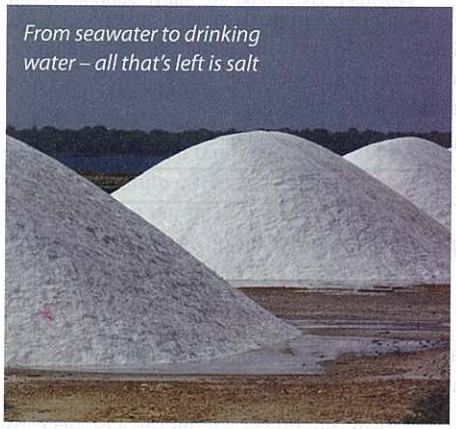
Ultra-efficient reverse osmosis drives peace

Jordanian desalination plant uses Israeli process – with NATO help

A NOVEL, highly-efficient process for water desalination using reverse osmosis will be tested in two pilot plants currently being planned in Jordan and Israel.

The process, developed by Eli Korin, professor of chemical engineering at Ben-Gurion University of the Negev, and Jack Gilron of the Zuckerberg Institute for Water Research at the same university, can reduce brine volumes to 33–50% of those generated in conventional reverse osmosis. This makes the process both more environmentally friendly and cheaper to run. Moreover, the process is easily scaleable and can be retrofitted to existing desalination plants.

The secret of the efficiency increase lies in minimising membrane fouling by exploiting the finite kinetics of the fouling process, Korin tells ***tce***.



From seawater to drinking water – all that's left is salt

"Our method for controlling membrane scaling is based on avoiding getting past the nucleation stage of sparingly solute salts on the surface of the membrane," he says. "We use the flow reverse method to prevent scale formation by switching the entrance and exit of the feed before the induction time of nucleation along the membrane wall runs out and precipitation occurs."

In layman's terms, Korin and Gilron have worked out exactly when they need to reverse the water flow to stop salts from forming solid particles and precipitating from the salty brine.

"Reversing the flow before the induction time of the system is reached replaces the supersaturated brine at the exit with the unsaturated feed and thus 'zeroes the induction clock'," Korin adds.

Korin and Gilron are now working with engineers from the University of Colorado and the Hashemite University of Jordan to test the process at pilot plant desalination units in Israel and in Jordan. Between them, the pilot plants at Eilat, run by Mekorot, Israel's national water company, and at Amman in Al Zareqa, Jordan, will produce around 120 m^3/day of drinking water. Rotec – a new startup company designed to commercialise the process – says that the Eilat pilot plant is due to be up and running by the end of 2009. The Jordanian unit will follow in early 2010.

Because it fosters close cooperation between Israel and Jordan, the research has attracted financial support from an unusual source: the North Atlantic defence pact NATO.