

## The effect of an organic ion-exchange resin on properties of heterogeneous ion-exchange membranes

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### ABSTRACT

This case study deals with relationships between characteristic properties of organic ion-exchange resins and heterogeneous ion-exchange membranes. At first chemical and temperature stability, humidity and particle size distribution of different types of ion-exchange resins was analyzed. Subsequently, membranes were prepared by using different filler/polymer matrix ratio or by using milled resins with different particle size distribution. Finally, different ion-exchange resins were used for preparing of heterogeneous ion-exchange membranes at fixed filler/polymer matrix ratio. We analyzed many characteristic properties of raw materials, intermediate and final products and we paid attention to process parameters during preparing of membranes too. It was proved that there are important relationships between properties of a membrane and the type of resin used for its preparation and the process of membrane preparation. The results show that most of ion-exchange resins can be used for ion-exchange membranes preparation but with different impact on characteristic properties of membranes. We also proved that increasing of filler/polymer matrix ratio or using very fine particle size distribution of milled resin improve electrochemical properties of membranes at the expense of worst mechanical properties and more complicated membrane preparation. On the basis of these results we are able to modify composition of heterogeneous ion-exchange membranes to reach required properties.

**Keywords:** Heterogeneous ion-exchange membrane; Membrane modification; Particle size of distribution

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