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Title : **Development of Porous Ceramic Membrane from Industrial Sanitaryware Solid Waste**

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Fabrication of ceramic membrane has been related to commercially available material which can be considered as high cost and its reduction was thus of great importance. Silica and alumina were the main ingredients that had been utilized in the fabrication of ceramic membrane. In this study, industrial waste from sanitaryware company had been selected as the raw material for ceramic membrane fabrication since it shown the presence of silica. The first objective of this research was to study the effect of particle size distributions (PSD), sintering temperature and binder concentration on the fabrication of ceramic membrane. It was then followed by characterization of the fabricated membrane. Next, the fabricated membrane was applied in cell separation process, and finally curve fitting and fouling model was analyzed. Extrusion process has been selected as the fabrication method. Pfefferkorn method was applied to measure the plasticity behaviour of the waste-ceramic paste in order to gain an insight in preparing paste that can be extruded. Three different PSD chosen were 71-89, 56-62 and < 45 µm. The results indicated that smaller particle sizes tends to have higher plasticity index and hence plasticity behavior, where the recorded PI for the smallest PSD was at 26%. Characterization of the ceramic membrane focused on properties that are important in the separation process such as porosity and mechanical strength. This characterization was conducted under the effect of particle size, sintering temperature, molecular weight (MW) of the binder and its concentration. In this study, the sintering temperature has been varied from 980 to 1040^{o}C, binder MW of 2000 and 6000, while the concentration was observed for 20, 50 and 80g/100 ml distilled water. The highest porosity of the fabricated ceramic membrane was obtained at sintering temperature of 980oC using PEG 6000 at 80 g/100 ml distilled water which was at 35% using the highest PSD. Mechanical strength of the fabricated membrane gave the highest value of 28 MPa at sintering temperature of 1040^{o}C, using the smallest PSD which was <45 micron at the concentration of 20 g of PEG2000. The separation ability of the fabricated membrane was performed via filtration process at three transmembrane pressures of 1.5, 2 and 2.5 bar. For that purpose, MRS and Lactobacillus casei has been identified as the solution and the bacteria used respectively in the production of lactic acid. Higher flux of 40 L/m2.h was recorded by ceramic membrane having the highest porosity. A good agreement between the model representation and the experimental values were achieved for all of the particle size distributions and pressures of the filtration system applied. Analysis on the fouling mechanism showed an intermediate blocking model was followed. Utilization of industrial solid waste in the fabrication of ceramic membrane and in the in-situ separation of cell and organic acid was successfully done in this research.