New ceramic microfiltration membrane from Tunisian natural sand: application for tangential wastewater treatment

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ABSTRACT

New ceramic supports from low-cost natural Tunisian sand have been prepared and characterized. Plastic paste has been prepared from sand powder (average particle size ≈ 100 µm) mixed with organic additives and water. The obtained paste has been extruded to porous tubular supports. After firing at 1,250°C/3 h, the support has shown a porosity of 44.72% and an average pore diameter of 10.36 µm. SEM analysis has shown smooth and cracks-free surface of the tubular supports. The tubes have displayed good chemical and mechanical properties. The water permeability of the sand support sintered at 1,250°C/3 h has been 3,611 L/h m² bar. Microfiltration layer has been also prepared from the same natural sand powder (average particle size <50 µm) by the slip casting method using a mixture of powder sand, water and polyvinyl alcohol solution. The water permeability of the microfiltration membrane sintered at 1,100°C/3 h has been 1,228 L/h m² bar. The obtained microfiltration membrane has been tested for the treatment of cuttlefish effluent. The membrane has displayed better separation performance in terms of chemical oxygen demand and turbidity removal.

Keywords: Ceramic support; Tunisian sand; Extrusion; Microfiltration membrane

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