

## **Characterization and evaluation of the confined limestone aquifer in Kuwait**

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**Abstract** In Kuwait Al-Sulaibiya field is considered as the largest groundwater well field producing brackish water from the Dammam aquifer. The areal distribution of the TDS trend of some wells showed an increase in TDS towards the NE direction and the trend size reached to approx. 65% in the eastern water wells. The groundwater is used for irrigation, domestic purposes and blending with distilled water. The chemical analyses showed that the field is occupied by brackish groundwater whose salinity ranges from 3448 to 9460 mg/L. The groundwater chemical types are Na<sub>2</sub>SO<sub>4</sub>, CaSO<sub>4</sub>, NaCl and CaCl<sub>2</sub>. The groundwater exhibited a simple dissolution or mixing process, a reverse ion-exchange process. The groundwater exhibited an over-saturation with respect to calcite and dolomite and under-saturation with respect to anhydrite, gypsum and halite. Moreover, ion-exchange, reverse ion-exchange, dissolution of gypsum, calcite precipitation, and the carbonate weathering are the prevailing geochemical processes in the Dammam aquifer.

**Key words** trend detection; attribution; circulation types; Europe; temperature; precipitation