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**Performance of combined ozonation, coagulation and ceramic membrane process for water reclamation: effects and mechanism of ozonation on virus coagulation**

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**Abstract**

We investigated virus removal and the formation of disinfection by-products by a combined ozonation, coagulation, and ceramic membrane filtration process (O<sub>3</sub>+PACl+CMF) for water reclamation. Pilot-scale continuous operation used secondary effluent as test water, and virus removal performance was tested using F-specific bacteriophage MS2. The rate of increase of transmembrane pressure decreased from 29 to 1 kPa/d with increasing ozone dosage from 0 to 6 mg/L. Ozonation reduced reversible fouling, and residual O<sub>3</sub> reduced irreversible fouling. Ozonation increased MS2 removal from 2.1- to 6.8-log with increasing specific ozone dosage from 0.16 to 1.29 mg-O<sub>3</sub>/mg-C. In PACl+CMF, however, MS2 removal decreased from 8.4- to 6.7-log. Lab-scale batch experiments revealed that increasing ozone dosage tended to inhibit MS2 coagulation. The inhibition was attributed to the negative effect of ozonation on particle destabilization, making it harder for the coagulant to neutralize surface charge in

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