

Geochemical processes controlling the groundwater quality in Oued Rmel aquifer of Zaghouan, Northeastern Tunisia

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Groundwater is the source of life and existence for the whole population on the terrestrial globe especially in semi-arid to arid climate countries. Located between the Mediterranean Sea and the Sahara, Tunisia belongs in a semi-arid climate. The rainfall is irregular in space and in time. The Tunisian population has always had to cope rare water resources and often of poor quality to satisfy its needs, particularly in agriculture and human consumption. The Oued Rmel aquifer, in Northeasten of Tunisia in Zaghouan city, extended geographically between between 36° 30' and 36° 45' latitude North, 10° 11' and 10° 37' longitude East. The groundwaters of Oued Rmel aquifer are exploited essentially for drinking and irrigation purposes. In an attempt to monitor the chemical water quality and to identify the different geochemical processes in the study area ,twenty three water samples were sampled in January 2013 and analyzed in chemicals parameters like Na⁺, Ca²⁺, Mg²⁺, K⁺, Cl⁻, SO₄²⁻ and HCO₃⁻.

The Geographic Information System and hydrochemical, technical and geochemical modelling were used to evaluate the geochemical processes controlling the groundwater quality of Oued Rmel aquifer. According to Piper diagram, Na-Ca-Cl-HCO₃ and Na-Cl are the two major types of facies that predominate in the study area from upstream to downstream respectively. Gibbs diagrams of anions and cations show that the water samples in study area fall in the evaporation dominance field; therefore it is the main mechanism controlling the groundwater chemistry of Oued Rmel aquifer. Based on the saturation indexes, the majority of water samples are saturated or over saturated with respect to dolomite, and Calcite and all wells are undersaturated with halite, anhydrite and gypsum.

Keywords: drinking water supply; Gibbs diagrams; saturation indexes; geochemical processes; Oued Rmel aquifer; Tunisia.