

## SEPARATION OF OIL IN WATER EMULSION WITH TiO<sub>2</sub> AND DIFFERENT TiO<sub>2</sub>/(f)CNT COMPOSITE MODIFIED MICROFILTER MEMBRANES

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### ABSTRACT

In the present study, PVDF microfilter membranes were modified with TiO<sub>2</sub> and 9 different CNT containing TiO<sub>2</sub>/CNT nanocomposites – in which CNTs differ in their lengths, diameters and surface properties – and were used for the membrane separation of 100 ppm crude oil emulsion. The effects of the modified membranes on the achievable fluxes, filtration resistances and purification efficiencies were investigated and were compared with the neat PVDF membrane. By the usage of TiO<sub>2</sub> nanomaterial significant flux enhancement, lower filtration resistances and better purification efficiencies could be achieved compared to the neat PVDF membrane. The utilization of several TiO<sub>2</sub>/CNT composite materials as surface modifiers was also beneficial to the filtration properties, but these coatings were not more advantageous – during the presently applied experimental conditions – than the simple TiO<sub>2</sub> coating. But the correlation between the different properties of CNTs and their effects on the membrane surface and filtration properties has been partially discovered. The functionalization of CNT was able to increase the surface hydrophilicity of TiO<sub>2</sub>/CNT nanocomposite membranes.

*Keywords: crude oil, emulsion, membrane separation, titanium dioxide, carbon nanotube, functionalized carbon nanotubes*

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