Synder Filtration

Membranes that perform. People who deliver.™

NF Whey Concentration & De-ashing Case Study

Nanofiltration technology is commonly used throughout the dairy industry for applications such as whey processing. The removal of salts via nanofiltration is important for the production of high-quality lactose, and can also prevent scaling and build-up on evaporators. In this case study, two of Synder's NF membranes were tested for their whey concentration and de-ashing properties using acid whey powder.

Overview

The objective of this study was to examine the flux and calcium rejection performance of Synder's NFX and NFS membranes, with acid whey powder used as the incoming feed stream. These results will determine the potential for NFS to be used in the dairy industry for applications such as whey concentration, decalcification, and de-ashing.

Experimental

Synder's NFX and NFS membranes were tested in 2540 spiral wound element modules. Acid whey powder (8wt%) was used as the incoming feed. Elements were tested at 490 psi with a feed flow rate of 2 gpm at 25°C. Permeate flux and calcium rejection was measured from 1x to 3x volumetric concentration factor (VCF). Calcium concentration was determined using the USEPA buret titration method with Hach CalVer calcium indicators.

Table 1: Acid Whey Powder Composition

Description	Specification
Ash	10.5% max
Fat	1.2 max
Moisture	5.0 max
pH	4.5-5.0
Protein (as is)	11% min
Sediment	15.0 mg max
Titratable Acidity	0.30% min

Project Goal
Examine performance of Synder's NFX and NFS membranes for whey concentration & de-ashing

Feed
Acid Whey Powder (8wt%)

Elements
NFX-3B-2540M
NFS-3B-2540M

Parameters Measured
Calcium concentration
TOC rejection
Permeate flux

Testing Conditions
Pressure: 490psi
Feed flow rate: 2gpm
Temperature: 25°C

Results

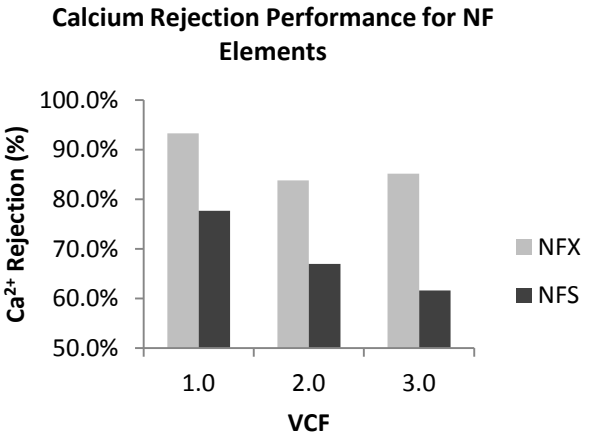

Figure 1: Calcium rejection performance for Synder's NFX and NFS 2540 elements obtained up to 3x VCF.

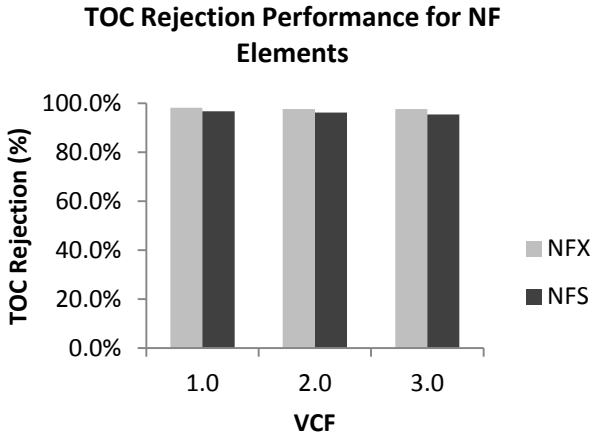

Figure 2: TOC rejection performance for Synder's NFX and NFS 2540 elements obtained up to 3x VCF.

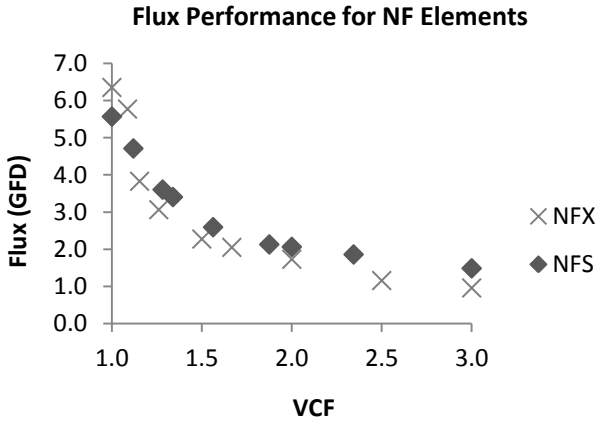

Figure 3: Flux performance for Synder's NFX and NFS 2540 elements obtained up to 3x VCF.

Conclusion

The results of this study indicate that Synder's NFS membrane has an advantage over NFX in de-ashing capabilities in a feed stream comprised of acid whey powder. Though the permeate flux reached similar values by the end of the run, there was a slight difference in the overall flux decay. NFS exhibited a flux decay of approximately 73%, compared to NFX, which exhibited a flux decay of nearly 85%. There was also a comparable TOC rejection for both membrane types.

Most notably, there was a significant difference in calcium rejection performance between NFX and NFS at each concentration factor, which is beneficial in the production of higher-quality lactose. Overall, these results indicate that Synder's NFS membrane has the potential to be used for whey concentration, decalcification, and de-ashing applications.