Concentration & Desalination of Optical Brightening Agents
Synder NFX Membrane

Introduction

For all manufacturers, freight costs for shipping their products can significantly affect their company's competitiveness on pricing. In this case, the current product of optical brightening agent (OBA) had more than 50% water in each container, which resulted in high freight costs. The OBA manufacturer had used competitor's NF spiral wound elements that offered only in 28mil spacer, for the desalting and concentration of optical brightening agent (OBA), however, the small spacer led to difficulty in concentrating this specific OBA when the OBA is concentrated to certain point.

After learning about Synder's wide variety of membrane spacers available for the spiral wound elements, they requested that Synder conduct a feasibility test on their existing OBA product. Based on the solid content, Synder made an NFX element with a 46 mil spacer to conduct this experiment.

This test was able to 1) determine if NFX membrane is selective enough to concentrate OBA while desalting it as well; and 2) find out if the 46 mil spacer is big enough to further concentrate the OBA without causing an extremely high pressure drop.

Membrane and testing conditions

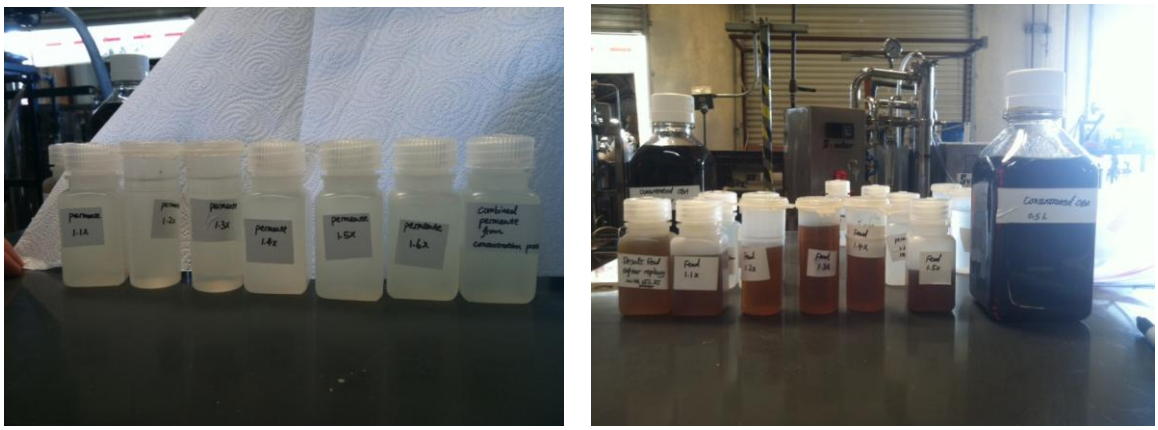
Feed Conditions	
Color	Yellow
pH	8-10
Solubility in water	Soluble
Density	1.13 g/cm3
Conductivity (ms/cm)	~68
Dry Content	20-21%
Synder Membrane	
Element	NFX-3-1812 Spiral Element
Membrane	Polyamide-TFC
NF Standard Operating Parameters	
Starting volume	15 L
Pressure (psi)	600 psi
Outlet Pressure (psi)	580 psi
Crossflow (gpm)	1.2 gpm
Temperature	40-50 C

Dry materials in 20 gram of feed solution

Results

During the diafiltration process, RO water equal to the volume of the feed mixture was used to gradually remove the salt from the feed. The permeate flux started at 14 gfd and increased to 23 gfd while salt was gradually removed from the feed solution.

After diafiltration, the feed was concentrated to 150% of the initial concentration. The permeate and feed sample was collected at 1.1 fold, 1.2 fold, 1.3 fold, 1.4 fold, 1.5 fold for the customer to evaluate. At the end of the concentration process, the permeate flux was in the range of 9 gfd.



Permeate (left) and concentrate (right) samples at different concentration factor. (In each picture, the sequence of samples is 1.1 fold, 1.2 fold, 1.3 fold, 1.4 fold, 1.5 fold concentration factor from left to right)

After the experiment, the filter was cleaned with caustic solution at pH 11 and then an acidic cleaning solution at pH 3.5, the clean water flux showed that the membrane was fully recovered.