

Grafting of styrene onto polypropylene for ion exchange membrane

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This work describes the styrene grafting onto polypropylene (PP) films by the simultaneous radiation method and subsequent sulfonation for ion exchange membranes application. The experiment comprises PP films with 40µm thickness exposed to gamma ionizing radiation at room temperature and nitrogen atmosphere when immersed in styrene/toluene 4:1 solution. The irradiation dosis used were 20 and 100 kGy. Chemical changes were monitored after styrene grafting. After irradiation the samples were evaluated at periods of 0, 7, 14, 21 and 28 days, at room temperature in order to observe the behavior of grafting process. The grafting films were sulfonated using sulfuric acid at 70 °C for 24 and 48 h. Structural changes and surface morphologies of the modified PP films were characterized by infrared spectroscopic analysis (FTIR), differential scanning calorimeter analysis (DSC), thermogravimetric analysis (TGA) and the degree of grafting (DOG) was determined gravimetrically. The ion exchange capacity (IEC) of membranes was determined by acid-base titration. The DOG values are higher in the film was submitted at 100 kGy dose. The thermal stability shows a little decrease in the degradation temperature of the sulfonated films comparing wiht the pure polymer. The IEC is expected to be near of the Nafion[®] (0.93 meq g⁻¹)¹ value.

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