

## Process of geothermal water treatment by reverse osmosis. The research with antiscalants

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### ABSTRACT

One of the main operational problems when using reverse osmosis (RO) technology is membrane scaling. Scaling directly affects membrane service life, the efficiency of the desalination process and operating costs, therefore predicting and preventing sediment precipitation in membrane systems is a key aspect of their operation. This process also plays an important role during the desalination of geothermal waters. Geothermal waters often exhibit high levels of carbonate hardness and elevated concentrations of silica, sulphates, strontium, barium and other elements. The elevated temperature of geothermal water during its desalination is particularly conducive to the formation of sediments, especially carbonates, but also silica, barite, alumino-silicates and in some cases copper sulphates. The work presents the results of research designed to optimise the selection of antiscalants which permit the reduction of deposits precipitating on the membranes used in the process of water treatment. They included modelling studies, laboratory tests and microscopic analysis of sediments formed on the membranes. The study used brackish geothermal water extracted from the geothermal intake. The geochemical modelling that was carried out (using the program PhreeqC) has allowed a detailed assessment of the tendency of mineral deposits to precipitate from the water being tested. It demonstrated what should be expected as regards the precipitation of different geochemical characteristics. It was all the more necessary to propose an appropriate antiscalant for a broad spectrum of action. Several commercially available antiscalants were used for tests in the RO process. The study was carried out using DOW FILMTEC membranes.

*Keywords:* Membrane; Reverse osmosis; Geothermal water; Water treatment; Antiscalant

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