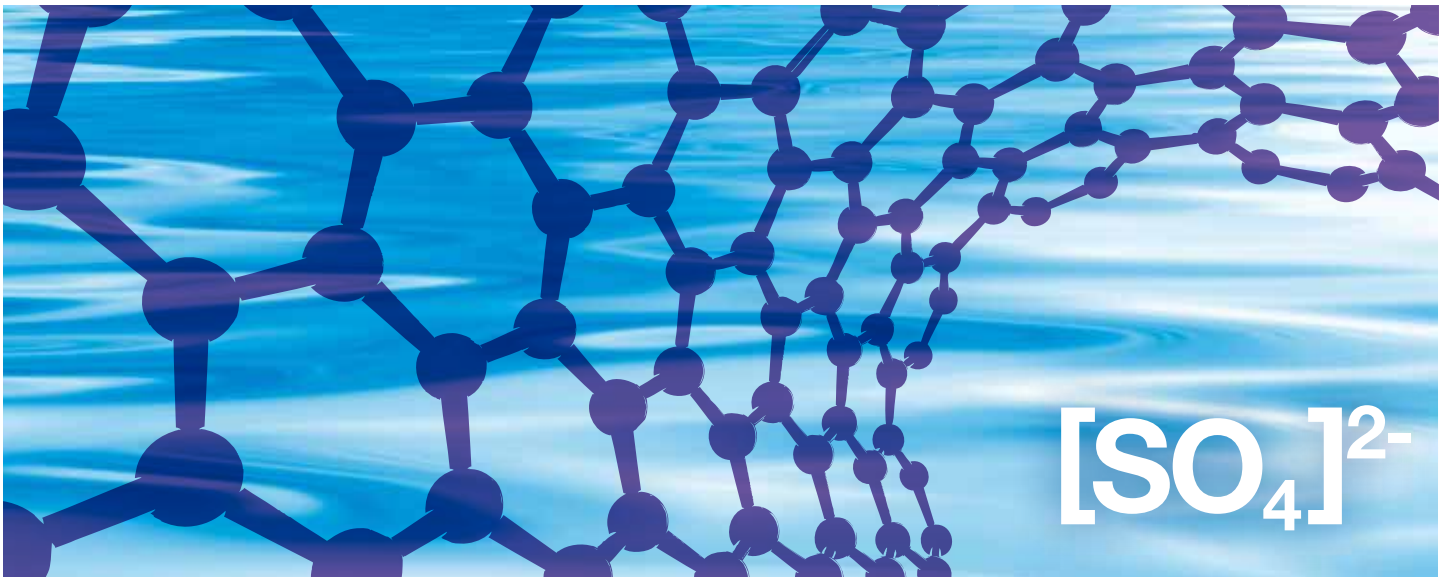
Nanofiltration removes sulfate from brine



New technology delivers energy savings for salt production: The underground salt extracted by AkzoNobel naturally contains impurities such as sulfate. These impurities must be removed because they disrupt industrial applications using salt, such as the production of chlorine. A complex substance, sulfate is difficult to remove and it can only be done using vast amounts of energy. AkzoNobel Industrial Chemicals technologists have managed to find a new method to do this using nanofiltration. This approach yields an estimated net energy savings equal to the annual gas consumption of 1,400 households.

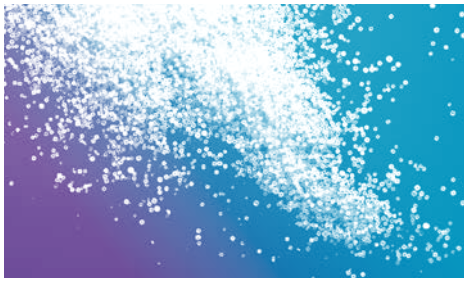
For several years now, a project named SURF to remove sulfate from brine has been running at the Hengelo site. AkzoNobel uses salt solution mining to produce salt. The salt is dissolved in water underground and is then processed on the surface as brine. The brine is evaporated, and salt crystals are formed. The brine, however, contains impurities from the original seawater from which the salt layers were created. It's these impurities that end up in the salt.

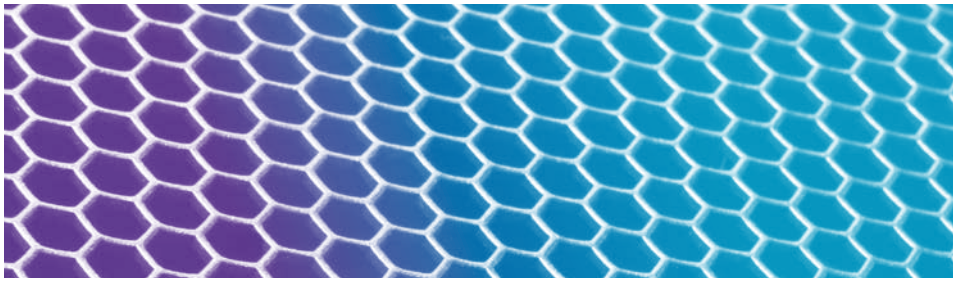
These contaminants are unacceptable in industrial applications and need to be removed. Sulfate, a contaminant, collects in the mother liquor. This is the liquid that remains after the salt crystals have formed. Controlling the sulphate level of this liquid results in a loss of production, with related energy consumption.

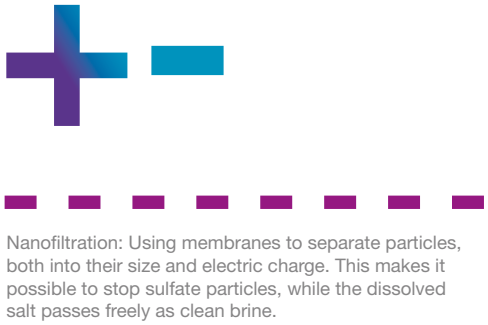
Breakthrough for salt industry

An unconventional idea to use nanofiltration to remove sulfate was mooted a few years ago during earlier innovation programs. This process involves using membranes to separate particles, both into their size and electric charge. This makes it possible to stop sulfate particles, while the dissolved salt passes freely as clean brine.

After a research project that lasted several years, the result was a success and nanofiltration was used for the first time in the Hengelo salt plant in early 2012. Because less salt is lost, this will lead to a 1.5 to 2 percent efficiency improvement. This saves a net 2.75 million m^3 of natural gas per year.







Nanofiltration: Using membranes to separate particles, both into their size and electric charge. This makes it possible to stop sulfate particles, while the dissolved salt passes freely as clean brine.

The SURF project is a fine example of open innovation within AkzoNobel. Researchers at the Salt business worked closely with membrane experts and EOS, AkzoNobel's engineering unit. In addition, technologists at the salt plant monitored practical applicability. All the necessary expertise within the project has been brought together in one team. At the same time, a partnership was entered into with Chemetics Inc. (a Jacobs Company), based out of Vancouver, Canada. As part of the partnership, Chemetics is licensed to supply the SURF technology to plants in many regions of the world.

The innovative SURF project has not only delivered new technology for the production of salt. It has also given AkzoNobel a better understanding of the entire energy system, the thermodynamics, of salt production. The latter is essential information for assessing the energy efficiency of future process improvements.

SURF is another fine example of innovation that contributes to sustainability and at the same time is economically advantageous. It fits perfectly with AkzoNobel's ambitions to be one of the world's most sustainable chemical companies.

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AkzoNobel

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