



The application of the radiotracer method for the investigation of the cake layer formation on the membrane surface in the cross-flow flat-sheet membrane module

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ABSTRACT

The application of the radiometric method with the use of radiotracers for the investigation of membrane fouling was tested. The radiotracer method allows for a more complete control of membrane modules' performance, which may contribute to a longer working time due to the reduction of a frequency and an intensity of a periodic cleaning. The experiments were carried out with the cross-flow membrane module equipped with flat-sheet ultrafiltration membranes made of polyether sulfone. A suspension of the bentonite labeled by the radioactive isotope of lanthanum – ^{140}La was used as a feed solution. The influence of process parameters such as cross-flow velocity and pressure as well as feed concentration on the rate of membrane blocking indicated by the change in the specific radioactivity of deposit formed on the membrane surface was tested. The performed studies demonstrated that radiometric method enabled to estimate the thickness of the cake layer deposited on the membrane during the filtration process. It was noticed that thickness of the bentonite layer formed on the membrane surface increased with the increasing concentration of the feed solution and decreased with the increasing flow velocity and applied pressure. Experiments also showed the ability of applied method for in situ determination of both kinetics of the deposit formation on the membrane as well as the permeability of the deposit layer and its resistance.

Keywords: Ultrafiltration; Membrane fouling; Radiotracers

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