



SSC GK

SSC GK BATCH 2.0

Chemistry

Is Matter Around Us Pure

Lecture :- 1

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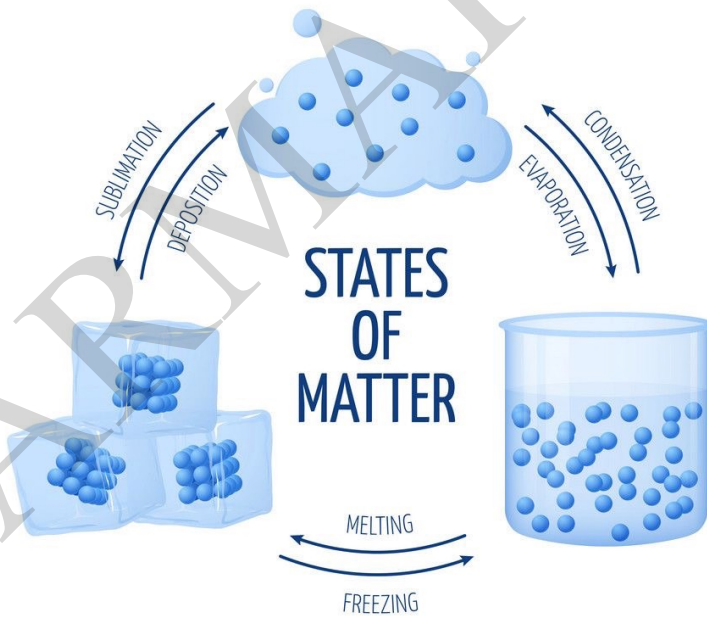


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IS MATTER AROUND US



What is matter?

Anything that has a fixed volume/mass occupies some space

Eg: phone, laptop, water, air

Panch Tatva by Indian Philosophers

1. Air
2. Earth
3. Fire
4. Sky
5. Water

Properties of Matter

1. Particles of matter have space b/w them
2. Particles of matter are continuously moving
3. Particles of matter attract each other

States of matter

	<u>Space</u>	<u>Kinetic Energy</u>	<u>Movement</u>	<u>Force of attraction</u>
• Solid	Low	Low	Low	High
• Liquid	Medium	Medium	Medium	Medium
• Gas	High	High	High	Low

↑ due to movement

Solid

- Has definite shape, distinct boundaries, negligible compressibility

Shape change → It may break

Effect of Change of Temperature

Temperature ↑ → Force of attraction ↓ → Movement of particles ↑ → Space ↑



Eg: Ice → Water → Vapour

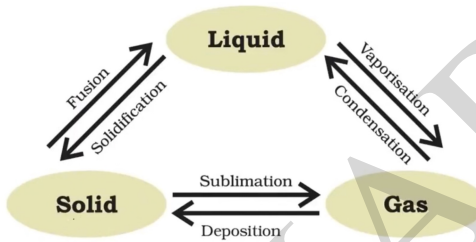
Effect of Change of Pressure

Solid CO_2



* Liquification of gas: Temperature \downarrow
Pressure \uparrow

Change in Matter



Gas $\xrightarrow{\text{Temp} \uparrow}$ Plasma (gas ionisation)

4th state of matter

Predicted

• S. N Bose and Einstein, 1924 \rightarrow Visualised

• Gas $\xrightarrow{\text{Cooling at } 0 \text{ K}}$ Bose-Einstein Condensate (5th state of matter)

Absolute zero

(Bosons particle)

• Eric Cornell \rightarrow By using Rubidium 87 atoms \rightarrow Boson

(1995)

In lab 1st time in 2001

Bosons particles
created

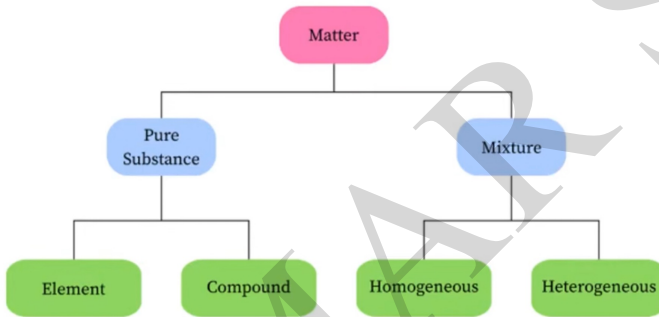
Awarded Nobel Prize in Physics

Favourable Condition for Evaporation

Liquid \rightarrow Gas

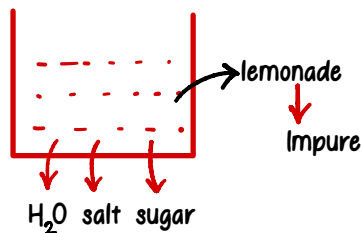
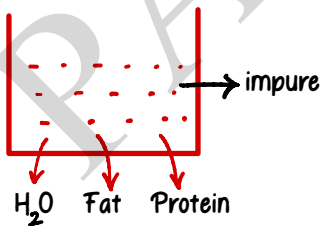
1. Increase in Temperature
 2. Increase in Surface Area
 3. Increase in Wind Speed
 4. Increase in Humidity
- } \rightarrow Rate of evaporation \uparrow
} \rightarrow Rate of Evaporation \downarrow

Classification of Matter



What is Pure Substance?

- Substances that is made up of only one type of particle
 - It has uniform composition and properties
- \rightarrow eg: Sugar crystal, iron piece, salt, distilled water





Element → Iron rod, H_2

Basic form of matter can't be broken into simple substances

Compound → H_2O (water)

Can be broken into simple substances

Mixture

- Two or more different type of substance particles
- Don't have fixed composition

Types

- Homogenous → Alloy → can be seen with naked
- Heterogenous → Eg: Sand eyes

Homogenous Mixture

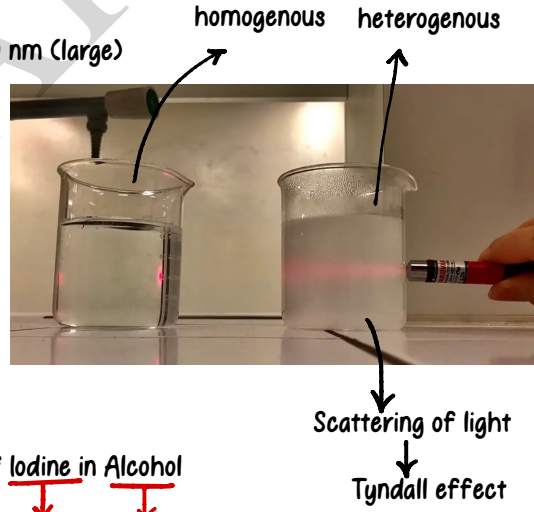
- Has a uniform mixture throughout
- Cannot be separated by physical process
- Also known as "Solutions"
 - Solid-Liquid
 - Liquid-Liquid
 - Solid-Solid → Eg: Alloy
 - Gas-Gas → Pure Air
- Small particle size → >1 nm diameter

Heterogenous Mixture

- Has a non-uniform composition
- Constituents can be separated through physical properties
- Also called "suspension"
- Particle size → >10 nm diameter

Heterogeneous Mixture	Homogeneous Mixture
It is a non-uniformly distributed mixture that can be distinguished.	It is a uniformly distributed mixture that cannot be distinguished.
It can be seen through the naked eye.	It cannot be seen through.
It can be separated easily.	It cannot be separated easily.
The constituent particles present possess different physical properties.	The constituent particles present do possess the same physical properties.
The size of particles is comparatively large.	The size of the particles is at the atomic or molecular level.
Example: sugar solution, blood, etc. Sand, sand solution	Example: grains and pulses, salt and sugar, etc. Lemonade, alloy

Tyndall Effect → Scattering of light
Homogenous → Will not scatter light → particle size > 1 nm
Heterogenous → Will scatter light → particle size > 10 nm (large)



Concentration of Solution

- Solute
 - Solvent
- Two components

Eg: Tincture of Iodine (Antiseptic) → Solution of Iodine in Alcohol
 Solute Solvent

- Saturated solution → Not much solute can be dissolved
- Concentrated Solution → Solute > Solvent
- Dilute Solution → Solvent > Solute

• Concentration of Solution = $\frac{\text{Amount of Solute}}{\text{Amount of Solution}}$

- $\text{Mass by \%} = \frac{\text{Mass of Solute} \times 100}{\text{Mass of Solution}}$

Ques. Solution \rightarrow 40 g \rightarrow Salt \rightarrow Solvent
 \rightarrow 160 g \rightarrow Water \rightarrow Solvent

Mass by %?

$$\frac{\text{Sol}^n}{40 + 160} \times 100$$

$$= \frac{40 \times 100}{200}$$

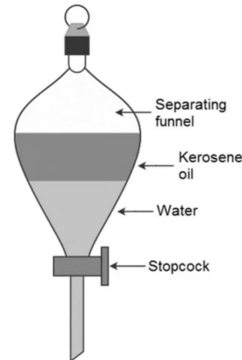
$$= 20\%$$

Colloidal Solution

1. Disperse Phase
 2. Disperse Medium
- Particle size \rightarrow 1 nm \rightarrow 10 nm
 - It appears to be homogenous but actually is heterogenous
Eg: milk, starch solution \rightarrow Colloidal
 - Shows Tyndall Effect

Separation of Components of a Mixture

- Dye from ink \rightarrow Evaporation
- Different colours from dye \rightarrow Chromatography \rightarrow Drug from blood
 - Colour \rightarrow \rightarrow Pigment from natural colour
- Cream from milk \rightarrow Centrifugation \rightarrow sublime
- Mixture of salt and ammonium chloride/naphthalene/anthracene \rightarrow Sublimation (solid to gas)
- Two immiscible liquid \rightarrow Separating funnel
 - oil in water
- Two miscible liquid \rightarrow Distillation
 - (Acetone and water) \rightarrow Boiling point is significant different



- If Boiling Point different less than 25 K → Fractional Distillation
Eg: Air

Physical and Chemical Changes

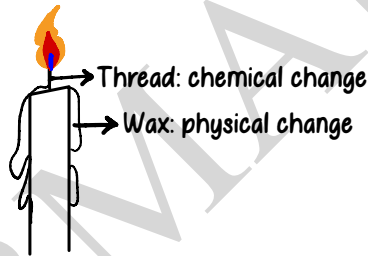
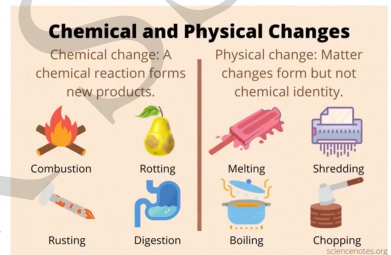
Physical Changes: matter changes form but not chemical identity

- It is reversible
Eg: melting, shredding, boiling, chopping

Chemical Changes: A chemical reaction forms new product

- It is irreversible → Iron oxide layer deposition
Eg: combustion, rotting, rusting, digestion

- Burning of candle → Both physical and chemical changes
- Cutting of fruits → Physical
- Milk turning into curd → Chemical



- Behaviour uniformity: Gas
- 10% of glucose in water means: 10 g of glucose dissolved in 90 g of water
- Water can be separated by Chemical methods
- Brass is a homogenous mixture
- In sugar solution: sugar is solute, water is solvent
- Brass is solution of molten copper in solid zinc



- *Blood and Sea are heterogenous mixture*
- *Cooking of food and digestion of food: both are chemical changes*

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