

The effect of density of crosslinking on the basic properties and mechanical strength of quaternized 4-vinylbenzyl chloride-co-styrene-co-2-hydroxyethyl acrylate membrane for vanadium redox flow battery

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The synthesis of ion-exchange membrane was affected by degree of crosslinking. The glutaric acid and glutaric dealdehyde have differently crosslink region. The aminated 4-vinylbenzyl chloride-co-styrene-co-2-hydroxyethyl acrylate copolymer was synthesized by glutaric acid (AVSH-GA) and glutaric dealdehyde (AVSH-GD) on solution polymerization. Structure of the AVSH-GA and AVSH-GD was analyzed by FT-IR spectroscopy. The mechanical property, thermal stability, pyrolysis, conversion, ion exchange capacity and water uptake of the AVSH-GA and AVSH-GD were measured. The AVSH-GA exhibited IEC ranging from 0.56 to 0.86 meq g⁻¹, tensile strength ranging from 10 to 21.1 MPa and weight loss of chemical resistance has 6.3%. The AVSH-GD exhibited IEC ranging from 0.53 to 0.86 meq g⁻¹, tensile strength ranging from 10 to 22.9 MPa and weight loss of chemical resistance has 3.9 %.