

# EFFECTS OF THE COMPONENTS OF MILK ON FOULING AND CLEANING OF POLYAMIDE REVERSE OSMOSIS MEMBRANES

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## ABSTRACT

*Reverse osmosis is used for the concentration of milk to reduce transportation costs from farms, and also within dairy factories to concentrate dairy liquids. A SEPA flat sheet reverse osmosis apparatus with a polyamide membrane was used to measure the flux, rejection, fouling and cleaning of components of milk, both as model solutions and also as whole or skimmed milk at up to 24 bar transmembrane pressure (TMP).*

*Both whole milk and skimmed milk were found to have similar fluxes with a maximum at about 14-16 bar TMP. At higher pressures the flux decreased below the maximum. The flux of a solution of twice the concentration of SMUF caused significant flux reduction with a maximum flux at 16 bar TMP. Neither the addition of lactose nor whey protein isolate to normal SMUF caused additional flux reduction. Skimmed milk with enhanced and depleted mineral and/or protein contents were also filtered. It was found that altering the mineral content either up or down increased the fouling resistance for filtration, whereas both changes in protein content reduced the amount of fouling. The fouling was found to be greater at higher TMP values. It is thought that high mineral contents led to mineral precipitation but low mineral contents cause casein micelle disintegration. The membranes were cleaned using a cycle of 10 minutes each of 0.5% NaOH, 0.8% HNO<sub>3</sub>, 0.5% NaOH with water rinses before each step. After 12 bar TMP filtration only one cleaning cycle was required but after 24 bar filtration, two cycles were required.*