

Salinity Reduction from Saharan Brackish Water by Fluoride Removal on Activated Natural Materials: A Comparative Study

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Abstract : The present study presents, firstly, to characterize the physicochemical quality of brackish groundwater of the Terminal Complex (TC) from the region of Eloued-souf and to investigate the presence of fluoride, and secondly, to study the comparison of adsorbing power of three materials, such as (activated alumina AA, sodium clay SC and hydroxyapatite HAP) against the groundwater in the region of Eloued-souf. To do this, a sampling campaign over 16 wells and consumer taps was undertaken. The results show that the groundwater can be characterized by very high fluoride content and excessive mineralization that require in some cases, specific treatment before supply. The study of adsorption revealed removal efficiencies fluoride by three adsorbents, maximum adsorption is achieved after 45 minutes at 90%, 83.4% and 73.95%, and with an adsorbed fluoride content of 0.22 mg/L, 0.318 mg/L and 0.52 mg/L for AA, HAP and SC, respectively. The acidity of the medium significantly affects the removal fluoride. Results deducted from the adsorption isotherms also showed that the retention follows the Langmuir model. The adsorption tests by adsorbent materials show that the physicochemical characteristics of brackish water are changed after treatment. The adsorption mechanism is an exchange between the OH⁻ ions and fluoride ions. Three materials are proving to be effective adsorbents for fluoride removal that could be developed into a viable technology to help reduce the salinity of the Saharan hyper-fluorinated waters. Finally, a comparison between the results obtained from the different adsorbents allowed us to conclude that the defluoridation by AA is the process of choice for many waters of the region of Eloued-souf, because it was shown to be a very interesting and promising technique.

Keywords : fluoride removal, hydrochemical characterization of groundwater, natural materials, nanofiltration

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