

MODELING BEHAVIOR OF CHARGED HIGH FLUX ULTRAFILTRATION MEMBRANES FOR DAIRY APPLICATIONS

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Charged membranes on a commercial scale have been developed and applied to milk and whey concentration. The charged membranes are based on polyethersulfone membranes containing sulfonated polystyrene grafts. The membranes have been produced at the industrial scale and tested both as a flat-sheet and as spiral elements. The modeling work was focused primarily on membrane flux decline. Various models for flux decline were developed using linear regression of the experimental data and models from literature.

Small scale experiments were performed in a stirred cell with skim milk, and two field trials were performed on skim milk, whole milk, and whey feed streams. The field trials were performed with 4 inch and 6 inch spiral elements, and a standard 10K MWCO polyethersulfone membrane was used as the control. Data were collected over many months of operation. The membranes were cleaned every two days, and then tested for pure water flux. The results will be presented on linear regression and on models from literature. We will also show results for a theoretical membrane with a well-defined and regular structure. The variables for the model included the pore size and the charge density of the membrane.