

PA 12 - Transport Through Chitosan Membranes

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South African produced chitosan was used to manufacture membranes crosslinked with glutaraldehyde. In the characterization of the membranes, it was found that the Chitosan content was only 4-6 % chitosan and that the membranes can be visualised as hydrated polymeric network, in which the chitosan forms a rigid honeycomb structure. The water in the membrane is present as fixed water, that is integrated with the chitosan, and free water, that can be removed from the membrane by applying a pressure difference. The free water content equals the porosity of the membrane. The physical properties of the chitosan membranes are: a wet density of 1100 kg.m^{-3} ; a chitosan content of 5.2 mass %; a free volume of 65 mass %; a fixed water of 30 mass %; a maximum pore radius of 40 nm; and a total surface area of $1.15 \cdot 10^5 \text{ m}^2.\text{kg}^{-1}$.

The transport through chitosan membranes can be described analogous to ultrafiltration membranes. The clean water flux of the membranes is in the order of $12 \text{ L.m}^{-2}.\text{hr}^{-1}.\text{bar}^{-1}$, and the transport of solute and solvent could well be modelled, at low solute concentrations, with a generic membrane model derived from irreversible thermodynamics.