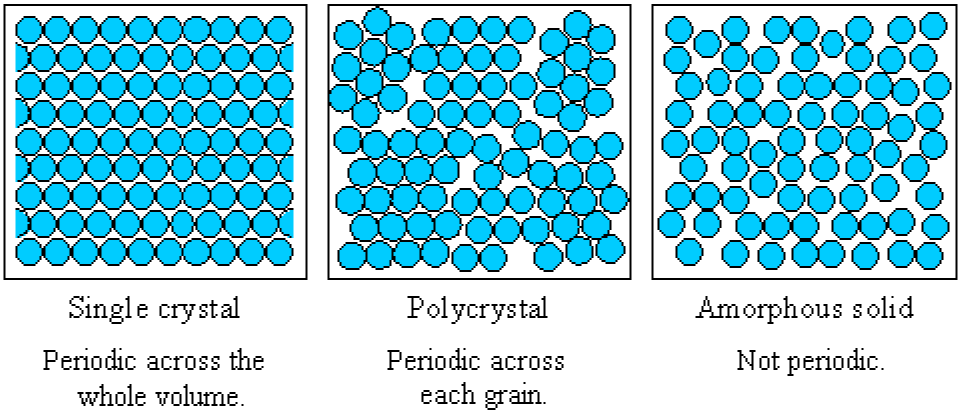
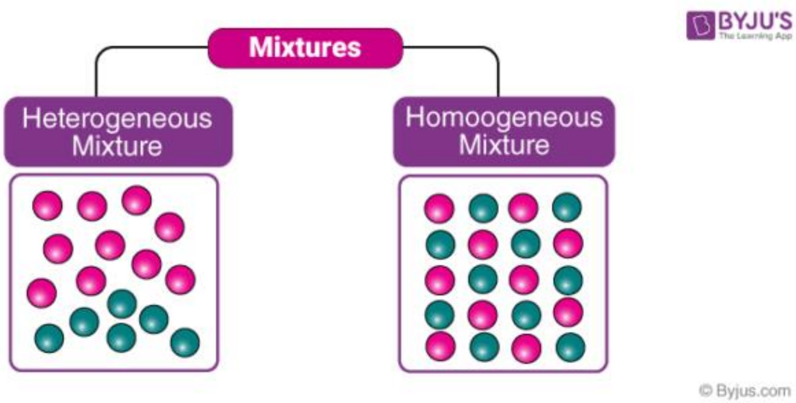
Matter:

Physical arrangements:



Homogenous or heterogeneous:



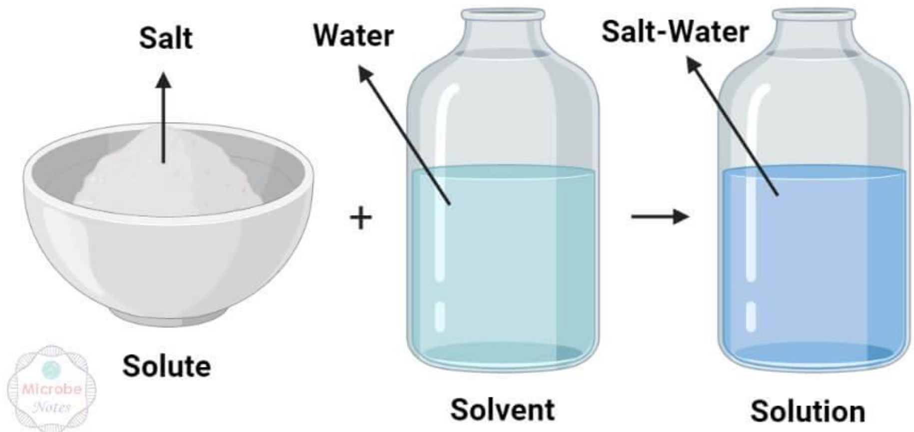
Pure and impure boiling points:

The melting point for impure substances will be lower than the melting point of the pure substance. The impurities will also mean that the sample will melt over a range of temperatures. The boiling point of an impure substance will be higher than the boiling point for the pure substance.

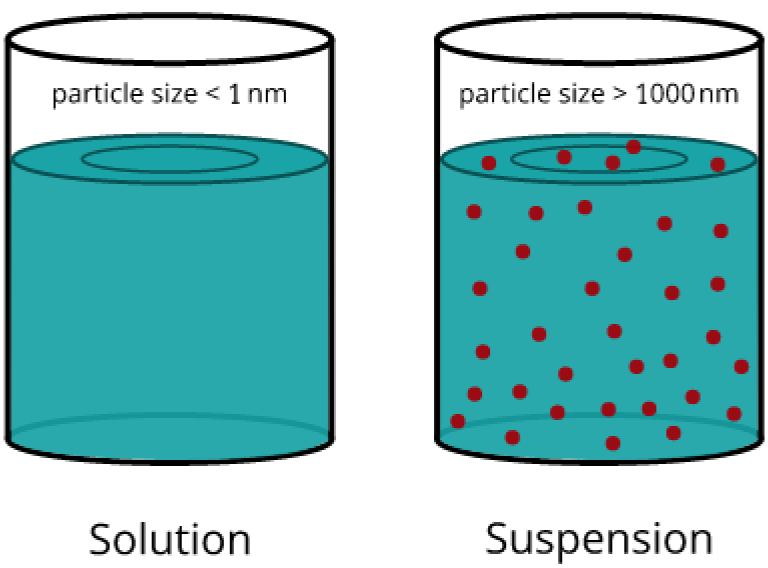
Phases:

Definitions:

- **Solute, Solvent and Solution:**

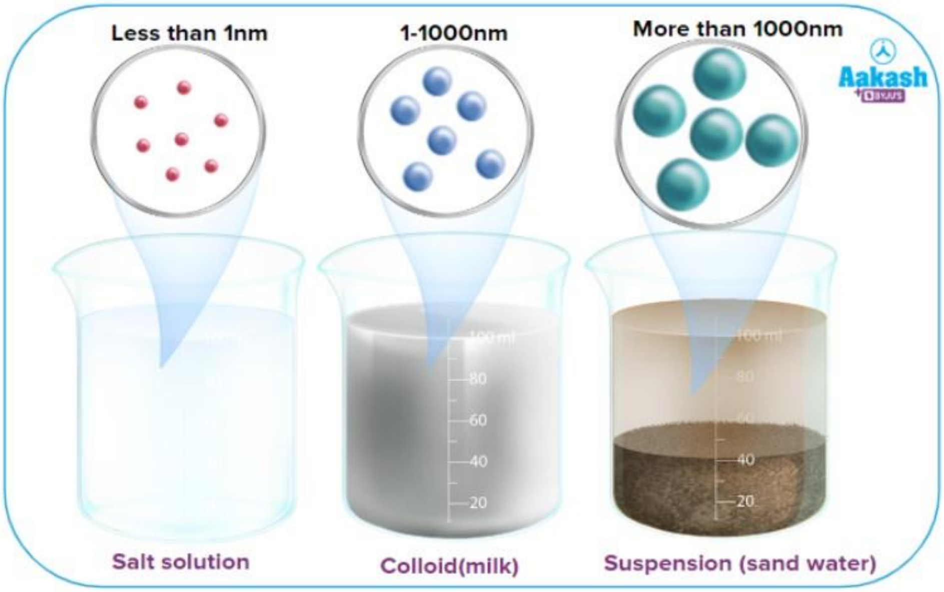


- **Suspension:** A heterogeneous mixture in which the solid particles are spread throughout the liquid without dissolving in it.



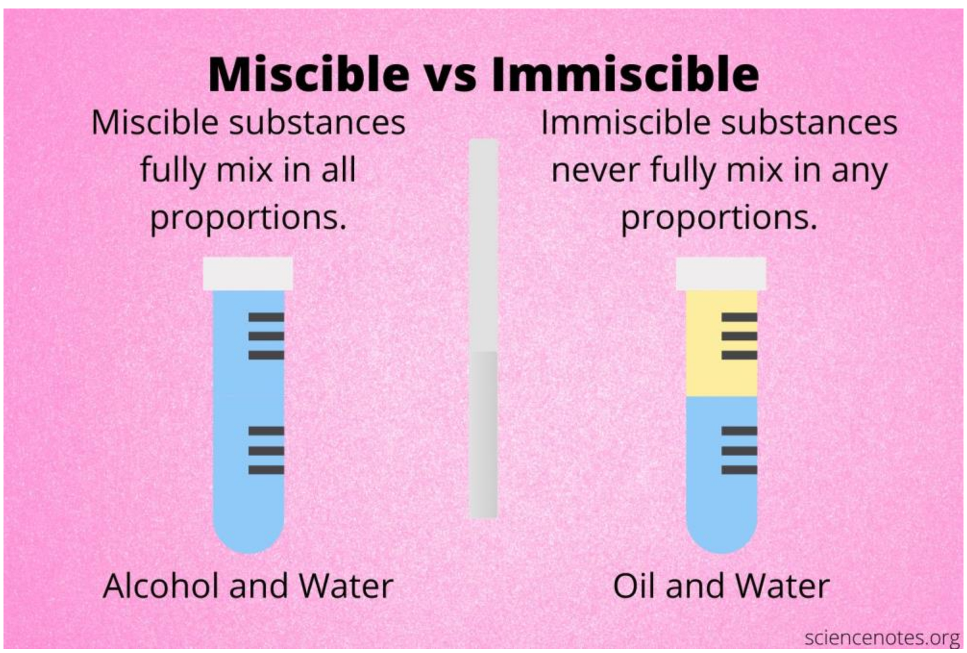
34

- **Colloids and gels:** a mixture where one of the substances is split into very minute particles which are dispersed throughout a second substance. The minute particles are known as colloidal particles. Gels are colloids in which the liquid medium has become viscous enough to behave more or less as a solid.



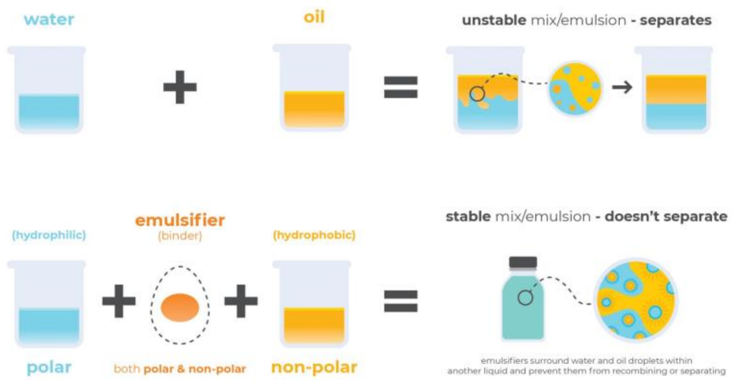
-

Miscible and immiscible:



How emulsifiers work:

Emulsifiers work by stabilizing a mixture of two liquids that tend to separate. Most commonly, emulsifiers have properties that are both oil-loving (lipophilic) and water-loving (hydrophilic). It's this property that enables these ingredients to mix.



Seperating substances

Definitions:

- Filtrate: Filtrate is the liquid or solution that passes through a filter or filtration process, leaving behind any solid particles or other impurities that are too large to pass through the filter.

- Residue: Residue is the material or substance that remains after a filtration, evaporation, or other separation process. It is typically composed of the solid particles or other impurities that were filtered out or left behind during the process.

- Distillate: Distillate is the liquid or substance that is obtained through the process of distillation. Distillation is a method of separating and purifying liquids by heating them to their boiling points, then collecting and condensing the resulting vapors.

- Volatile: Volatile refers to a substance that evaporates easily at room temperature and pressure, typically with a low boiling point. Volatile substances can be easily vaporized or turned into a gas, making them useful in a variety of chemical processes, such as distillation or extraction.

Methods of seperation:

- Decantation: Decantation is a process in which a liquid mixture is allowed to stand for a period of time so that the heavier, denser components settle to the bottom of the container. The liquid can then be carefully poured off, leaving the solid or denser components behind.

- Evaporation: Evaporation involves heating a liquid mixture to the boiling point of one of its components, causing it to vaporize and leave behind the other components in a solid or liquid form. The vapor can then be condensed back into a liquid using a condenser.

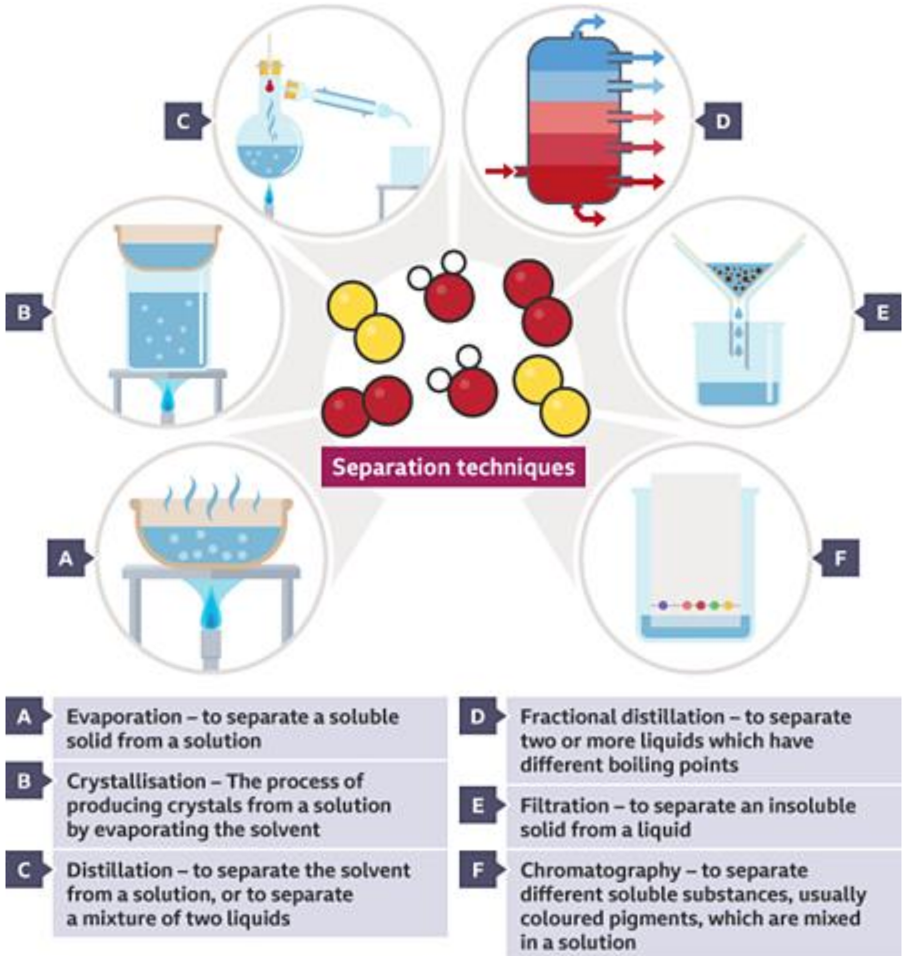
- Vaporization: Vaporization involves heating a solid mixture to the point where one or more of its components volatilize and turn into a gas, leaving behind the other components in a solid form. The vapor can then be collected and condensed back into a liquid using a condenser.

- Filtration: Filtration is a process in which a mixture is passed through a filter to separate out solid components or insoluble particles from a liquid or gas. The filter allows the liquid or gas to pass through while trapping the solid or particulate matter.

- Separation funnel: A separation funnel is a specialized type of funnel used to separate two immiscible liquids of different densities. The mixture is added to the funnel, and after a period of settling, the valve at the bottom is opened to drain off the lower layer.

- Distillation: Distillation is a process in which a liquid mixture is heated to the boiling point of one of its components, causing it to vaporize and then be condensed back into a liquid form. This allows the components of the mixture to be separated based on their boiling points.

- Chromatography: Chromatography is a method of separating and purifying components of a mixture based on their differential rates of migration through a stationary phase. This can be achieved using various types of chromatography, including paper chromatography, thin-layer chromatography, and gas chromatography.



How they work:

Decantation:

1. Start with a mixture of a liquid and a solid that have different densities.
2. Allow the mixture to stand undisturbed for some time so that the solid settles to the bottom.
3. Carefully pour off the liquid from the top into another container, leaving the solid behind in the original container.
4. Repeat the process if necessary.

Separating Funnel:

1. Start with a mixture of two immiscible liquids of different densities in a separating funnel.
2. Allow the mixture to settle for some time so that the liquids form distinct layers.
3. Open the valve at the bottom of the funnel to drain off the lower layer into a separate container.

4. Repeat the process if necessary.

Distillation:

1. Start with a liquid mixture that can be separated based on boiling points.
2. Heat the mixture to its boiling point, causing one component to vaporize and rise into a condenser.
3. The vapor condenses back into a liquid in the condenser and is collected in a separate container.
4. Repeat the process as necessary.

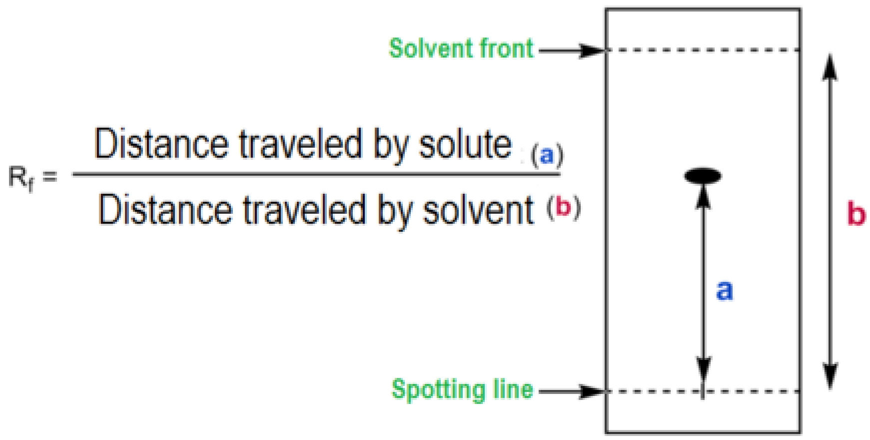
Chromatography:

1. Draw a line with a pencil on a strip of chromatography paper, about 1-2 cm above the bottom edge of the paper.
2. Apply a small spot of the mixture to be separated at the center of the line using a capillary tube.
3. Allow the spot to dry completely before proceeding.
4. Place the bottom edge of the paper in a solvent (such as water, alcohol, or acetone) in a container or chromatography chamber, making sure that the spot is above the level of the solvent.
5. The solvent will rise up the paper due to capillary action, carrying the mixture with it.
6. As the solvent travels up the paper, the components of the mixture separate based on their differential rates of migration through the stationary phase (the paper).
7. Allow the solvent to travel up the paper until it reaches the top edge of the paper or the desired distance.
8. Remove the paper from the container and allow it to dry completely.

Decrystallization:

1. Start with a mixture containing a solid that has formed crystals.
2. Add a small amount of a solvent, such as water, to the mixture and heat it, dissolving the crystals.
3. Allow the mixture to cool, causing the crystals to reform.
4. Filter the mixture to remove any remaining impurities.
5. Repeat the process if necessary to achieve a more pure crystal product.

Retardation factor values:



Dialysis:

Definitions

- Diffusion: Diffusion is the process by which particles in a gas or liquid move from an area of high concentration to an area of low concentration. This movement occurs spontaneously and is driven by the random motion of particles. Diffusion plays a critical role in a wide range of natural and industrial processes, including the movement of gases through the atmosphere, the spread of pollutants in water and air, and the transport of nutrients and waste products across cell membranes.

- Osmosis: Osmosis is the diffusion of water molecules through a selectively permeable membrane from an area of low solute concentration to an area of high solute concentration. This process is important in many biological systems, such as the movement of water into and out of cells. Osmosis can also be harnessed for practical purposes, such as desalination of seawater.

- Semi-permeable: A semi-permeable membrane is a type of membrane that allows certain molecules or ions to pass through while preventing others from passing through. These membranes are often used in biological systems, such as cell membranes, where they allow certain nutrients to enter the cell while blocking harmful substances.

- Dialysate: Dialysate is a fluid used in dialysis to help remove waste products and excess fluids from the blood. The dialysate is made up of water, electrolytes, and other chemicals that help to balance the levels of fluids and minerals in the body. During dialysis, the dialysate is circulated through a semi-permeable membrane that separates the blood from the dialysate, allowing waste products and excess fluids to diffuse across the membrane and into the dialysate.

-

Factors affecting movement of particles

- Temperature: Increasing the temperature of a substance generally increases the kinetic energy of its particles, causing them to move faster and increasing the rate of diffusion.

- Concentration gradient: The greater the difference in concentration between two regions, the faster the rate of diffusion as particles move from the area of higher concentration to the area of lower concentration.

- Pressure: Changes in pressure can affect the rate of diffusion, particularly in gases, as increasing pressure can cause the gas particles to move closer together, increasing the likelihood of collisions and diffusion.

- Size and shape of particles: The size and shape of particles can affect their ability to diffuse through a medium. Smaller particles and those with simpler shapes generally diffuse more quickly than larger, more complex particles.

- Type of medium: The type of medium through which particles are diffusing can affect the rate of diffusion. For example, particles diffuse more quickly through gases than through liquids, and more quickly through liquids than through solids.

- Presence of a barrier or membrane: The presence of a barrier or membrane can limit or control the movement of particles, as in the case of semi-permeable membranes used in osmosis and dialysis.

Dialysis

During dialysis, the patient's blood is passed through a dialysis machine that contains a semi-permeable membrane. The dialysate, which is a solution of electrolytes and other substances, is circulated on the other side of the membrane. The concentration of solutes in the dialysate is carefully controlled to create a concentration gradient that allows waste products and excess fluids to diffuse across the membrane and into the dialysate.

As the blood passes through the semi-permeable membrane, waste products and excess fluids that are present in the blood, such as urea and excess water, move from an area of high concentration to an area of lower concentration. This process of diffusion is driven by the concentration gradient created between the blood and the dialysate.