

**Membrane cleaning: foulant types and preferred chemical cleaning agents  
(membrane compatibility must be checked)**

Foulant	Effect on system performance	Preferred chemical agent	Cleaning regime	Notes
Calcium carbonate	Flux decline Increased salt passage	Citric acid (preferred) or dilute hydrochloric acid for heavy deposits (see notes)	pH 2-3, for 30 minutes	Usually very effective, except where scale deposit is blocking flow of cleaning solution HCl can be harmful to TFC membranes due to free chlorine content
Insoluble scales (CaSO <sub>4</sub> , BaSO <sub>4</sub> )	Flux decline Increased salt passage	Sequestering agents (e.g. EDTA), these can usually be bought as proprietary membrane cleaner that includes a surfactant component	Varies, and long soaking time may be required. Suggest 2% concentration of sequestering agent at pH 10	Can be reasonably effective if cleaning solution is heated
Iron and manganese	Flux decline Increased salt passage	Citric acid or proprietary membrane compatible agent	Suggest 1-2% concentration, recirculate and soak for up to four hours	Usually very effective Will also remove light deposits of calcium carbonate
Precipitated silica	Flux decline	None proven except very hazardous acidified ammonium bifluoride.	Not recommended	Replace fouled membrane
Polymer fouling	Severe flux decline	None proven: Alkaline surfactant blend or proprietary agent may be marginally effective (see notes)	pH 10-13, circulate and soak for up to six hours	Investigate and eliminate source of polymer in system. Consider use of anionic flocculant in pre-treatment
Colloidal fouling	Flux decline Increased salt passage	Alkaline surfactant blends, possibly combined with sequestering agent	pH 10-13, circulate and soak for up to six hours	Reasonably effective
Organic fouling	Flux decline Increased salt passage	As above: some new proprietary agents appear promising	As above	Marginally effective
Biofouling	Increased 'delta P'	As above	As above	Can be very effective if optimised and cleaning solution heated to optimise
Maintenance cleaning	Increased 'delta P' Flux decline Increased salt passage	1 <sup>st</sup> stage: alkaline surfactant blend 2 <sup>nd</sup> stage: mild acid clean	1 <sup>st</sup> stage: pH 10-13, circulate and soak for up to six hours 2 <sup>nd</sup> stage: pH 2-3, for 30 minutes	2 stage clean targets biofouling and organic material before dissolving scale. Usually an effective maintenance clean in many situations
System disinfection	-	Sodium hypochlorite Hydrogen peroxide / peroxyacetic acid mixture Proprietary non-oxidising biocides	As required	Membrane compatibility must be checked first. Some non-oxidising biocides can be used for membrane preservation

- MicroCell dosing device • Membrane cleaning and regeneration
- System and pre-treatment design • Process commissioning and troubleshooting