Performance Using Hollow Fiber FO Module

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Abstract:
Forward osomosis (FO) is one of the next generation seawater desalination technologies (Blandin, G. et al., 2015). The recent FO process adapt a hybrdrid system rather than using FO alone. The feature of the FO process is that it does not require an artificial pressure, consumes less energy, and can be treated with concentrated water. Despite these advantages, however, there is a difficulty in the empirical step due to the lack of recovery and maintenance techniques in the draw solution in the cleansing process. Therefore, it is pointed out as a technology that does not have market competitiveness. In this study, we investigated the change of permeate flow rate according to the flow rate of the draw solution in the process operation factor in order to increase the permeate flow rate, one of the performance factors in the positive osmosis process.
The FO process experiment for this study was conducted with the same device as the above figure (Fig. 1). The concentration of the solution was measured in place of the electrical conductivity and used to determine the concentration change of the solution in the experiment. At this time, the measurement method was specified using a portable multimeter (ProfiLine Multi 3320, WTW). All pipes were made of polymer material.
This experiment was carried out to investigate the effect of the factors on the semi-pilot scale. The experimental results showed a smaller permeation flux than the Lab-scale test. However, the results showed similar trends as reported. Because the effective membrane area according to the inner diameter of the module is smaller than the increase of the flow rate of the inflow pump, the flow velocity in the actual hollow fiber membrane is increased more greatly. Also, there was little increase in module pressure with increasing flow (<0.1 bar), but salt despreading was better.

Keywords: Forward Osmosis, Hollow fiber, Operation, Flux

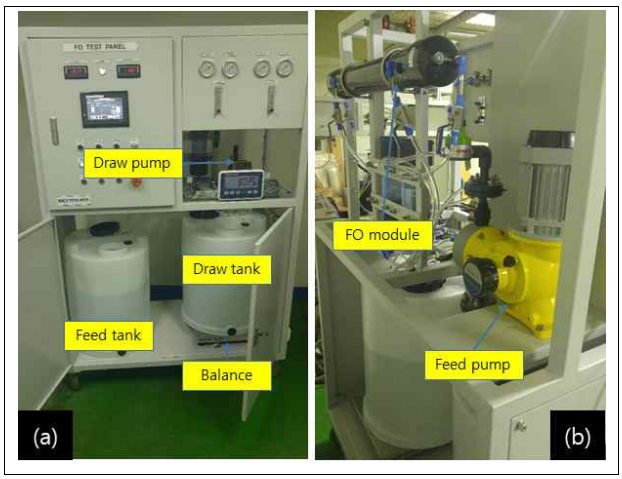


Fig. 1. Follow-fiber FO process test unit (a) : front view, (b) : back view

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ACKNOWLEDGEMENT

This research was supported by a grant(code 18IFIP-B088091-05) from Industrial Facilities & Infrastructure Research Program funded by Ministry of Land, Infrastructure and Transport of Korean government.