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Elaboration and characterization of low-cost ceramic membrane made from natural Moroccan perlite for treatment of industrial wastewater

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Abstract

This work describes the elaboration of flat ceramic microfiltration membrane based on natural perlite for microfiltration of industrial wastewater. The ceramic membrane was obtained by an uniaxial pressing process and sintering at optimized temperature. The sintering temperature was investigated in the range from 850 to 1050 °C. The elaborated membrane of 38.4 mm in diameter and 2.2 ± 0.3 mm in thickness was characterized by environmental scanning electron microscopy (ESEM), porosity, water permeability, mechanical strength, and chemical resistance.

The porosity of optimized membrane (sintered at 950 °C) is 52.11% with an average pore size of 1.70 µm. The water permeability reached a value of 1433.46 L/h.m^2.bar. In addition, the membrane has a mechanical resistance of 21.68 MPa and exhibits good chemical resistance both in an acidic and basic medium.

The performance of prepared membrane was evaluated by frontal microfiltration of two industrial wastewater effluents (agro-food and tannery). Experimental results show that retention of turbidity was superior to 97 and 96% respectively for agro-food and tannery