

The effect of a new additive on the basic properties of styrene-based pore-filling membranes

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The Styrene-based pore-filling membranes were prepared by thermal polymerization. Styrene and divinylbenzene (DVB) were used as a monomer and crosslinker, respectively. N-vinyl pyrrolidone (VP) was introduced to polymer backbone as an additive in order to improve the oxidative stability of the membranes. The styrene/VP/DVB was filled in porous substrate films and then was sulfonated in the chlorosulfonic acid/sulfuric acid mixture for enough time. The prepared membranes were characterized in terms of proton conductivity, water uptake, oxidative and thermal stability. The membrane containing VP showed higher proton conductivity than the styrene/DVB membrane at the same styrene content. Compared with the same DVB contents (10wt% of DVB in the monomer composition), the membranes containing more VP enhanced better oxidative stability in 3wt% H₂O₂ solution. The thermal stability of the membranes also increased with ascending the VP content compared with those with no VP and the same DVB content.