

Evaluating the quality of desalinated ground water using reverse osmosis techniques: a case study of the city of Tobruk . libya

Azaldin.A.Altahr.Allafi

Abstract

The city of Tobruk is located within the libya country, a semi-arid area with a fragile environment, characterized by poor soil, the absence of surface water, and scarce rainfall. the salinity of most groundwater reservoirs in the study area is high, ranging from 1620 to 3656 mg/L, making the water unsuitable for human use. The main objective was to evaluate the quality of groundwater desalinated by reverse osmosis plants. The results were then assessed using criteria established by the World Health Organization standards (WHO) and the National Center for Standards and Measurements of Libya, located at the Tajoura Industrial Research Center. Four groundwater wells were selected in different areas and samples were taken from each well before and after the desalination process. The results showed pH before the desalination process of 8 to 8.2 and after the desalination process of 8 to 7.4 and an electrical conductivity ranging before the desalination process of 8060 $\mu\text{scm-1}$ to 17350 $\mu\text{scm-1}$ and after the desalination process of 363 $\mu\text{scm-1}$ to 1200 $\mu\text{scm-1}$. Total dissolved solids (TDS) levels ranged before the desalination process from 4030 mg/l to 8800 mg/l after the desalination process of 182 mg/l to 601 mg/l. The amounts of the anions identified as nitrate, sulfate, and chloride ranged before the desalination process from 0 mg/l to 245 mg/l, 0 mg/l to 1200 mg/l, 1917 mg/l to 3550 mg/l respectively. The amounts of the anions identified as nitrate, sulfate, and chloride ranged after the desalination process from 0 mg/l to 300 mg/l, 0 mg/l to 200 mg/l, 36 mg/l to 335 mg/l respectively. The concentrations of magnesium, iron, and calcium before the desalination process that varied between 0 mg/l to 820 mg/l, 0 mg/l to 0.03 mg/l, 1917 mg/l to 3550 mg/l respectively. The concentrations of magnesium, iron, and calcium after the desalination process that varied between 0 mg/l to 250 mg/l, 0 mg/l to 0.1 mg/l, 36 mg/l to 335 mg/l respectively. The results revealed that the majority of the groundwater samples desalinated by the reverse osmosis process were within the range specified by the World Health Organization and the National Center for Standards and Measurements of Libya, located at the Tajoura Industrial Research Center.

Date of Submission: 15-03-2025

Date of acceptance: 31-03-2025
