



## Ceramic membrane behaviour in anionic dye removal by ultrafiltration

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### ABSTRACT

The study is aimed at investigating the suitability of ceramic membranes to the decolourization of organic dye solutions. The process involved commercially available ceramic membrane modules CéramINSIDE® (Tami Industries) of various cut-off values (15 and 150 kDa). The ultrafiltration (UF) experiments were performed at a transmembrane pressure of 0.2 MPa with the use of cross-flow system J.A.M INOX PRODUKT. Comparable studies including the effect of hydraulic conditions existing in the system on membrane performance were reported. Transport and separation properties of the membranes towards dye solutions were investigated at varied linear velocity in the modules (1.5; 2.9; 4.4; 5.9, and 6.9 m/s). Seven anionic organic dyes (Methyl Orange, Indigo Carmine, Amido Black, Titan Yellow, Direct Blue, Direct Green, and Direct Black) of molecular weight ranging from 327 to 1084 Da were used in the tests. The UF tests were carried out with dye solutions and dye solutions containing mineral salt (NaCl). The results showed that increasing the linear velocity generally improved the membrane permeability, whereas dye selectivity was strongly affected by the molecular weight of the dye tested and the membrane cut-off. Nevertheless, the ceramic membranes yielded an 85–99% retention of the high-molecular-weight dyes (above 600 Da) irrespective of the hydraulic conditions in the module, membrane cut-off and dye solution composition.

*Keywords:* Water reuse; Dye; Ultrafiltration; Membrane cut-off; Ceramic membrane; Textile industry

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