



2. WEEK

**DIFFUSION
COEFFICIENT AND
DETERMINATION
METHODS**

WHAT IS DIFFUSION?


- The movement of molecules from a high concentration zone to a low concentration zone is referred to as “Diffusion”.
- This is the result of the Brownian motion of the particles.

➤ It is called "Osmosis" to be the result of the movement of the solvent molecules and "Diffusion" to the movement of the molecules of the dissolving matter.

➤ Diffusion can be explained by Fick's Law.

$$dQ / dt = - D.A.[dc/dx]$$

➤ The sign (-) in this equation means the decrease in concentration.


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- ❖ The diffusion coefficient is a measure of the ability of the medium to move in the environment.
 - ❖ The diffusion coefficient is directly proportional to the temperature, inversely proportional to the viscosity and particle size of the medium.

DETERMINATION METHODS OF DIFFUSION COEFFICIENT

1. Porous disc method
2. Measuring method of diffusion generated from gel
3. Determination of diffusion from membranes

1. Porous Disc Method:

In the glass apparatus used for this purpose, the solution and the solvent are separated from each other by means of glass filters in the appropriate pore size. The liquid in the pores is stagnant and is not affected by the stirring applied to the medium. Therefore, the passage of the solute through the porosity takes place only by diffusion.



❖ In this apparatus, the A / H value is calculated from the calibration of the instrument since the pore surface area (A) and effective pore length (H) of the pores can not be measured.

2. Measuring Method of Diffusion

Generated from Gel:

Diffusion of the active ingredient from the dilute aqueous gel solution occurs as it is in aqueous media. The water present in the gel remains immobile in the gel mesh and the substance molecules are diffused from this phase.

- ❖ As the concentration of the gel-forming structure increases, the pore size of the gel decreases and if the molecular size of the active substance is close to that of por, the diffusion rate of the molecule decreases.
- ❖ In this method, the diffusion coefficient of the gel is determined by determining the transition of the pure solvent molecules containing the active substance.

3. Determination of Diffusion from Membranes:

If the absorption of the active substance from the gastrointestinal tract is due to passive diffusion, then appropriate synthetic membranes can be used and the diffusion coefficient can be measured by attaching these membranes instead of the glass filter of the instrument used in the "Porous Disk Method".