

IX Chemistry

Matter in Our Surroundings

1. Matter is anything that occupy space and have mass.
2. Physical Nature of Matter
 - i) Matter is made up of particles
e.g. salt mixes in water, break anything into small pieces.
 - ii) Particles of matter are very small
e.g. crystals of potassium permanganate in water, ~~defol~~ in water.
3. Characteristics of Particles of Matter
 - i) Particles of matter have space between them
e.g. salt in water, lemon water
 - ii) Particles of matter are continuously moving
e.g. unlit and lit incense stick, ink and honey in water, potassium permanganate or copper sulphate in hot and cold water
Thus, with increase in temperature the kinetic energy of the particles also increases.

Diffusion - the particles of matter intermix on their own with each other by getting into the spaces between the particles.

On heating, diffusion becomes faster.

- iii) Particles of matter attract each other
e.g. try to break an iron nail, a piece of chalk and a rubber band and then try to cut running water with your fingers.
This shows that force of attraction varies one kind of matter to another

4. States of Matter

i) The Solid State

Definite shape, distinct boundaries and fixed volumes. Solids may break under force but it is difficult to change their shape, so they are rigid.

a) rubber band change shape when stretched. Is it solid.

Yes as it change shape under force and regains shape once force is removed.

b) sugar and salt take shape of container. Are they solid

Yes because shape of each salt or sugar crystal is fixed

c) sponge can be compressed. how then it is a solid.

sponge has air spaces in it. When we press it, it is the air that moves out and we are able to compress the sponge.

ii) The liquid state

no fixed shape but have a fixed volume. Liquids flow and change shape, so they are not rigid and thus are called fluids. Solids, liquids and gases can diffuse in liquids e.g. oxygen and carbon dioxide diffuse in water which is necessary for aquatic plants and animals.

The rate of diffusion of liquids is higher than that of solids. This is because there is lot of space and particles move freely.

iii) The gaseous state

Gases are highly compressible as compared to solids and liquids. e.g. take 3 syringes - in one salt, in second water, in third air. Third syringe will ~~more~~ be more compressible.

LPG and Oxygen are put in cylinders after being compressed. CNG is used as fuel.

Due to high speed of particles and large space between them, gases show the property of diffusing very fast into other gases.

In the gaseous state, the particles move about randomly at high speed. Due to this random movement, the particles hit each other and also the walls of the container. This force exert pressure on the walls of the container.

5. Change of state of matter

Melting point - The temperature at which a solid melts to become a liquid at the atmospheric pressure is called its melting point.

The melting point of a solid is an indication of the strength of the force of attraction between its particles.

Fusion - The process of melting is called fusion.

Latent heat of fusion - The amount of heat energy that is 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.

Boiling point - The temperature at which a liquid starts boiling at the atmospheric pressure is known as its boiling point.

Boiling is the bulk phenomenon

Latent heat of vaporisation - The amount of heat energy required to change 1 kg of a liquid into vapour at atmospheric pressure at its boiling point.

Water vapour has more energy than water at same temperature.

Sublimation - a change of state directly from solid to gas without changing into liquid state (~~or vice versa~~) (or vice versa) is called sublimation.

e.g. Heating of camphor or ammonium chloride on china dish.

6. Effect of Change of Pressure

Applying pressure and reducing temperature can liquefy gases.

Solid CO_2 gets converted directly to gaseous state on decrease of pressure to 1 atm without coming into liquid state (sublimation)

That's why it is also known as dry ice.

7. Evaporation

The phenomenon of change of a liquid into vapours at any temperature below its boiling point is called evaporation.

Factors affecting evaporation

- i) an increase in surface area
- ii) an increase of temperature
- iii) a decrease in humidity
- iv) an increase in wind speed

How does evaporation cause cooling?

The absorption of energy from the surroundings make the surroundings cold.

- e.g. putting acetone (nail polish remover) on your palm.
sprinkling of water on the roof or open ground
sweating (we wear cotton clothes during summer)

The heat energy equal to the latent heat of vapourisation is absorbed from the body leaving the body cool.

Why do we see water droplets on the outer surface of a glass containing ice-cold water?

8. Other two states of matter

- i) Plasma - ionised gases. Eg. Fluorescent tube contains helium or other gases, neon sign bulbs contain neon gas.

The gas gets ionised (charged) when electrical energy flows through it. The plasma glows with a special colour depending on the nature of gas. The sun and the stars glow because of plasma in them.

- ii) Bose-Einstein Condensate - It is formed by cooling a gas of extremely low density to super low temperatures. Predicted by Satyendra Nath Bose and Albert Einstein.