

## Effect of antiscalants for inhibition of calcium sulfate deposition in thermal desalination systems

Nawaf N. Al-Mutairi<sup>a\*</sup>, Farag Abdul Aleem<sup>b</sup>, Malik I. Al-Ahmad<sup>b</sup>

<sup>a</sup>National Center for Water Research, King Abdulaziz City for Science and Technology, P.O. Box 6086, Riyadh 11442, Saudi Arabia  
Tel. +966 14883555; Fax +966-1-4814391; email: nmutairi@kacst.edu.sa

<sup>b</sup>Chemical Engineering Department, King Saud University, P.O. Box 800, Riyadh 11421, Saudi Arabia

Received 3 August 2008; accepted in revised form 15 June 2009

---

### ABSTRACT

Antiscalants are used in desalination and water treatment plants to reduce or prevent scale formation on heat transfer equipments surfaces. For this purpose, an experimental apparatus has been designed to study the effect of various types of antiscalants on the deposition of calcium sulfate on the surface of stainless steel tubes. Three antiscalants are used in this study, sodium hexametaphosphate (SHMP), Belgard EV2030 and ethylenediamene-tetraacetic acid (EDTA). Two levels of antiscalants used in this work are 1 and 3 ppm, while  $\text{CaSO}_4$  concentrations are 3000 and 7000 ppm. Collected results revealed that 33% decrease in fouling can be achieved by using SHMP, while 19% fouling reduction with Belgard EV2030 and 40% decrease in fouling when using EDTA. Also, the effect of the antiscalants is decreased by increasing the concentration of calcium sulfate from 3000 to 7000 ppm. This observation was extracted from graphical plots of obtained results. For antiscalant concentration above 1.5 ppm, it was found that the increase in its concentration has almost no effect on fouling resistance.

*Keywords:* Calcium sulfate; SHMP; EDTA; Belgard EV2030, Fouling resistance

---

\* Corresponding author.