

Modelling and Simulation of Milk Fouling

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Abstract : This work focuses on the study and modeling of the fouling phenomenon in a vertical pipe. In the first step, milk is one of the fluids obeying the phenomenon of fouling because of the denaturation of these proteins, especially lactoglobulin, which is the active element of milk, and to facilitate its use, we chose to study milk as a fouling fluid. In another step, we consider the test section of our installation as a tubular-type heat exchanger that works against the current and in a closed circuit. A simple mathematical model of Kern & Seaton, based on the kinetics of the fouling resistance, was used to evaluate the influence of the operating parameters (fluid flow velocity and exchange wall temperature) on the fouling resistance. The influence of the variation of the fouling resistance with the operating conditions on the efficiency of the heat exchanger and the importance of the dirty state exchange coefficient as an exchange quality control parameter were discussed and examined. On the other hand, an electronic scanning microscope analysis was performed on the milk deposit in order to obtain its actual image and composition, which allowed us to calculate the thickness of this deposit.

Keywords : fouling, milk, tubular heat exchanger, fouling resistance

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