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Study on Ultra-Filtration Performance of Simulated Seawater Containing Organic Compounds and Suspended Particles

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Summary

The ultrafiltration (UF) properties of two monodispersed PMMA particles (average diameter: 1.5 μm, 5.0 μm) were investigated.   Additionally, using dextran (Mw: 70,000) as a model organic compounds, the UF property of the mixture of the dextran and the PMMA particles were also investigated in this study.

In the case of the UF of the monodispersed PMMA particles suspensions, the steady state flux was observed, just as the case of the UF of aqueous solution containing macromolecules.   In addition, the assumption that the flux did not change with time in the case where the lift velocity of the particles is larger than the flux was examined using PMMA particles with 1.5 μm or 5.0 μm, and this assumption seemed to be valid.   However the method to calculate the lift velocity has not been established.   In concrete, the lift velocity equation by Belfort *et al.* needs the shear rate for calculating it, however it depends on the distance from the membrane surface.   It remains unsolved how to decide the distance for calculating the lift velocity.   Furthermore we should continue studying the effects of particle diameter or feed concentration on the lift velocities.

In the case of the UF of the mixture of the dextran and the PMMA particles suspensions, the filtration resistance due to the PMMA particles was smaller than that due to the organic solutes, which resulted in that the steady state flux was proved to be expressed by using the osmotic pressure model.   However we conducted the experiments only in the case of the situation where the lift velocity was higher than the filtration flux, so we need more studies in the case where the assumption is not valid.