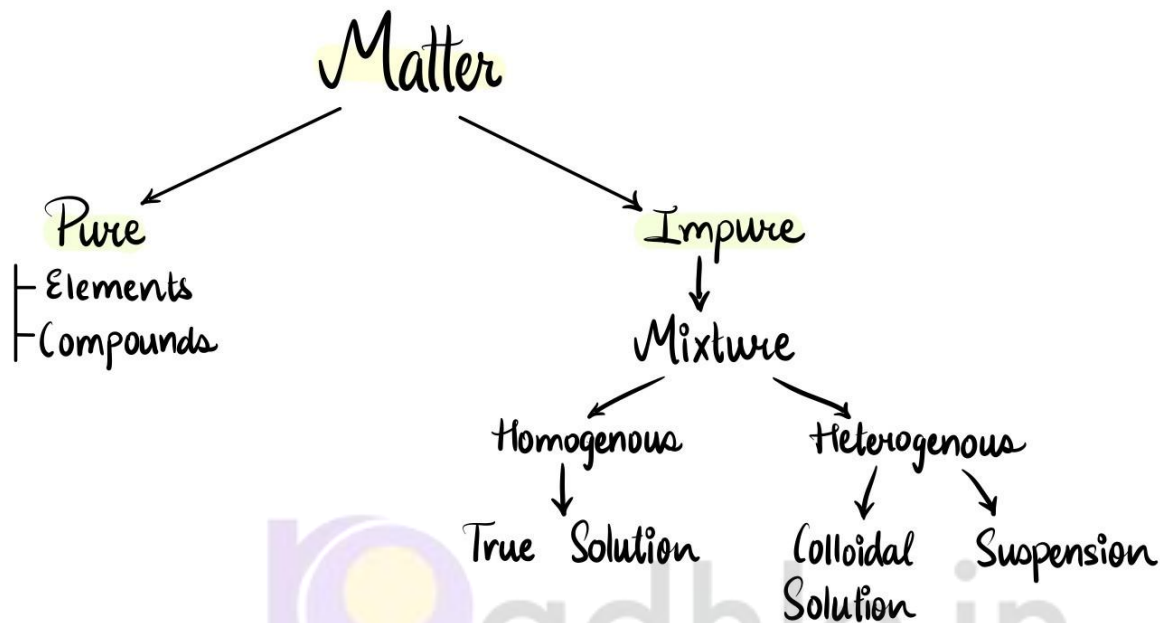


IS MATTER AROUND US PURE ?

(सच्चे Matter का इशारा)



Pure Matter :

↳ Can't be broken into simpler form by physical processes (गहरा रिश्ता).

i) Elements :

→ Elements are made up of single type of atoms and can't be broken down into simpler substances.

Elements are further grouped into the following 3 categories :

a) Metals : Iron, Copper, gold, silver, platinum, sodium etc.

b) Non-metals : Carbon, oxygen, sulphur, nitrogen, hydrogen etc.

c) Metalloids : Boron, silicon, germanium etc.

ii) Compounds :

→ Compounds are made up of a group of atoms that are tightly bound together by chemical bonds and can't be broken down into simpler

substances.

Impure Matter :

◇ Can be broken down into simple substances by physical processes (कम
जहरा रिश्ता)

Mixture and its types :

→ Mixture consists of more than one kind of pure substances which can be separated by physical methods.

Mixtures are of two types :

- i) Homogenous mixture
- ii) Heterogenous mixture

i) Homogenous mixture :

• A mixture is said to be homogenous if all the components of the mixture are uniformly mixed and there are no boundaries of separation between them.

Ex: Sugar in water, etc.

ii) Heterogenous mixtures :

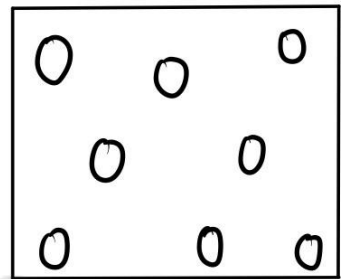
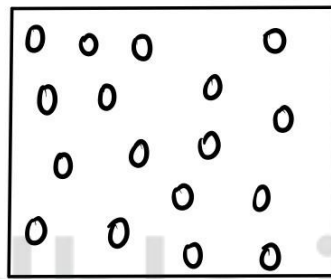
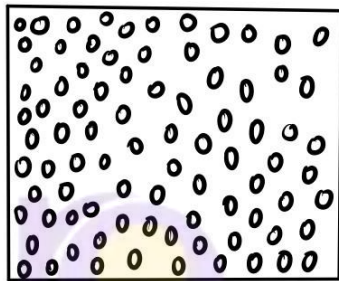
• A mixture is said to be heterogenous if all the components of the mixture are not uniformly mixed and there are visible boundaries of separation between them.

Ex: Water and sand, Air etc.

Properties of Mixtures

| Property | Solution | Colloid | Suspension |
|---------------|---------------|-------------|-----------------|
| Particle size | Less than 1nm | 1 to 100 nm | More than 100nm |
| Appearance | clear | cloudy | cloudy |
| | | | |

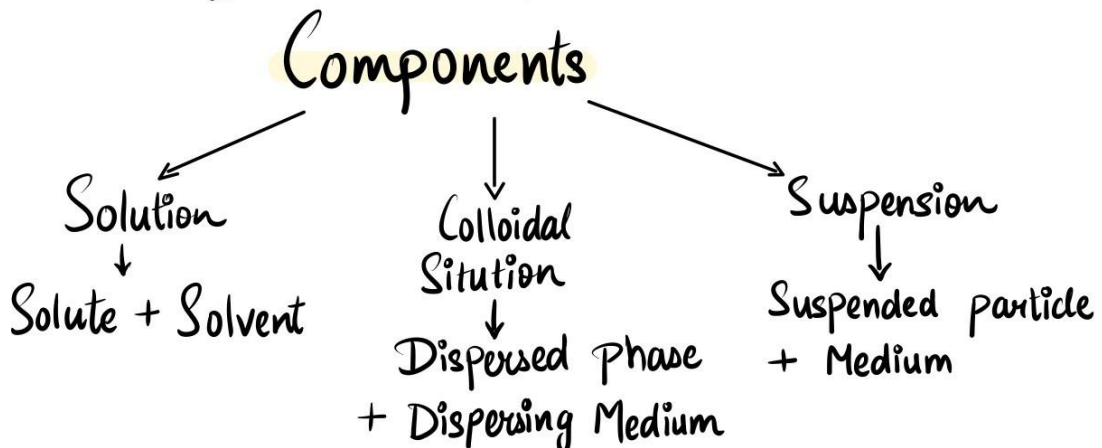
| | | | |
|----------------------|---------------------------------|---------------------------------|--|
| Seperation | Does not seperate | Does not seperate | Seperate or settles |
| Filterability | Passes through the filter paper | Passes through the filter paper | Particles do not pass through filter paper |
| Effect of beam light | Light can pass through | Scatters light | Light cannot pass through |
| Example | Salt solution | Mayonnaise | Muddy water |



Tyndall Effect :

- ◇ The Tyndall effect is light scattering by particles in a colloid or in a very fine suspension.
- ◇ It is seen only in colloids and some suspensions.

Components of different types of mixtures :



A solution has two components :

i) Solvent ii) Solute

i) **Solvent** : The component of the solution that dissolves the other component in it (usually the component present in larger amount) is called the **solvent**.

ii) **Solute** : The component of the solution that is dissolved in the solvent (usually present in lesser quantity) is called the **solute**.

Concentration of a solution :

i) **Saturated solution** :

- When no more amount of solute can be dissolved in a solution at a given temperature, it is called a saturated solution.

ii) **Unsaturated Solution** :

- When more amount of solute can be dissolved in a solution at a given temperature, it is called a unsaturated solution.

iii) **Solubility** :

- The amount of the solute present in the saturated solution at a given temperature is called its solubility.

- The concentration of a solution is the amount of solute present in a given amount (mass or volume) of solution.

- Also, the amount of solute dissolved in a given mass or volume of solvent is called concentration of solution.

Concentration of solution : $\frac{\text{Amount of solute}}{\text{Amount of solvent}}$
or $\frac{\text{Amount of solute}}{\text{Amount of solution}}$

- (Here, amount means mass or volume).

Two methods of finding concentration of solution :

i) Mass by mass percentage of a solution =

$$\left(\frac{\text{Mass of solute}}{\text{Mass of solution}}\right) \times 100\%$$

ii) Mass by volume percentage of a solution =

$$\left(\frac{\text{Mass of solute}}{\text{Volume of solution}}\right) \times 100\%$$

Types of Colloids (very important, directly asked in 1-2 marks) :

| Dispersed phase | Dispersing Medium | Type | Example |
|-----------------|-------------------|-----------|--------------------------------|
| Liquid | Gas | Aerosol | Fog, clouds, mist |
| Solid | Gas | Aerosol | Smoke, automobile exhaust |
| Gas | Liquid | Foam | Shaving cream |
| Liquid | Liquid | Emulsion | Milk, face cream |
| Solid | Liquid | Sol | Milk of magnesia, mud |
| Gas | Solid | Foam | Foam, rubber, sponge, pumice |
| Liquid | Solid | Gel | Jelly, cheese, butter |
| Solid | Solid | Solid Sol | Coloured gemstone, milky glass |

Trick to remember —

Learn this table according to dispersing medium.

Gas is two times, Liquid is 3 times and Solid is 3 times.

Now to remember type,

| | | | | | | | |
|---------------|--------|-----|------|---------|----------|---------|---------|
| Subodh Sharma | Ge(Ji) | Fir | Se | England | Fir | America | Aaye |
| Solid | Sol | Gel | Foam | Sol | Emulsion | foam | Aerosol |
| | | | | | | Aerosol | Aerosol |

SEPERATION METHODS (जुदाई के तरीके)

- Whether its real life or chemistry, two things/people separate only when there are some differences between them.
- They can be difference in thinking, emotions, compatibility, etc.

So how is Chemistry related ?

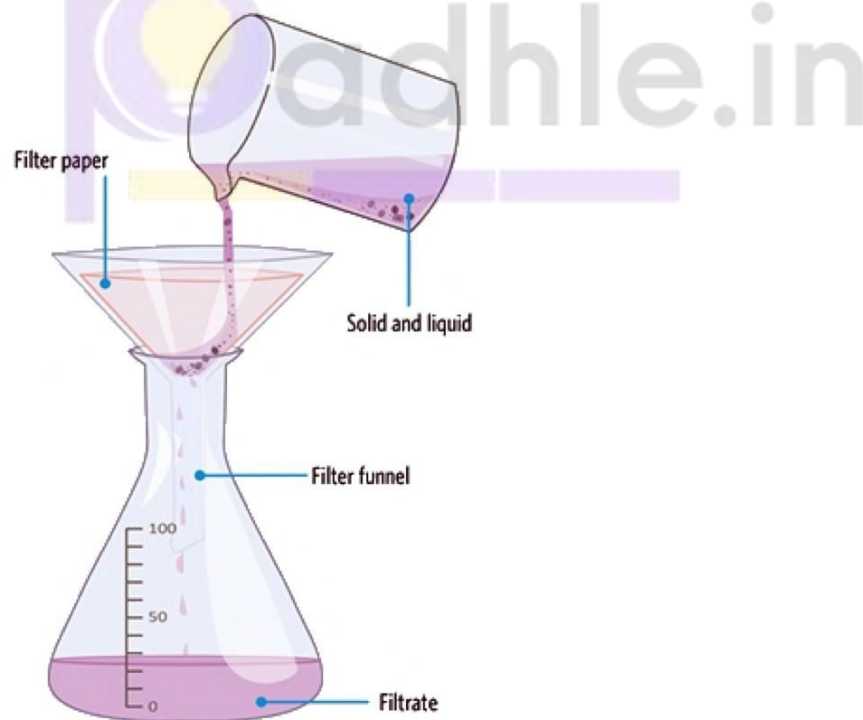
- Here also, in Mixtures, we separate the components as per their differences.
- We first find out how their physical properties are different from each other, and then use Ninja Techniques to separate them.
- * What are the possible differences that can exist between the components in a mixture ?

1. Boiling Point
2. Particle Size
3. Attracts to Magnet
4. Sublimate or Not
5. Weight of particles
6. Volatility
7. Solubility, etc..

* Different Types of Separation Methods -

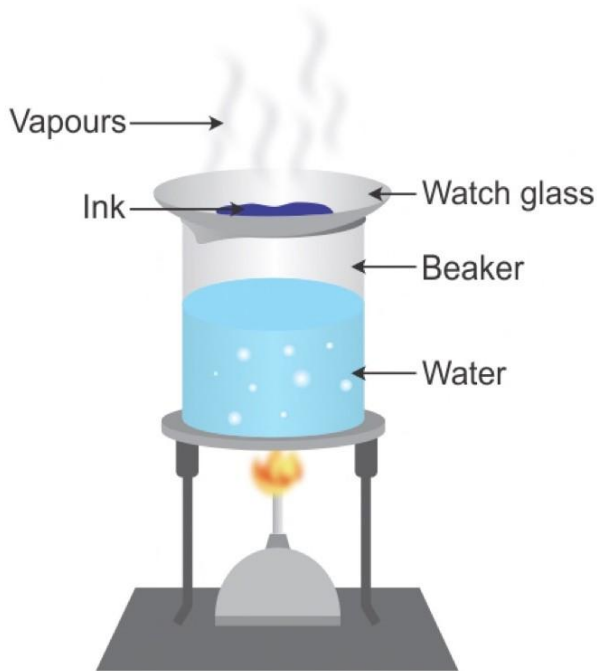
1. Filtration
2. Magnetic Separation
3. Sublimation
4. Separating Funnel
5. Evaporation
6. Crystallisation
7. Distillation
8. Fractional Distillation
9. Chromatography
10. Centrifugation

1) Filtration (Difference in particle size of components)



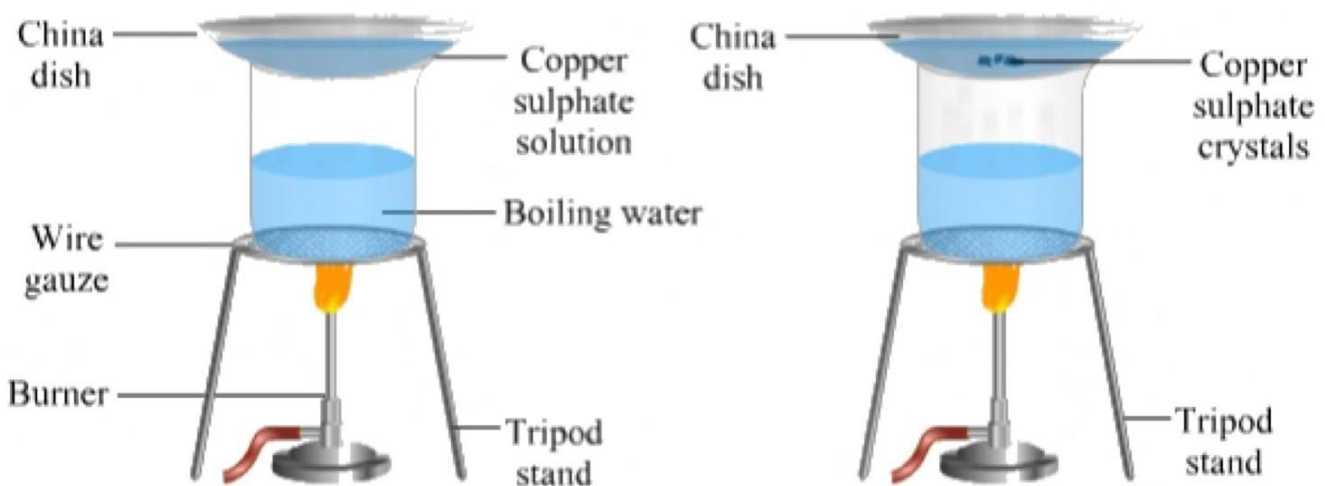
Eg - Sand and water

2) Evaporation (Difference in volatility of components)



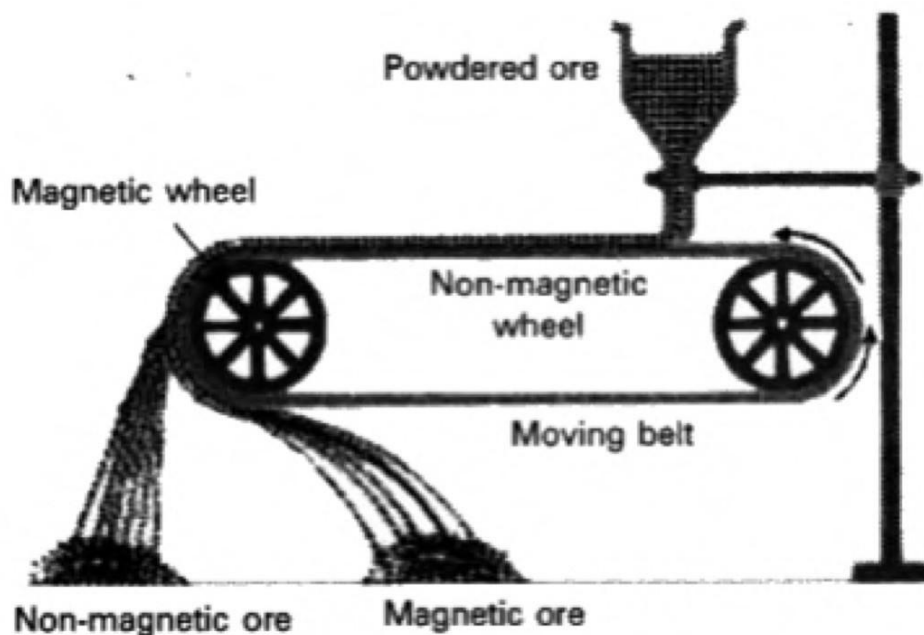
Eg - Coloured Dye from Ink

3) Crystallisation (Difference in volatility of components)



Eg - Copper Sulphate and Water

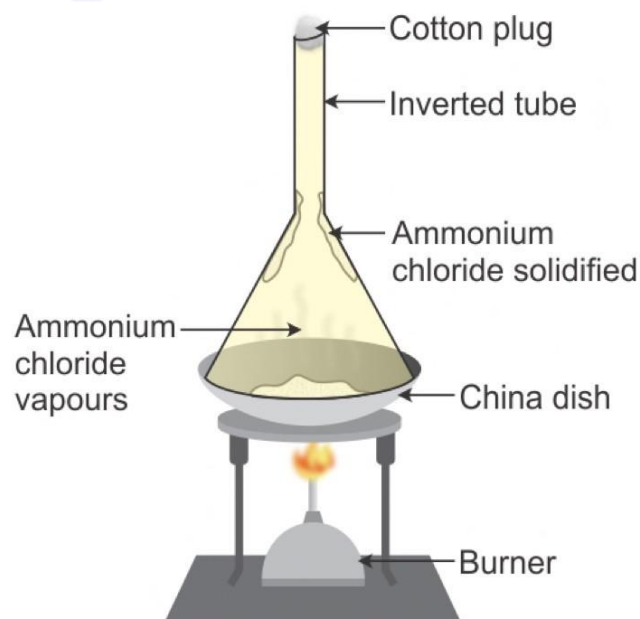
4) Magnetic Separation (One component gets attracted to magnet with other doesn't)



Magnetic separations

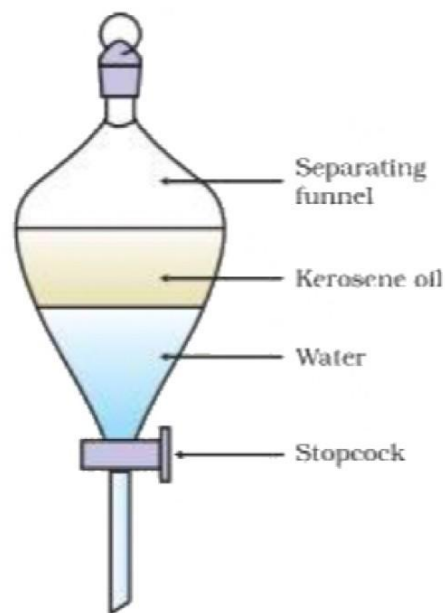
Eg- Iron pieces from sand

5) Sublimation (One component sublimates while other doesn't)



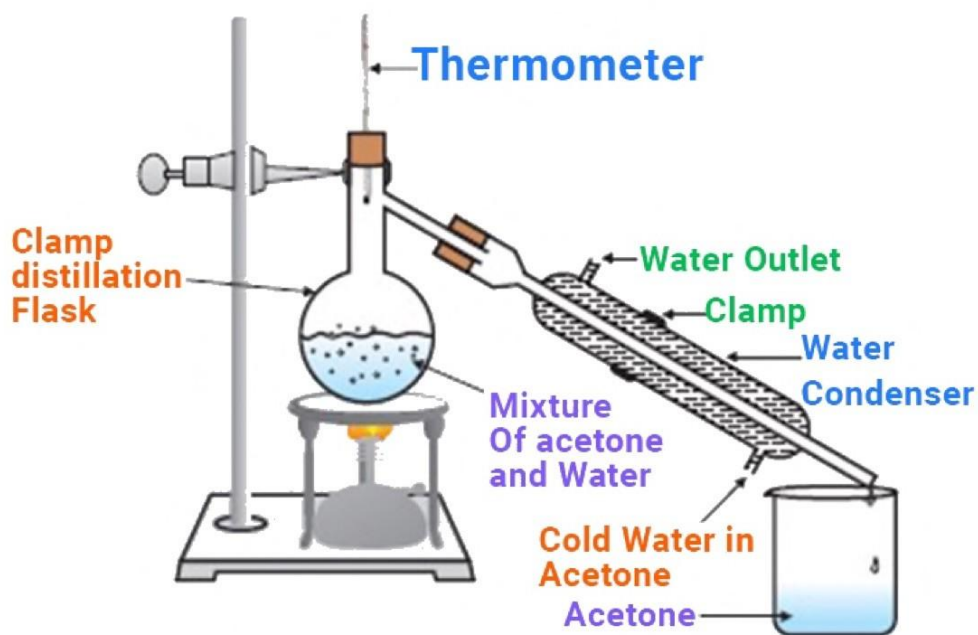
Eg- Ammonium Chloride and salt

6) Separating Funnel (2 Liquid components are not miscible. i.e. difference in density)



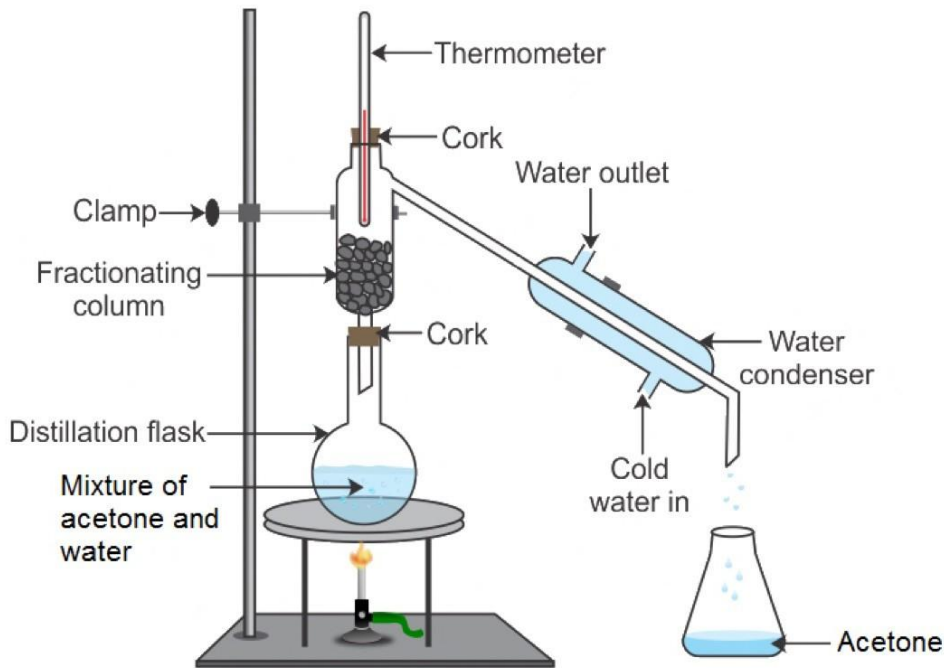
Eg- Immiscible Liquids like oil and Water

7) Distillation (difference in boiling point of components)



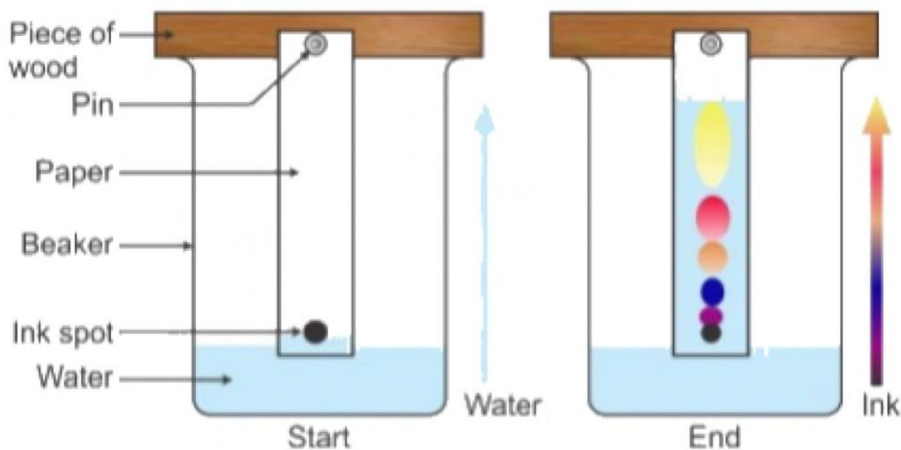
Eg- Acetone and water

8) Fractional Distillation (Difference in boiling point less than 25K)



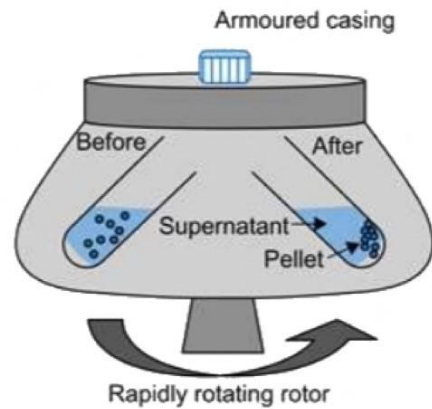
Eg - Separation of components of Crude Oil

9) Chromatography (Difference in solubility of components)



Eg - Separation of dyes in black ink, drugs from blood.

10) Centrifugation



Remove cellular elements from blood to provide cell-free serum or plasma.

