

Using selected natural viruses for a novel integrity method for capillary ultrafiltration membranes.

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Abstract:

A novel method is proposed which can measure the quantity of selected natural viruses (NV) in surface water. With this method it is possible to quantify the NV in samples from feed and permeate and calculate the LOG removal value. First small lab scale modules (RX300, 0,07 m²) are tested. The membranes used are the 0.77mm hollow fibre capillary membranes. In the test with the RX300 modules 5 different modules were tested, 1 module with no leaks and 4 with different defects. During these tests there was a clear difference between the intact module and the modules with defects. The intact module had a NV removal of almost LOG 6 compared to a removal of maximum LOG 1 for the RX300 modules with leaks.

A full-scale module with 64 m² is used to verify the method further. During this test a module is used and after each test additional defects are added. The test started with a module without leaks and after this, leaks are created via holes in the module housing. Tests are performed with 0, 1, 3, 5, 10 and 50 leaks in the same module. Results show a decrease in the NV removal. The test with 0 leaks had a NV removal of LOG 5. With the added leaks the module decreases in NV removal. With 1 leak the NV removal drops to LOG 4 and eventually to a LOG 2 removal with 50 membrane leaks.

Currently additional tests are performed where the membranes will be repaired and NV removal of the module with 50 repaired defects will be measured.

Keywords: Natural viruses (NV), novel membrane integrity method, capillary ultrafiltration membranes.