

Grafting of styrene onto poly(vinylidene fluoride) (PVDF) and poly(tetrafluoroethylene) (PTFE) films for ion exchange membrane application

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Grafting of styrene followed by sulfonation onto PVDF and PTFE was studied in the synthesis of ion exchange membranes. Radiation-induced grafting of styrene onto PVDF and PTFE films was investigated by simultaneous method using a Co⁶⁰ source. The films of PVDF and PTFE were irradiated at 20 and 100 kGy dosis and chemical changes were monitored after contact with styrene and graft. Films of PTFE and PVDF were immersed in styrene/toluene 4:1 and was submitted to gamma radiation. 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 degree. The grafting films were sulfonated using sulfuric acid at 70 °C for 24 and 48 h. Results were evaluated 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 structural changes showed that irradiated PVDF and PTFE films exhibited a much higher grafting degree at 100 kGy confirmed of all evaluation techniques. The initial IEC values for PVDF and PTFE films are at around 0,3 meq.g⁻¹. This values is also small when compared to Nafion[®] (0.9-1.1 meq.g⁻¹)[1]. However, more studies will be done with PTFE and PVDF films in order to improve the results.

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