfume all over the room?
A: Gases have a very large intermolecular space with molecules in continuous motion moving around independently leading to the diffusion of perfume.

Long Answer Questions:

1. Differentiate between Solid, Liquid and Gases.

BASIS FOR COMPARISON	SOLID	LIQUID	GAS
Meaning	Solid refers to a form of matter which has structural rigidity and has a firm shape which cannot be changed easily.	Liquid is a substance, which flows freely, having a definite volume but no permanent shape.	Gas refers to a state of matter, do not have any shape but conform to the shape of the container, completely, in which it is put in.
Shape and Volume	Fixed shape and volume.	No fixed shape but has volume. Takes the shape of the container in which it is kept	Neither definite shape nor volume.

BASIS FOR COMPARISON	SOLID	LIQUID	GAS
Free surfaces	Can have many free surfaces	Only one free surface	None
Energy	Lowest	Medium	Highest
Compressibility	Difficult	Nearly difficult	Easy
Arrangement of molecules	Regular and closely arranged.	Random and little sparsely arranged.	Random and more sparsely arranged.
Fluidity	Cannot flow	Flows from higher to lower level.	Flows in all directions.
Molecular motion	Negligible molecular motion	Brownian molecular motion	Free, constant and random molecular motion.
Intermolecular space	Very less	More	Large
Intermolecular attraction	Maximum	Medium	Minimum
Sound speed	Fastest	Faster than gas but slower than solid	Lowest among all
Storage	Don't need container, for storage.	Cannot be stored without container.	Needs closed container for storage.

2. State the postulates/assumptions of Kinetic Theory of Matter.

A: The postulates of the Kinetic Theory of matter can be summarized as follows:

- a. All matter is made up of very tiny particles called molecules
- b. In the solid state the particles are rigidly held in positions about which they can only vibrate.
- c. In the liquid state, the particles are in continuous motion, but are not completely separated from each other. While in motion they collide with themselves.
- d. Because of the motion of the molecules they possess kinetic energy the amount of which varies in the three states of matter.
- e. The Kinetic energy of a substance gets affected by the temperature of the substance and increases with increase in temperature.
- f. In the gaseous state the particles are in random motion, almost independent of each other.
 - i. The particles in the gaseous state travel much longer distances than in a liquid before they collide with other particles or the walls of the vessel.
 - ii. The collision with the walls of the vessel gives rise to the pressure of the gas.

3. Differentiate between boiling and evaporation.

Boiling

- It is the conversion of liquid to gas at a

Evaporation

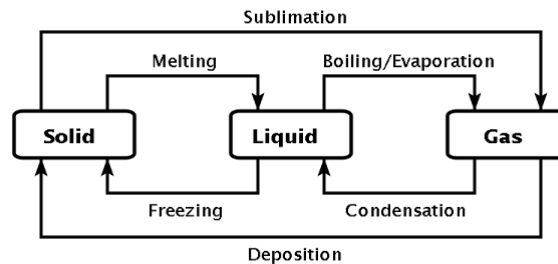
- It is the conversion of liquid to gas at any

- fixed temperature
- The conversion takes place throughout the liquid
- It takes place on external heating of the liquid
- It is not accompanied by cooling of the surrounding
- temperature
- It is a surface phenomenon
- No external heating is required
- Evaporation causes cooling

Eg. Boiling of water

Eg. Evaporation of acetone or spirit

4. Show all the processes of change of state through a diagram.



5. What is a meniscus?

A. The meniscus (plural: menisci, from the Greek for "crescent") is the curve in the upper surface of a liquid close to the surface of the container or another object, caused by surface tension. It can be either concave or convex, depending on the liquid and the surface.

6. Why does water have a concave meniscus (curved upward) but mercury has a convex meniscus (curved downward) with glass?

A. Water wets glass and spreads out on it because the adhesive forces between the liquid and the glass are stronger than the cohesive forces within the water. Mercury does not wet glass - the cohesive forces within the drops are stronger than the adhesive forces between the drops and glass. When liquid mercury is confined in a tube, its surface (meniscus) has a convex shape because the cohesive forces in liquid mercury tend to draw it into a drop.

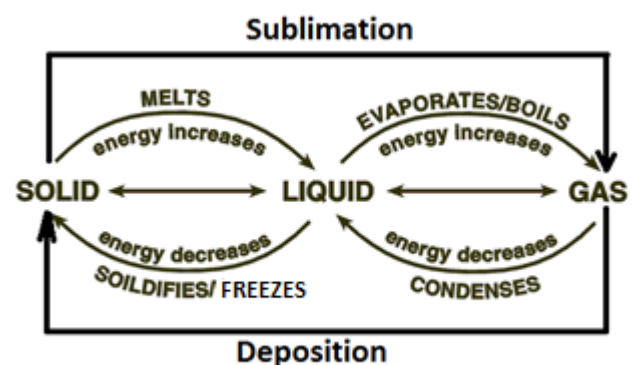
7. What is Brownian motion? Explain how Brownian motion supports the idea that matter is made from tiny particles in continuous motion.

A. Brownian motion or pedesis (from Ancient Greek: πήδησις /pé:de:sis/ "leaping") is the random motion of particles suspended in a fluid (a liquid or a gas) resulting from their collision with the fast-moving molecules in the fluid.

Brownian Motion is explained using the concept that there is change of direction and speed of particles on intermolecular collision, thus supporting the idea that matter is made from tiny particles in continuous motion.

8. Name and explain the processes involved in change of state.

- A. The six changes of state are:
- ✓ Melting: change from a solid to a liquid.
 - ✓ Vaporization: change from a liquid to a gas.
 - Slow vaporization is called evaporation.
 - Fast vaporization is called boiling.



- ✓ Condensation: change from a gas to a liquid.
- ✓ Solidification / freezing: change from a liquid to a solid.
- ✓ Sublimation: change from a solid directly to a gas
- ✓ Deposition: change from a gas directly to a solid

9. What do you mean by evaporation?

A. The process in which liquid change into vapour without boiling is called evaporation. It occurs at all temperatures. In liquid, the speeds of molecules in random motion are different and keep changing due to the intermolecular bombardments. When a molecule near the surface of the liquid gets sufficient speed or energy, it escapes from the liquid surface and leaves behind a liquid with a lower energy content (= lower temperature).Evaporation could occur at any temperatures. At higher temperatures, the process speeds up. Rate of evaporation increases with temperature, area of the exposed surface and wind; and, decreases with humidity of the atmosphere, pressure and boiling point of the liquid.

Explanation

1. How does the temperature/Kinetic energy of a substance vary with the addition of heat? Explain with the help of a heating curve.

A: As a substance is heated from the solid state it absorbs the heat leading to a rise in the Kinetic energy of the molecules. This is reflected in a rise in temperature till the substance reaches the melting point. At the melting point the energy from the heat is used to increase the intermolecular spaces and decrease the intermolecular forces as the substance undergoes a change of state. Once the entire substance has melted the temperature again starts to rise signifying an increase in the Kinetic energy of the molecules. At the boiling point again the energy from the heat is used to increase the intermolecular spaces and decrease the intermolecular forces as the substance undergoes a change of state. Once the entire substance has turned to vapour the temperature again starts to rise. There is no change in temperature occurring while the substance undergoes a change of state.

2. Explain the melting of a solid on the basis of Kinetic theory.

A: As a substance is heated from the solid state it absorbs the heat leading to a rise in the Kinetic energy of the molecules. This is reflected in a rise in temperature till the substance reaches the melting point. At the melting point the energy from the heat is used to increase the intermolecular spaces and decrease the intermolecular forces as the substance undergoes a change of state.

3. Explain the evaporation of a liquid on the basis of the Kinetic theory.

A: The molecules of a liquid are in constant random motion and possess Kinetic energy. They often collide against each other exchanging their Kinetic energy. Sometimes a molecule with more kinetic energy comes towards the surface of the liquid and is able to overcome the intermolecular forces of the surrounding liquid molecules, thus escaping into the surrounding. As the molecule escapes the surface of the liquid it takes away a part of the liquid's Kinetic energy, thereby causing cooling of the liquid.

4. Explain how droplets are formed.

A: Droplets are formed around a cold object due to the phenomenon of condensation. The surrounding atmosphere contains water vapour which on contact with a cold surface loses energy. As the molecules lose energy the temperature falls to the condensation or the liquefaction point. At the point of liquefaction the intermolecular forces become stronger and intermolecular spaces reduce and the vapour is converted into a liquid. The liquid adheres to the glass or metal surface due to forces of adhesion and forces of cohesion lead to the droplet increasing in size.

5. Explain the freezing of a liquid on the basis of the Kinetic theory.

A: As a substance is cooled from the liquid state it releases energy leading to a fall in the Kinetic energy of the molecules. As a result the temperature falls till it reaches the freezing point. At the

freezing point the energy molecules come closer due to a loss in its energy content and the intermolecular spaces decrease and intermolecular forces increase. The substance is thus converted to a solid at the freezing point.

6. Explain why salt and sugar dissolve in water after some time.

A: While dissolving in a liquid a solid breaks up into molecules inside the liquid. And these molecules hide themselves in the intermolecular space of the liquid. So the volume of the liquid does not change and dissolution of the salt and sugar takes place.

7. What are molecular forces of attraction?

Intermolecular forces (IMF) are the forces which mediate interaction between molecules, including forces of attraction or repulsion which act between molecules and other types of neighboring particles, e.g., atoms or ions. Intermolecular forces are weak relative to intramolecular forces – the forces which hold a molecule together.

The forces in solids are of four types:

(a) ionic - this is the electrostatic attraction of two oppositely charged ions and occurs in crystals such as sodium chloride.

(b) covalent - this force results from electrons being shared between the shells of adjacent atoms as in diamond, silicon and methane.

(c) metallic - this force is due to the free electron cloud that exists in metals such as copper. The electrons move freely between the atoms and are not fixed to any pair of atoms as they are in the covalent bond.

(d) van der Waals - these are electric dipole forces formed by the electron cloud and the nucleus; they operate in all matter and are responsible for the attractive force between molecules in a gas. They can be observed in solid neon, simply because none of the others operate there.

Solution of Previous Years' Question Papers 2019

1st Term

1. The fixed temperature at which a liquid changes into a solid is known as

- | | |
|------------------|-------------------|
| a) boiling point | b) freezing point |
| c) vapourisation | d) condensation |

Ans : Freezing Point

3. The intermolecular force is the strongest in –

- | | |
|--------------------------|----------|
| a) liquid | b) gases |
| c) both liquid and gases | d) solid |

Ans : Solid

2. The process in which a gas directly condenses into a solid state is called

Deposition /Condensation

6. The boiling point of pure ice is **100°C**

7. Change of State occurs when **heat** is either absorbed or released.

3. Why iodine and naphthalene differ from other solids?

Ans: Iodine and naphthalene are sublimates and change directly from solid to vapour phase without passing through the liquid phase.

4. Write the value of melting point of ice and freezing point of water ?

Ans. : Melting point of ice and freezing point of water is 0°C .

4. Write the value of melting point of ice and freezing point of water.

Ans: Melting point of ice and freezing point of water both exist at 0°C

6. Differentiate between Force of Adhesion and Cohesion

Ans:

Force of Cohesion	Force of Adhesion
1. Intermolecular forces between molecules of the same kind	1. Intermolecular forces between molecules of different kinds
2. Leads to capillary effect	2. Influences the formation of a meniscus