Evaluation of hydrogeochemical parameters of the groundwater in El-Bahariya Oasis, Western Desert, Egypt.

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Abstract:

El-Bahariya Oasis is a natural topographic depression located in the heart of the Western Desert of Egypt. The Nubian sandstone aquifer represents the main water-bearing horizon. The hydrochemical characteristics of the concern aquifer are studied based on the chemical analysis of 125 groundwater samples collected from different sites. The salinity of the groundwater is relatively low (TDS vary from 108 to 632 ppm), as well as the electric conductivity and total hardness. The recorded groundwater temperature values, from Nubian sandstone aquifer in the study area, range between 15 to 45°C. The variation in temperature may be due to structures or differences in drilling depths. The contour maps of TDS, TH, major cations (Ca2+, Mg2+, Na+, and K+), and major anions ((HCO3)-, (SO4)2-, and Cl-) were constructed in the studied area to show the distribution, behaviors, directions of increasing and decreasing, of the previous chemical elements. The hypothetical salt combinations in the studied area revealed the presence of different salts arranged in terms of their predominant as NaCl, Ca(HCO3)2, MgSO4, Mg(HCO3)2, KCL, Na2SO4, NaHCO3, MgCl and CaSO4 where their average equivalent percentage are 31 %, 20 %, 14 %, 11 %, 10 %, 7 %, 3 %, 2 % and 2 % respectively. Water types classified according to chloride, sulphate, and bicarbonate ions, indicates that the dominant salts are sodium chloride, and sodium bicarbonate. That area influenced by meteoric replenishment in the past time and affected by marine water. Most of the samples having sodium-chloride facies. Hydrochemical Parameters are used for identification of groundwater bodies, based on and confirmed by hydrogeochemical indicators such as ionic ratios. These ratios are helpful in detecting the previous hydrochemical processes affecting water quality such as mixing, leaching and ion exchange and are useful in comparing water from different sources or reservoirs. The use of such ratios is important to distinguish between groundwater having paleosalinity characteristics and those mineralized resulting by evaporation processes.

Keywords:

Hydrochemistry, Nubbian sandstone aquifer, El-Bahariya Oasis, Western Desert.

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