Desalination and Water Treatment
www.deswater.com
9 (2009) 142–148
September
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doi: 10.5004/dwt.2009.764

Preparation and characterization of microfiltration membranes and their supports using kaolin (DD2) and $CaCO_3$

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Received 15 September 2008; Accepted 5 November 2008

ABSTRACT

In this work, the supports for microfiltration and ultrafiltration were prepared with local kaolin (DD2) and calcite mixtures. The choice of these raw materials is based on their natural abundance (low price). These supports were made by extrusion technique in order to obtain tubular supports which were afterwards sintered at 1250°C for 2 h. It has been found that supports had interesting characteristics; an average pore size of about 4 μm, a porosity ratio around 52% and a tensile strength ≈ 23 MPa. Moreover, the pore size distribution is almost homogeneous (mono-modal type). The surface and the cross-section morphologies observed through a scanning electron microscope (SEM) are also homogeneous and do not present any macro defects (cracks, etc.). These supports were selected as substrates for the membrane layers used in microfiltration (MF). The membrane layers were elaborated from zirconium oxide, using slip casting technique. The specimens were subsequently sintered at 1150°C. The microstructure and porosity as well as the permeability have been also studied. It has been found that the average pore size is about 0.35 μm and a layer thickness ≈ 24 μm. The water permeability measured is 1440 l/h/m²/bar. These membranes may also be used as supports for ultrafiltration (UF).

Keywords: Kaolin; Calcite; Supports; Membranes; Microfiltration; Extrusion; Slip casting

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Presented at the Conference on Membranes in Drinking and Industrial Water Production, 20–24 October 2008, Toulouse, France.