

## **Crosslinked PVA/Bentonite Clay Nanocomposite Membranes: An Effective Membrane for the Separation of Azeotropic Composition of Isopropanol and Water**

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**Abstract :** Membrane based separation is the most important energy -efficient separation processes. There are wide ranges of membrane based separation process such as Micro-filtration, ultra filtration, reverse osmosis, electro-dialysis etc. Among these pervaporation is one of the most promising techniques. The promising technique is in the sense that it needs an ease of process design, low energy consumption, environmentally clean, economically cost effective and easily separate azeotropic composition without losing any components, unlike distillation in a short period of time. In the present work, we developed a new bentonite clay reinforced cross-linked PVA nano-composite membranes by solution casting method. The membranes were used for the pervaporation separation of azeotropic composition of isopropanol and water mixtures. The azeotropic composition of water and isopropanol is difficult to separate and we can't get a better separation by normal separation processes. But the better separation was achieved here using cross-linked PVA/Clay nano-composite membranes. The 2wt% bentonite clay reinforced 5vol% GA cross-linked nano-composite membranes showed better separation efficiency. The selectivity of the cross-linked membranes increases 65% upon filler loading. The water permeance is showed tremendous enhancement upon filler loading. The permeance value changes from 4100 to 8200, due to the incorporation hydrophilic bentonite clay to the cross-linked PVA membranes. The clay reinforced membranes shows better thermal stability upon filler loading was confirmed from TGA and DSC analysis. The dispersion of nanoclay in the polymeric matrix was clearly evident from the TEM analysis. The better dispersed membranes showed better separation performance. Thus the developed cross-linked PVA/Clay membranes can be effectively used for the separation of azeotropic composition of water and isopropanol.

**Keywords :** poly(vinyl alcohol), membrane, gluraldehyde, permeance

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