

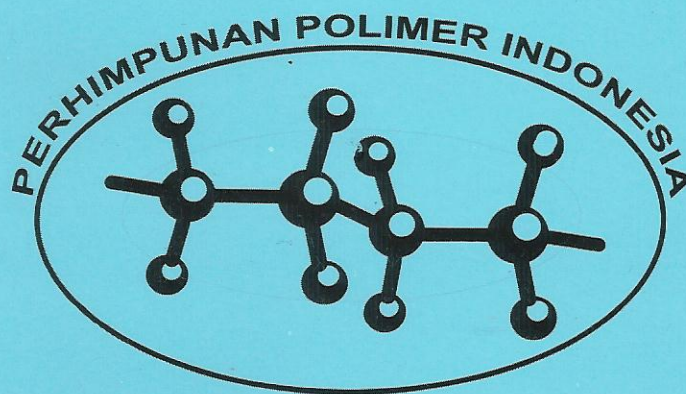
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Daftar Isi

Kata Pengantar i

Daftar Isi ii

Resolusi Enansiomor dengan Teknik Membran Berbasis Material Selulosa Kristal Cair
Asep Riswoko 1

Perbaikan Unjuk Kerja Komponen Optoelektronika Pengemisi Cahaya Biru Melalui Aplikasi Struktur Lapisan Ganda Berbasiskan Proses Larutan
Paula Santi Rudati 8

Sintesis dan Karakterisasi Polimer Superabsorban dari Akrilamida
A. Zainal Abidin, Ni Made Truly Pinnanti Sastra dan Guntur Susanto 14

The Effect of Fibre Particle Size and Initiator Concentration to the Mechanical Properties of Green Polyblend of Polypropylene Recycle Filled Natural Fibre
Neng Sri Suharty, Basuki Wryosenono, Maulidan Firdaus dan Galuh Kusuma Wardani 20

Effect of Concentration of Sulfonating Agent of the Charge Effectiveness of Sulfonated Polysulfone Membrane
B. Piluharto, Y. Jayusman, C.L. Radiman, S. Achmad dan V. Suendo 26

Research and Development Environmentally Degradable Polymers and the Potential for Its Application in Indonesia
Lies A. Wisofodharmo and Sudirman 32

EFFECT OF CONCENTRATION OF SULFONATING AGENT ON THE CHARGE EFFECTIVENESS OF SULFONATED POLYSULFONE MEMBRANE

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ABSTRACT

EFFECT OF CONCENTRATION OF SULFONATING AGENT ON THE CHARGE EFFECTIVENESS OF SULFONATED POLYSULFONE MEMBRANE. Polysulfone (PSF) has been sulfonated homogeneously using chlorosulfonic acid as a sulfonating agent in chloroform. The concentration of sulfonating agent from 6 to 10 wt% was varied to study its effect on membrane effective charge. The sulfonated membrane were characterized to determine the presence of functional group by Fourier Transform-Infra Red (FT-IR), the Ionic Exchange Capacity (IEC) by titration, the water uptake by gravimetry and the transport properties by membrane potential measurements. It was found a new peak at 3350 cm^{-1} after sulfonation, which corresponds to -OH stretching of the sulfonic group. This data proved that the -SO₃H group were introduced successfully into the polymer chain. Based on Teorell-Meyer-Sievers (TMS) equation and membrane potential data, we found that the membrane effective charge increases with the sulfonating agent concentration. The increase of concentration from 6 to 8 wt% increases the effective charge from 0.003 to 0.06. This result was also supported by IEC and water uptake data.

Keywords: Effective charge, Sulfonated polysulfone, Cation-exchange membrane, Ionic transport properties

ABSTRACT

PENGARUH KONSENTRASI AGEN SULFONASI TERHADAP EFEKTIVITAS MUATAN DARI MEMBRAN POLISULFON TERSULFONASI. Polysulfon (PSF) telah disulfonasi secara homogen menggunakan asam klorosulfonat sebagai agen sulfonasi di dalam kloroform. Konsentrasi agen sulfonasi divariasikan dari 6 %berat hingga 10 %berat untuk mempelajari pengaruhnya terhadap muatan efektif membran. Membran tersulfonasi dikarakterisasi untuk menentukan adanya gugus fungsi menggunakan *Fourier Transform-Infra Red (FT-IR)*, *Ionic Exchange Capacity (IEC)* menggunakan teknik titrasi, serapan air menggunakan gravimetri dan sifat transpor dengan pengukuran potensial membran. Ditemukan adanya puncak baru pada 3350 cm^{-1} setelah sulfonasi, yang berhubungan dengan peregangan ikatan -OH dari gugus sulfonat. Data ini membuktikan bahwa gugus -SO₃H berhasil dimasukkan ke dalam rantai polimer. Berdasarkan persamaan *Teorell Meyer Sievers (TMS)* dan data potensial membran, ditemukan bahwa muatan efektif membran meningkat dengan meningkatnya konsentrasi agen sulfonasi. Peningkatan konsentrasi dari 6 %berat menjadi 8 %berat meningkatkan muatan efektif dari 0,003 menjadi 0,06. Hasil ini juga didukung oleh data *IEC* dan serapan air.

Kata kunci: Muatan efektif, Polisulfon tersulfonasi, Membran penukar-kation, Sifat transpor ionik

INTRODUCTION

In the fuel cell application, Nafion is the most widely used as a electrolyte component. Some of advantages properties such as the good mechanical and thermal stability and highly proton conductivity