**GAS DEHUMIDIFICATION USING SUPPORTED IONIC LIQUID MEMBRANES**

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**ABSTRACT**

Membrane-based technology for gas dehumidification (or drying) is in the spotlight because of its technical, energy-efficiency and ecofriendly advantages compared to conventional absorption, adsorption and refrigeration methods [1]. Typically, hydrophilic polymer membrane materials have been investigated in different dehumidification applications such as natural gas dehydration, flue gas drying, ventilation, and air conditioning systems [1]. However, they face performance limitations and, as a result, a new research direction has recently been established by immobilizing ionic liquids (ILs) on porous substrates to tackle such issues.

In this work, two series of pyridine-based ILs based on were prepared. The first group includes ILs with varying alkyl chain length of the cation while in the other group, various anions were used keeping the same cation structrure. The chemical structure of ILs was confirmed by FTIR and NMR spectroscopy and their viscosity was measured while the density of ILs was theoretically calculated. Short-term thermal stability of ILs was also investigated by thermogravimetric analysis (TGA) and glass transition temperature of ILs was determined using differential scanning callorimery (DSC). Supported ionic liquid membranes (SILMs) were prepared by drop-casting ILs on a hydrophobic PVDF substrate. Finally, pure and mixed gas and water vapor permeability measurements were carried out using the Wicke-Kallenbach method.

It has been demonstrated that the water vapor permeability of synthesized ILs can be tuned by selection of a counter anion with high hydrophilicity. The membrane with the IL containing the more hydrophilic counter anion (MeSO3-) had the highest water vapor permeability and H2O/gas selectivities. The performance of this membrane in terms of water vapor permeation properties is among the highest reported in the literature.

**KEYWORDS:** Supported ionic liquid membranes (SILMs), gas dehydration, air dehumidification, water vapor permeability.

**REFERENCES**

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