Thermodynamic evaluation of fixed charge density and dielectric properties of PVC based Mn₃(PO₄)₂ composite ion-exchange membrane

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ABSTRACT

PVC based MP composite membrane has been prepared by the sol–gel method of material synthesis. This composite material as well as membrane has been characterized by SEM, XRD, FTIR, TGA, and LCR studies which are used to show the mechanical, chemical, and thermal properties. By the above characterizations, it is clear that the membrane has smooth, porous, and cracks free surface as well as it also verified the material nature, functional groups, thermal stability, phase transition, ion transportation etc. Some strong electrolytes are used to obtain the ionic potential and charge density of membrane which decided the nature of charge present on membrane. TMS theoretical approach is used to obtain the other parameters of membrane like transport number, mobility ratio, charge effectiveness etc. The observed ionic potential and charge density of used electrolytes are following the KCl < NaCl < LiCl and KCl > NaCl > LiCl order, respectively.

Keywords: Sol–gel method; PVC based MP composite material; TGA analysis; Mechanical and electrical properties; Charge density