



Chemical and stable-radiogenic isotope compositions of Polatlı-Haymana thermal waters (Ankara, Turkey)

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Complex tectono-magmatic evolution of the Anatolian land resulted in development of numerous geothermal areas through Turkey. The Ankara region in central Anatolia is surrounded by several basins which are filled with upper Cretaceous-Tertiary sediments. Overlying Miocene volcanics and step faulting along the margins of these basins played a significant role in formation of a number of low-enthalpy thermal waters. In this study, chemical and isotopic compositions of Polatlı and Haymana geothermal waters in the Ankara region are investigated. The Polatlı-Haymana waters with a temperature range of 24 to 43 °C are represented by Ca-(Na)-HCO₃ composition implying derivation from carbonate type reservoir rocks. Oxygen-hydrogen isotope values of the waters are conformable with the Global Meteoric Water Line and point to a meteoric origin. The carbon isotopic composition in dissolved inorganic carbon (DIC) of the studied waters is between -21.8 and -1.34 permil (vs. VPDB). Marine carbonates and organic rocks are the main sources of carbon. There is a high correlation between oxygen (3.7 to 15.0 permil; VSMOW) and sulfur (-9.2 to 19.5 permil; VCDT) isotope compositions of sulfate in waters. The mixing of sulfate from dissolution of marine carbonates and terrestrial evaporite units is the chief process behind the observed sulfate isotope systematics of the samples. ⁸⁷Sr/⁸⁶Sr ratios of waters varying from 0.705883 to 0.707827 are consistent with those of reservoir rocks. The temperatures calculated by SO₄-H₂O isotope geothermometry are between 81 and 138 °C nearly doubling the estimates from chemical geothermometers.