



Sulfate removal from the sea by anion exchange process combined with K_2SO_4 precipitation

Emanuel Korngold

Zuckerberg Institute for Water Research, Ben-Gurion University of the Negev, P.O. Box: 653, Beer-Sheva 8410501, Israel, Tel. +972 86461940; Fax: +972 86472960; email: korngold@bgu.ac.il (E. Korngold)

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ABSTRACT

Sulfates can be removed from seawater by weak base anion exchanger which is regenerated with concentrated potassium chloride solution. The potassium sulfate was removed from the regeneration solution by adding solid KCl, which reduced the solubility of K_2SO_4 causing its precipitation. Dilution of the regenerated solution was substantially reduced by using three displacement solutions with different KCl concentrations. Precipitation of potassium sulfate in the column during regeneration was prevented by heating the regeneration solution to 55°C. After the regeneration solution exited the column, it was cooled to achieve maximum precipitation of the K_2SO_4 . The weight of the K_2SO_4 obtained was about the same as that of the KCl used for regeneration. The concentration of sulfate in seawater was reduced from 34 mM to less than 15 mM. To produce one ton of potassium sulfate about 250 tons of seawater is needed. The volume of the solution disposed of to the drain approached zero.

Keywords: Sulfate removal; Seawater; Anion exchanger; Recycled regeneration
