

# TECH TIPS

Issue #14 February 2007

## Membrane Cleaning Versus Other Surfaces





When we look at TACT WINS principles and apply them to cleaning surfaces the TACT part most of the time gives us room to try different things to clean a surface.

TIME  
ACTION  
CHEMICAL CONCENTRATION  
TEMPERATURE

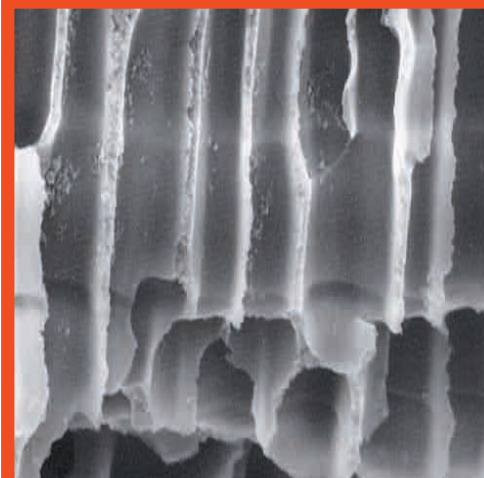
I will take each one separately.

Action - we can change the action in Open Plant Cleaning foaming versus brush. Cleaning stainless pipes, tanks etc. we can use higher flows, or split up line circuits to make them shorter. When cleaning membrane systems the flow across the membranes is determined by the stage or cross flow pump. We cannot change the action without changing the pumps. We have to use what the manufacturer gives us.

Chemical concentration - is determined by the limits placed on pH by the membrane element manufacturer. Most of the membranes we use in dairy applications are actually made of plastics. The actual membrane layer itself is very thin, less than a sheet of paper. This is the biggest difference when it comes to cleaning membranes versus stainless or other surfaces. We are cleaning a plastic surface that has pores or holes in it. Plastic presents many challenges when it comes to cleaning. Surfactants must be chosen carefully so we don't stress crack the membranes. Solvent type cleaners can dissolve the glues used to put together membranes.

Thin Film Composite membranes are made with a very thin layer of polyamide laid over a polysulfone membrane. Polyamide cannot tolerate chlorine even at very low levels. But we use chlorine to clean polysulfone membranes all the time. That is why membrane cleaning is the one area we still use enzymes on a regular basis. It is the only way to remove protein from a TFC RO membrane. We need to know for sure what type of membrane we are cleaning to make sure we use the correct procedures. Most plastic membranes can only tolerate pH in the range of 1-12, but usually for cleaning only allow pH of 1.8 to 11.5.

Because of the above problems, we are very limited in which chemicals we can use and the amounts we can use. If we run into a cleaning problem we can't just use 2-3% caustic to remove the soil. The other area we have problems with plastic membranes is the use of defoamers. Almost all defoamers will tend to stick to polymeric membranes causing them to foul and not permeate. You must not ever use defoamers, even in the products being processed on the membrane system. Once they get on the membrane surfaces it is very difficult to remove defoamers.







Temperature – again we are limited by the membrane tolerance. Ceramic and sintered stainless can with stand very high temperatures but polymeric or plastic membranes are generally limited to 135°F (57°C) and most element manufacturers don't want temperatures during cleaning over 125°F (50°C). So we are very limited in the temperature area.

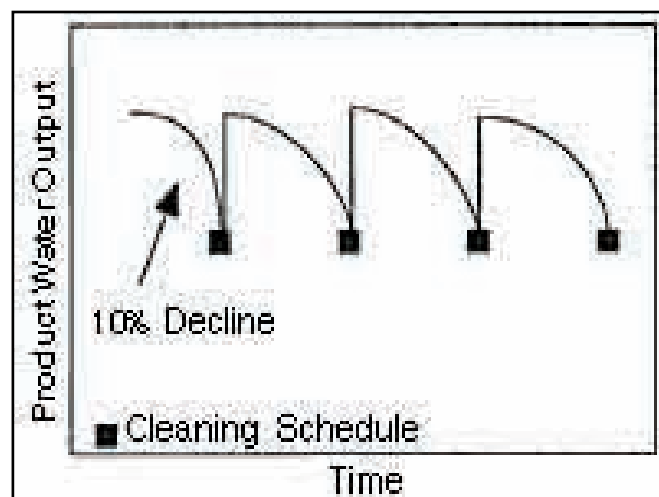
The other way temperature affects membrane cleaning is the removal of fats and oils from a membrane. To saponify fats with caustic you need temperature above 150°F (65°C). Polymeric membranes don't allow temperatures this high. To remove fats and oils we rely on surfactants. That is why membrane cleaning solution will tend to foam. And like stated earlier in this Tech Tip, you cannot use defoamers to control the foam.

Time – That is the one area we can change. Generally that is one of the strategies used when cleaning membranes. We will leave the wash solutions in longer, or repeat wash steps several times to gradually remove a fouling layer. Or switch back and forth from acid type cleans to alkaline or enzymatic cleans. Time is the one thing we can use and most often we end up spending many hours doing cleaning procedures. Membrane cleaning procedures can take upwards of 4 hours to complete.

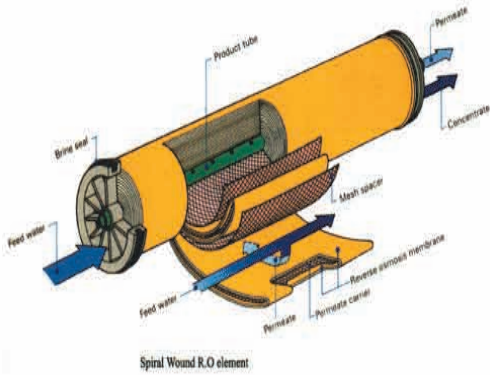
Fortunately JohnsonDiversey has invested considerable time and effort to develop a line of cleaners for membrane systems. We also have the Membrane Trustee Group that meets regularly to discuss membrane cleaning issues. From these discussions we look for new procedures and formulations to clean membrane systems.



A typical membrane unit.



After the membranes (output) drops to a certain level cleaning is necessary.



I am  
a member of  
JohnsonDiversey's  
Membrane Trustee Group.  
If you have any questions or  
needs in the membrane area let me  
know, I can address them or forward  
them to the group. We also conducting  
a Membrane Training Seminars to help  
them better understand membrane  
cleaning principles and membrane  
technology itself.

Because membrane cleaning is  
"different" than most of the  
sanitation situations we encounter,  
be sure to contact the  
Technical Support when you encounter  
a customer who wants assistance in  
cleaning his membrane system(s).  
We have a database established  
to serve as a repository of membrane  
cleaning expertise.  
Be sure you have the correct  
chemicals, procedures etc.  
to run a successful membrane cleaning  
program.

For questions on membrane applications contact  
Dennis L. Schmidt @ [dennisl.schmidt@johnsondiversesey.com](mailto:dennisl.schmidt@johnsondiversesey.com)

JohnsonDiversey  
United States  
3630 East Kemper Road  
Cincinnati, Ohio 45241  
p: 1-800-233-1000  
f: 513-956-4841

JohnsonDiversey  
Canada  
2401 Bristol Circle  
Oakville, Ontario L6H 6P1  
p: 1-800-233-1000  
f: 905-829-1218

Or visit our website at: [www.johnsondiversesey.com](http://www.johnsondiversesey.com)

