Experiment

Aim

To study the dialysis of starch sol containing Sodium Chloride through a Cellophane or Parchment Paper.

Theory

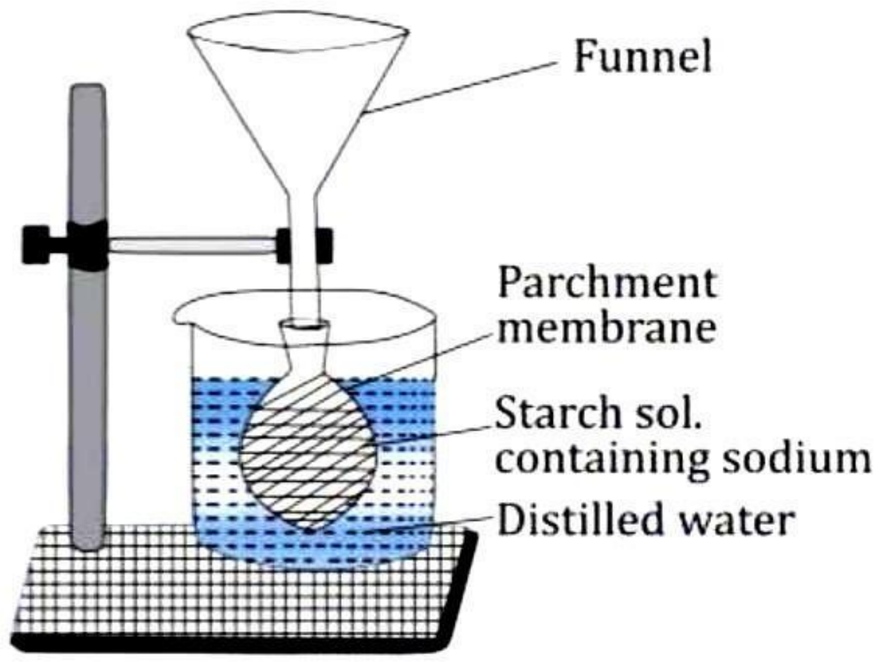
The purification of sol. by dialysis is based upon the fact that while the colloidal particles cannot pass through cellophane or parchment membrane, the ions of an electrolyte can readily do so.

Material Required

(400 ml) Beaker, a funnel with a long stem, cellophane or parchment membrane, dropper, test- tubes, iron stand, starch sol containing sodium chloride, $AgNO_3$ solution and iodine solution.

Procedure

1. Take a parchment membrane and fold it into the shape of a bag. Then tie it to the end of the stem of a funnel using rubber band or a thread (Fig. 4).
2. Add the given starch sol containing sodium chloride into the parchment bag through the funnel till two-thirds of the bag is full.
3. Take a 400 ml beaker and fill it three-fourths with distilled water. Place it over an iron stand, dip the parchment bag into distilled water and fix the funnel in position by means of a clamp.
4. Allow to it stand for about half an hour.
5. Then, withdraw about 1 ml of water from the beaker with the help of a dropper and transfer it to a test tube. Add to it a few drops of iodine solution. No blue colour appears. This indicates the absence of starch in water. Thus, it follows that starch molecules do not diffuse through parchment paper.



Purification of starch sol by dialysis.
Fig. 4

6. Now withdraw another 1 ml of water from the beaker and transfer it to another test tube. Add to it a few drops of $AgNO_3$ solution. A white ppt of AgCl is produced immediately. This shows presence of chloride ions and hence sodium chloride in water. It follows that Na^+ and Cl^- diffuse through the parchment paper. As Na^+ and Cl^- diffuse out of the starch sol, it gets free from the ions gradually.
7. In order to check whether sodium chloride is completely removed or not replace the water in the beaker by fresh distilled water and again place the parchment bag containing sol in it. After about 10 minutes, test for the presence of Cl^- ions. If the Cl^- ions are absent dialysis is complete, otherwise, the sol still contains Cl^- ions and therefore the dialysis should be continued.

Result

By the above process, the required aim is obtained.

Precaution

1. Fill only two-third of the cellophane/parchment bag with sol.
2. There should be no leakage of sol from the bag into the beaker.
3. Use distilled water for dialysis.

Emulsion And Emulsification

Emulsion

Emulsions are colloidal solutions in which both dispersed phase and dispersion medium are liquids. They are of two types.

(i) Oil in Water: Oil acts as dispersed phase and water as dispersion medium e.g., milk, vanishing cream.

(ii) Water in Oil: Water acts as dispersed phase and oil as dispersion medium e.g., butter, cold cream. Emulsions of oil in water are unstable and separate as two layers on standing.

Emulsification: The process of making an emulsion is known as emulsification. Emulsions can be prepared by vigorously agitating the mixture of both the liquids. To stabilize an emulsion, a substance called as emulsifying agent must be added. Proteins, gums, soaps and detergents are frequently used as emulsifiers. The emulsifying agent forms an interfacial film between suspended particles and the medium.

Demulsification: The separation of the emulsion into its constituents is called demulsification. It can be done by boiling, centrifugation, electrostatic method etc. e.g., cream is separated from milk by centrifugation.

Application of emulsions:

(a). The cleansing action of soap is based upon the formation of oil-in-water emulsion.
(b). The froth floatation process of concentrating the ore during metallurgy is based on the treatment of powdered ore with oil emulsion.
(c). Certain disinfectants as dettol give emulsion of oil-in-water type of mixing with water.
(d). Several drugs are prepared in the form of emulsions.

VIVA VOCE

Q 1. What is dialysis?
Ans. Dialysis is a process used to separate colloidal particles from true solutions based on their size difference. It involves the diffusion of solute molecules through a semipermeable membrane.

Q 2. How does dialysis work?
Ans. In dialysis, a semipermeable membrane allows smaller molecules (like water and small solute particles) to pass through while retaining larger particles (such as colloids and macromolecules).

Q 3. Why is a semipermeable membrane necessary for dialysis?
Ans. A semipermeable membrane selectively allows certain molecules to pass through based on their size and charge, thereby facilitating the separation of substances.

Q 4. What is the purpose of studying the dialysis of starch sol containing Sodium Chloride?

Ans. The purpose is to understand the process of dialysis and to observe how the colloidal solution (starch sol) and the dissolved salt (Sodium Chloride) behave differently during dialysis.

Q 5. How do you prepare a starch sol?

Ans. Starch sol is prepared by mixing starch powder with water and heating the mixture to form a colloidal solution.

Q 6. Why is Sodium Chloride added to the starch sol before dialysis?

Ans. Sodium Chloride is added to the starch sol to increase the conductivity of the solution, making it easier to monitor the progress of dialysis.

Q 7. What is the function of cellophane or parchment paper in dialysis?

Ans. Cellophane or parchment paper serves as a semipermeable membrane that allows the passage of water and small solute particles while retaining colloidal particles and larger molecules.

Q 8. How can you confirm the completion of dialysis?

Ans. Dialysis is complete when the solute concentration inside and outside the dialysis bag reaches equilibrium, which can be confirmed by testing the external solution for the presence of the solute.

Q 9. What factors can affect the rate of dialysis?

Ans. Factors such as the surface area of the membrane, concentration gradient, temperature, and thickness of the membrane can influence the rate of dialysis.

Q 10. What are the applications of dialysis in real-life scenarios?

Ans. Dialysis is used in various fields such as medical treatment (hemodialysis for kidney patients), purification of water, food processing (removing excess salt from cheese), and in laboratory experiments for separating substances.