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Separation of butanol from ABE mixtures by sweep gas pervaporation using a supported gelled ionic liquid membrane: analysis of transport phenomena and selectivity

Plaza, A.¹, Merlet, G.¹ Hasanoglu, A.^{1,2}, Isaacs, M.³, Sanchez, J.⁴, Romero, J.^{1*}

- 1) Laboratory of Membrane Separation Processes (LabProSeM), Department of Chemical Engineering, University of Santiago de Chile (USACH).
- 2) Yıldız Technical University, Department of Chemical Engineering, Davutpaşa, 34210 Istanbul, Turkey.
- 3) Department of Inorganic Chemistry, Faculty of Chemistry, Catholic University of Chile (PUC).
- 4) Institut Européen des Membranes (IEM UMR 5635, UM2/ENSCM/CNRS)

ABSTRACT

The separation of acetone-butanol-ethanol mixtures (ABE) from aqueous solutions, which are produced in ABE fermentation processes, is carried out by sweep gas pervaporation using gelled supported ionic liquid membranes and by membrane evaporation. The membranes were synthesized by the gelation of an ionic liquid ([bmim][PF₆]) into the porosity of polytetrafluoroethylene (PTFE) hollow fibers. The performance of the membranes used in sweep gas pervaporation is compared with the membrane evaporation process using the same hollow fiber support without IL in order to verify the selectivity contributed by the gelled ionic liquid gap formed in the membrane pores. Improved butanol/ethanol selectivity was verified for gelled IL membranes in pervaporation experiments compared to the evaporation process. A

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