Relationships between transport and physical–mechanical properties of ion exchange membranes

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ABSTRACT
This review focuses on the characterization of properties of ion exchange membranes, on the compromises between ion exchange capacity, relative water content and electrochemical properties of ion exchange membranes. Properties of heterogeneous ion exchange membranes prepared from polyethylene as matrix, ion exchange resin powder and polyester fabric were studied. Ion exchange membranes were prepared with using different ion exchange resins. These ion exchange membranes can be used in many electro separation processes like electro dialysis, electrode ionization, membrane electrolysis or electrophoresis. Desalination of brackish and surface water, purification of waste water or mine water, water desalination after tertiary biological treatment, purification of organic substances, stabilization of wine or demineralization of whey are the most frequent applications where these prepared ion exchange membranes can be utilized. All prepared ion exchange membranes were characterized with same methods and monitored the parameters of ion exchange membranes were ion exchange capacity using Mohr method, electric resistance measured in a special experimental cell using a compensation method, permselectivity measured in the same measuring cell as electric resistance and relative water content. The relationships between the transport and physical–mechanical properties were found. An ion exchange membrane with specific required properties can be prepared on the basis of resultant values of monitored properties.

Keywords: Heterogeneous ion exchange membrane; Properties of IEMs; Ion exchange capacity; Electric resistance; Relative water content

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