FOULING MECHANISM IN DAIRY WASTEWATER ULTRAFILTRATION

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Membrane processes have been widely used in industrial wastewater treatment in the last few decades because they have several advantages over traditional separation systems: high separation precision, better selectivity, operational at room temperature, no chemical damage, high automation, easy operation, energy saving, reduced cost, comprehensive utilization of resources, and reduced pollution. A critical factor in membrane technology is membrane fouling. Membrane fouling is responsible for the reduction of the permeate flux and contributes to the reduction of the productivity of the processing industry. During our experiments, we investigated how membrane fouling changes during the ultrafiltration of model dairy wastewater at different transmembrane pressures (0.1, 0.2 and 0.3 MPa) and mixing speeds (100, 200, 300 and 400 rpm). With a resistance-in-series models, we examined whether the membrane fouling is reversible (the deposit can be easily removed by washing operations) or irreversible (irreversible fouling) for each measurement, and with the Makardij model, we investigated whether the rate constant of the fouling or the rate constant of the deposit removal is the larger. In the case of both fouling models, we obtained the result that higher mixing speeds could prevail at lower pressures, so in these cases the irreversible resistances were decisive, while in the other cases the reversible resistances were decisive. This study was financed by the Hungarian National Research, Development and Innovation Office, project NKFI-FK-142414.