

Investigation of Fouling Mechanism and Development of Anti-fouling Processes in Ion-exchange Membrane Salt-production System

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Summary

In ion-exchange membrane salt-production system, membrane fouling always degrades its performance. Therefore, the quantity and the quality of adherent dirt on the membrane as well as the qualities of the raw and the sand-filtered sea water samples were investigated at two salt-making plants (factories) located in different regions in June, July, September and November, 2004.

Sand-filtered system decreased markedly the contents of SS, organic nitrogenous compound concentrations, the number of planktons in the filtrated sea water. In particular, the number of planktons including nanoplanktons decreased to less than 4% that of the raw sea water. The number of bacteria also decreased in this process, but the level in filtered water fluctuated markedly (less than 1% to 30% that of the raw sea water). Bacterial composition (*Acinetobacter* sp., *Pseudomonas* sp., *Vibrio* sp., *Moraxella* sp, *Pasteurella* sp. etc.) was not so effected by this filtration process.

On the other hand, little polysaccharides were removed from the influent sea water by the sand-filtered system. Furthermore, it was found that the carcass and the fecal pellets of marine microorganisms, planktons and bacteria, and some kinds of their metabolites (mainly polysaccharides) were possibly loaded in the filtration process. The adherent dirt compositions on the anion and the cation exchange membranes were classified as organic substances, ferric matter, the ingredients of earth and sea water (Al, Si, Cl, P, S, Ca, K, Mn, Cu, Br and so on). Polysaccharides trap various substances such as bacteria, small particles of organic and inorganic matters. For the suppression of membrane fouling, therefore, the establishment of an effective removing system of polysaccharides derived from the influent sea water and loaded in the sand-filtration process will be required in ion-exchange membrane salt-production facilities.