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NASA TECH BRIEF

Use of Nonwettable Membranes for Water Transfer

Nonwettable vinyl fluoride membranes can be used for creating an osmotic water flow. Normally, this type of membrane is used for filtering organic solvents.

Since vinyl fluoride membranes will pass water vapor but not nonvolatile solutes at normal pressures, a water partial-pressure gradient across the membrane results in a transfer of water through the membrane. This gradient may be established either by a difference in the colligative properties of the solutions on either side of the membrane (osmotic gradient) or by a temperature differential.

Over a large pressure range, the transfer rate is independent of the pressure differential across the membrane. However, air saturation of the membrane must be maintained, and too great a pressure differential will either cause solution breakthrough (forcing liquid through the capillaries) or burst the membrane.

Rates of water transfer between two solutions separated by a vinyl fluoride membrane were measured. Using various solutes, water was transferred from a dilute solution, through the membrane, and into a saturated solution. Transfer rates varying from 0.0799 to 1.51 milliliters per hour per square inch of membrane area were observed.

The transfer of water through vinyl fluoride membranes has two unique features: (1) Very low water transfer rates can be held constant by holding temperature and solute concentrations constant. (2) The pressure gradient against which water may be transported is limited only by solution breakthrough or by the mechanical strength of the membrane.

This technique may find useful application in cases where very low, constant water evaporation or transfer rates are critical. For example: In the growth of crystals, structure is dependent on the water removal rate from the growth medium.

Note:

No additional documentation is available. Specific questions, however, may be made directed to:

Technology Utilization Officer
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Reference: B70-10235

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to:

Patent Counsel
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Category 04