

Abstract

The objectives of this thesis were to study the composition of seawater and pretreatment system which affected reverse osmosis membrane and the performances of reverse osmosis process.

Scales of sulfate and carbonate salts, colloids, metal oxides and biological foulants were found to reduce the performance of reverse osmosis membrane. The effective pretreatment system should be consisted of 5 μm cartridge filter, chemical additions, carbon filter and 1 μm cartridge filter, respectively.

Reverse osmosis of seawater with and without pretreatment was carried out under the same conditions. The results indicated that the permeation flux and rejection of pretreated seawater were higher and there was less accumulation on the membrane surface. An increase of percentage of recovery reduced both permeation flux and rejection since there was an increase of surface accumulation and flow resistances. The permeation flux, rejection, accumulation and flow resistances also increased with pressure. An increase of flow rate enhanced permeation flux but decreased rejection, accumulation and flow resistances.

The experiments carried out with synthetic solutions of NaCl, MgSO_4 and CaSO_4 showed that scales of sulfates had more pronounced effect on the membrane and the flux reduction was 8.06%.

Keywords : Colloids / Membrane / Pretreatment System / Resistances / Reverse Osmosis
/ Salt Scales