World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:8, No:9, 2014

Physicochemical Characterization of MFI–Ceramic Hollow Fibres Membranes for CO2 Separation with Alkali Metal Cation

Authors : A. Alshebani, Y. Swesi, S. Mrayed, F. Altaher

Abstract : This paper present some preliminary work on the preparation and physicochemical caracterization of nanocomposite MFI-alumina structures based on alumina hollow fibres. The fibers are manufactured by a wet spinning process. α-alumina particles were dispersed in a solution of polysulfone in NMP. The resulting slurry is pressed through the annular gap of a spinneret into a precipitation bath. The resulting green fibres are sintered. The mechanical strength of the alumina hollow fibres is determined by a three-point-bending test while the pore size is characterized by bubble-point testing. The bending strength is in the range of 110 MPa while the average pore size is 450 nm for an internal diameter of 1 mm and external diameter of 1.7 mm. To characterize the MFI membranes various techniques were used for physicochemical characterization of MFI–ceramic hollow fibres membranes: The nitrogen adsorption, X-ray diffractometry, scanning electron microscopy combined with X emission microanalysis. Scanning Electron Microscopy (SEM) and Energy Dispersive Microanalysis by the X-ray were used to observe the morphology of the hollow fibre membranes (thickness, infiltration into the carrier, defects, homogeneity). No surface film, has been obtained, as observed by SEM and EDX analysis and confirmed by high temperature variation of N2 and CO2 gas permeances before cation exchange. Local analysis and characterise (SEM and EDX) and overall (by ICP elemental analysis) were conducted on two samples exchanged to determine the quantity and distribution of the cation of cesium on the cross section fibre of the zeolite between the cavities.

Keywords : physicochemical characterization of MFI, ceramic hollow fibre, CO2, ion-exchange
Conference Title : ICCEE 2014 : International Conference on Chemical and Environmental Engineering
Conference Location : Paris, France
Conference Dates : September 22-23, 2014

Open Science Index, Chemical and Molecular Engineering Vol:8, No:9, 2014 waset.org/abstracts/13679