

Electrochemical Properties of Polyethylene Membrane Modified with Sulfonic and Phosphonic Acid Groups

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1. Introduction

In recent years, the radiation-induced graft polymerization is an important research subject, because it is a good method for the modification of physical and chemical properties of polymeric material. In this study, ion-exchange membranes were prepared by radiation-induced grafting of glycidyl methacrylate (GMA) and subsequent sulfonation and phosphonation of poly(GMA) graft chains. The electrochemical properties such as electrical resistance and transfer number of the ion-exchange membranes were examined.

2. Experimental

The PE film was used as the base polymer for grafting polymerization. The PE film of the size 4 × 5 cm was irradiated by γ -ray from Co-60 under atmospheric pressure and ambient temperatures, and then reacted with monomer. The unreacted monomer and homopolymers after grafting of GMA were removed with tetrahydrofuran (THF). PE film obtained by grafting copolymerization were dried in a vacuum oven at 60 °C for 7 h.

3. Results

The surface area, thickness and volume of grafted PE film increased with increasing grafting yield. The specific electrical resistance of PE membrane modified with the PO₃H and SO₃H groups decreased with increasing the ion-exchange capacity. The PE membrane modified with PO₃H group had a lower specific electric resistance than that of PE membrane modified with SO₃H group.