cw.

Date: 6/4/April/23
Page:

Chapter-1.
Matters in Our Surroundings

Matter :→ Anything which occupies space and has mass is called matter.
eg.→ Air, water, hydrogen and oil, etc.

Particles :→ Everything around us is made of tiny pieces or particles. The particles which make up matter are atoms or molecules
eg.→ A small rain drop is made up of about 10^{21} particles.

Characteristics of Particles

Particles have following characteristics:
1. The particles of matter are very very small.
2. The particles of matter have spaces between them.
3. The particles of matter are constantly moving.
4. The particles of matter attract each other.

Properties of Matter :-

There are two properties of matter -

(i) Physical properties
(ii) Chemical properties

Physical Properties

The properties which determines the physical nature of matter are called physical properties of matter.

eg :- Colour, Odour, hardness, softness, state of matter, etc.

Chemical Properties

The properties which show the chemical composition of matter are called chemical properties of matter.

eg :- Reactivity, Acid or Base, etc.

Classification of Matter on the basis of their physical state :-

On the basis of physical states, all the matter can be classified

into 3 groups:-

(i) Solids
(ii) Liquids
(iii) Gases.

Solids

Solids have following characteristics:-

1. Solids have a fixed shape and a fixed volume.
2. Solids cannot be compressed much.
3. Solids have high densities.
4. Solids do not fill their container completely.
5. Solids do not flow.

Liquid.

Liquids have following characteristics:-

1. Liquids have fixed volume but they have no fixed shape.
2. Like solids, liquids cannot be compressed much.
3. Liquids have moderate to high densities but less dense than solids.
4. Liquids do not fill their container completely.
5. Liquids generaly flow easily.

Gases

- Gases have following characteristics:

1. Gases have neither a fixed volume nor a fixed shape.
2. Gases can be compressed easily.
3. Gases have very low densities.
4. Gases fill their container completely.
5. Gases flow easily.

Diffusion

- The spreading out and mixing of a substance with another substance due to the motion of its particles is called diffusion.
- The rate of diffusion increases on increasing the temperature of diffusing substance.
- Diffusion in gases is very fast in liquids diffusion is slower than gases and in solids diffusion is very very slow.

Temperature

1. The degree of hotness or coldness of any substance is called its temperature.

2. The common unit of measuring temperature is 'degree celsius' which is denoted by °C

3. The SI unit of temperature is 'kelvin', which is denoted by K.

eg:→ Water :→

	Melting point	boiling p
C	0°C	100°C
F	32°f	212°f
K	273K	373K

Temperature on K scale : Temperature on C scale + 273.

30°C + 273.

303 K

Change the temperature readings from C scale to K scale.

(i) 25°C

⇒ Temperature on K scale = Temp. on C scale + 273
⇒ 25°C + 273
⇒ 298 K.

(ii) 123°C

⇒ Temperature on K scale = Temp. on C scale + 273.
⇒ 123°C + 273.
⇒ 396 K.

(iii) 82°C

⇒ Temperature on K scale = Temp. on C scale + 273.
⇒ 82°C + 273.
⇒ 355 K.

(iv) 93°C

⇒ Temperature on K scale = Temp. on C scale + 273.
⇒ 93°C + 273.
⇒ 366°K K.

v) 38°C

⇒ Temperature on K scale = Temp. on C scale + 273.

⇒ 38°C + 273.

⇒ 311 k.

(vi) 75°C

⇒ Temperature on k scale = Temp. on C scale + 273°C

75°C + 273.

348 k.

Changing celsius to f.

⇒ formula = $f = C \times \frac{9}{5} + 32$

Change the temperature readings from C° to f.

(i) 30°C.

⇒ $f = C \times \frac{9}{5} + 32$

$f = 30° \times \frac{9}{5} + 32$

$f = 54 + 32$

$f = 86°f$

(ii) 25°C

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{25}^{5} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 45 + 32$

$\Rightarrow f = 77°f$

(iii) 35°C.

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{35}^{7} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 63 + 32$

$\Rightarrow f = 95°f$

(iv) 120°C.

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{120}^{24} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 216 + 32$

$\Rightarrow f = 248°f$

v) 70°C

$\Rightarrow f = 70C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{70}^{14} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 126 + 32$

$\Rightarrow f = 158°f$

(vi) 95°C.

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{95}^{19} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 171 + 32$

$\Rightarrow f = 203°f$

(vii) 82°C.

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = \cancel{82}^{16.4} \times \frac{9}{\cancel{5}} + 32$

$\Rightarrow f = 147.6 + 32$

$\Rightarrow f = 179.6°f$

cw.

(viii) 15°C

$\Rightarrow f = C \times \frac{9}{5} + 32$

$\Rightarrow f = 15^{3} \times \frac{9}{5} + 32$

$\Rightarrow f = 27 + 32$

$\Rightarrow f = 59°f$

(ix) 200°C

$\Rightarrow f = C \times \frac{9}{5} + 32.$

$\Rightarrow f = 200^{40} \times \frac{9}{5} + 32$

$\Rightarrow f = 360 + 32.$

$\Rightarrow f = 392°f.$

Change the temperature from fahrenheit scale to celsius scale.

Formula $= C = \frac{5 \times (F - 32)}{9}$

eg → Convert 95°F to celsius scale?

$\Rightarrow C = \frac{5 \times (F-32)}{9}$

$C = \frac{5 \times (95-32)}{9}$

$C = \frac{5 \times 63^{7}}{9}$

$C = 35°C$

(i) $86^\circ F$

$\Rightarrow C = \frac{5 \times (F - 32)}{9}$

$\Rightarrow C = \frac{5 \times (86 - 32)}{9}$

$\Rightarrow C = \frac{5 \times 54^{6}}{9}$

$\Rightarrow C = 30^\circ f$

(ii) $72^\circ F$

$\Rightarrow C = \frac{5 \times (F - 32)}{9}$

$\Rightarrow C = \frac{5 \times (72 - 32)}{9}$

$\Rightarrow C = \frac{5 \times 40^{4.44}}{9}$

$\Rightarrow C = 22.2^\circ f$

(iii) $59^\circ f$

$\Rightarrow C = \frac{5 \times (F - 32)}{9}$

$\Rightarrow C = \frac{5 \times (59 - 32)}{9}$

$\Rightarrow C = \frac{5 \times (27^{3})}{9}$

$\Rightarrow C = 15^\circ f$

(iv) $68^\circ f$

$\Rightarrow C = \frac{5 \times (F - 32)}{9}$

$\Rightarrow C = \frac{5 \times (68 - 32)}{9}$

$\Rightarrow C = \frac{5 \times 36^{4}}{9}$

$\Rightarrow C = 20^\circ f$

v) $50^\circ f$

$\Rightarrow C = \frac{5 \times (f - 32)}{9}$

$\Rightarrow C = \frac{5(59 - 32)}{9}$

$\Rightarrow C = \frac{5 \times 18^{2}}{9}$

$\Rightarrow C = 10^\circ f$

(vi) $105^\circ f$

$\Rightarrow C = \frac{5 \times (f - 32)}{9}$

$\Rightarrow C = \frac{5 \times (105 - 32)}{9}$

$\Rightarrow C = \frac{5 \times 73^{8.14}}{9}$

$\Rightarrow C = 40.7^\circ f$

cw.

Change of state of Matter

We can change the state of matter in two ways.

(i) By changing the temperature.
(ii) By changing the pressure

Effect of change of temperature

By increasing the temperature the solid can be converted into liquid state and the liquid can be converted into gaseous state.

And by decreasing the temperature a gas can be converted into liquid state and a liquid can be converted into a solid state.

i) Solid to liquid change (melting):→

→ The process in which a solid substance changes into a liquid on heating, is called melting. This process is also called fusion.

(ii) Melting Point

⇒ The temperature at which a solid substance melts and changes into a liquid at atmospheric pressure, is called melting point

Eg →

Substance	Melting point
Ice	0°C
Sodium (Na)	97°C
Sulphur	119°C
Lead (Pb)	327°C
Zinc (Zn)	420°C
Iron (Fe)	1533°C

(ii) Liquid to gas change (Boiling) →

⇒ The process in which a liquid substance changes into a gas rapidly on heating is called boiling.

Boiling point

The temperature at which a liquid boils and changes rapidly into a gas at atmospheric pressure is called boiling point of the liquid.

eg →

Substance	Boiling point
Acetone	56°C
Alcohol	78°C
Petrol	95°C
Water	100°C
Mercury	357°C
Ethanoic acid	118°C

Condensation

The process of changing a gas to a liquid by cooling is called condesation. Condensation is the reverse of boiling.

Freezing

The process of changing a liquid into a solid by cooling is called freezing. Freezing means solidification. Freezing is the reverse of melting

Latent heat

The heat energy which has to

be supplied to change the state of a substance is called its latent heat. The word latent mean 'hidden'.

Types of latent heat

There are 2 types of latent heat

(i) Latent heat of fusion (solid-liquid)
(ii) Latent heat of vapourisation (liquid - gas)

Latent heat of fusion

The latent heat of fusion of a solid is the quantity of heat in joules required to convert 1 kg of the solid (at its melting point) to liquid without any change in temperature.

It has been found by experiments that 3.34×10^5 joules of heat has to be supplied to change one kilogram of ice to water at the same temperature of 0°C.

Latent heat of vaporization

The latent heat of vaporization of a liquid is the quantity of heat in joules required to convert 1 kg of the liquid (at its boiling point) to vapour or gas without any change in temperature.

- It has been found by an experiment that 22.5×10^5 joules of heat is required to change 1 kg of water to steam at the same temperature of 100°C.

Sublimation

The changing of a solid directly into vapour on heating and of vapour into solid on cooling, is know as sublimation.

- The solid substance which undergoes sublimation is said to sublime.

- The solid obtained by cooling the vapours of the solid is called sublimate

Eg:- Iodine, Camphare, Naphthalene, etc.

Evaporation

The process of a liquid changing into vapour or gas even below its boiling point is called evaporation

Factors affecting evaporation

i) Temperature
ii) Surface Area
iii) Humidity
iv) Wind speed

Ⓘ Temperature

The rate of evaporation increases on increasing the temperature of liquid is called temperature.

Surface Area

The rate of evaporation increases on increasing the surface area of the liquid.

Humidity

When the humidity of air is low, then the rate of evaporation is high and when the humidity of air is high, then the rate of evaporation is low.

Wind speed

The rate of evaporation of a liquid increases with increasing the wind speed.

Tuitions
26/4/19

Effect of change of Pressure -

The physical state of matter can also be changed by changing the pressure.

Gases can be changed into liquids by increasing the pressure and decreasing the

Plasma occurs naturally in the stars including the sun. The sun and other stars glow because of the presence of plasma in them.

Plasma can also be made on the earth by passing electricity through gases at very low pressure taken in a glass tube.

Bose - Einstein Condensate:-

In 1920 an Indian scientist Satyendra Nath Bose did some calculation for the 5th state of matter. On the basis of these calculation, Albert Einstein predicted the existence of new state of matter called Bose - Einstein Condensate (BEC)

It is obtain by cooling a gas of extremely low density to super low temperature.

Limitless 21/8/19

Answer the following questions -

Q1→ Which of the following are matter?

Ans→ Chair and almonds.

Q2→ Give reasons for the observation:
The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food you have to go close.

Ans→ Because the rate of diffusion increases on increasing the temperature of diffusing substance. So, the smell of hot sizzling food reaches from several metres and the smell of cold food is not reaches from from several metres

Q3→ A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?

The ability of a diver to cut

through water in swimming pool shows that matter is made up of particles.

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

Ans- (i) Particles of matter have spaces between them.

(ii) Particles of matter are continuosly moving.

(iii) Particles of matter attract each other.

Q1→ The mass per unit volume of a substance is called density.
(density = mass / volume)
Arrange the following in order of increasing density :- air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Ans→ These are in order of increasing density :-
Air < Exhaust from chimney < Cotton < Water < Honey < Chalk < Iron.

2.(a) Tabulate the difference between states of matter.

Ans→ Solid - Solid have high density.
* Solid cannot be compressed much.

* Liquid - Liquid have moderate to high density.
* Like solid, liquid cannot be compressed much.

* Gas - Gases have low density.
* Gas can be compressed much.

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

Ans → (b) * Rigidity can be expressed as the tendency of matter to resist a change in shape.

* Compressibility is the ability to be reduced to a lower volume when force is applied.

* Fluidity is the ability to flow.

* Filling a gas container means the attainment of shape of the container by gas.

* Shape defines a definite boundary.

* Kinetic energy possessed by a particle due to its motion.

* Density is mass per unit volume.

Q3 → Give reasons.

a. A gas fills ~~completly~~ completely the vessel in which it is kept.

Ans→ There is a little attraction between particles of gas. Thus, gas particles move freely in all directions.

b. A gas exerts pressure on the walls of the container.

Ans. Because the particles of gas move randomly in all directions at high speed.

c A wood wooden table should be called a solid.

Ans→ A wooden table has a definite shape and volume. It is very rigid and cannot be compressed.

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.

Ans-) Particles of the air have large spaces between them. On the other hand, wood has little space between between its particles and it is rigid.

Q→ Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Why?

Ans Ice which is solid has vacant spaces between water molecules thus making ice lighter than water. Thus ice floats on water.

14/5/19

Temperature

Gases $\xrightarrow[\text{Temperature decrease}]{\text{Pressure increase}}$ Liquid.

Ammonia $\xrightarrow[\text{Temp. decrease}]{\text{Pressure increase}}$ Liquid ammonia.

Some solids can change into gases on decreasing the pressure and increasing the temperature.

Dry ice (Solid CO_2) $\xrightarrow[\text{Temp. increase}]{\text{Pressure decrease}}$ CO_2 gas.

Eg. → (i) Ammonia gas can be liquified by applying high pressure and lowing the temperature.

(ii) The conversion of solid CO_2 into CO_2 gas is caused by the decrease in pressure and higher atmospheric temperature.

Plasma.

Plasma is a mixture of free electrons and ions.