



Environmentally friendly antiscalant effective in inhibition of scale formation and dispersing organic and colloidal matter in seawater desalination plants

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ABSTRACT

The aim of the study is to evaluate the effectiveness of environmentally friendly antiscalant ADIC RO-18^{AdicGreen} in preventing the formation of scales in the reject, dispersing organic matter and inhibiting the colloidal fouling in the seawater reverse osmosis systems. The antiscalant developed is environmentally friendly because it is phosphorous and nitrogen free. Experimental tests were conducted in order to evaluate the ability of the antiscalant developed to disperse organic and colloidal matter. The results of filtration curves, operated under constant pressure (Modified Fouling Index), and the study using scanning electron microscopy with energy dispersive X-ray spectroscopy of the deposit adhered to filters, indicated that the antiscalant dosage retards filter fouling, and decreases the amount of clay retained on the filter, with respect to a filter without the presence of antiscalant. To evaluate the ability of this antiscalant developed to prevent scale formation in the reject of seawater reverse osmosis, a study in a RO pilot plant was carried out. The tests results demonstrated the antiscalant is effective in controlling inorganic scales and inhibiting the deposition of iron, aluminium, manganese and silica. A dosage of the antiscalant model and the scaling potential reduction for sparingly soluble species model were developed. The models calculate scaling potentials and recommend the minimum dosage of antiscalant to ensure the effective protection of the reverse osmosis membranes against scaling and fouling. Dosing the minimum effective antiscalant reduces operating costs for chemical treatment and minimizes treatment chemical discharge to the environment.

Keywords: Reverse osmosis; Seawater antiscalant; Colloidal and organic dispersion; Scale inhibition; Seawater; Environmental friendly antiscalant

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