

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 ₄ , BaSO ₄) | 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 st stage: alkaline surfactant blend 2 nd stage: mild acid clean | 1 st stage: pH 10-13, circulate and soak for up to six hours 2 nd 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