

Kedem - Katchalsky equations for gravidiffusion

Marian Kargol, Tadeusz Kosztolowicz, Armin Kargol, Stanisław Przestlski

The practical equation of Kedem and Katchalsky (1958) in their original form describe volume flows of solutes (J_S) which occur through membranes under the influence of difference in osmotic pressure $\Delta\pi$ and mechanical pressure ΔP . In this paper, proceeding as did Kedem and Katchalsky, equations are derived which describe these flows in a system of a horizontally situated membrane. In deriving these equations, the gravidiffusion process within the membrane was taken into consideration, i.e. the modification (acceleration or inhibition) induced by the gravity force of the only the equation for J_S . The proposed equation has the form:

$$J_S = \bar{c}(1 - \sigma)J_V + \bar{c}L_G\Delta P_G + \omega\Delta\pi.$$

This equation for volume flow J_V does not undergo any changes. Our interest in the problem of gravidiffusion is mainly due to biophysical aspects. It is focused on the problem related to the mechanical process of perception of the gravitational stimulus by living organisms and mechanisms of their reaction to this stimulus.