Sulphur, oxygen and strontium isotope composition of the Ca-sulphate minerals in the Tuzgölü Basin, Türkiye

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The studied evaporate deposits are located in southeastern part of Tuzgölü basin. The basin is closed and the largest interior lacustrine basin in Central Anatolia, Turkey. The thickness of evaporite deposits is over than a thousand meters. The salt and soda deposits in the region are also among a few known reserves of the world. However, the properties and origin of evaporate deposits have not been investigated in detail. Therefore, geochemical and mineralogical properties of the evaporates taken from ten drillings to define brine chemistry and origin of the gypsum and anhydrite in the basin were investigated. The evaporite minerals are composed of Na-Cl (halite), Na-Ca-sulfate (glauberite, thenardite and eugasterite), Ca-sulfate (anhydrite, gypsum), Mg-sulfate (bloedite, epsomite, and loweite), and Ca-carbonate minerals (dolomite, magnesite, and calcite). Sr, Li and B contents of gypsum vary from 141.2 to 6056.2 ppm, 0.7-21.5 ppm, and 202-701 ppm, respectively. $\delta^{18}O$, $\delta^{34}S$ and $^{87}Sr/^{86}Sr$ isotope contents of the gypsum range from 21.1 to 32.2 ‰, 19 to 35.9 ‰ and 0.708209 to 0.707926, respectively. The Sr, Li and B contents of anhydrite are in range of 2749.8 and 6056.2 ppm, 63 and 68 ppm, and 350 and 967 ppm, respectively. $\delta^{34}S$ and $^{87}Sr/^{86}Sr$ isotope contents of the anhydrite range from 18.8 to 20.8 ‰ and 0.70793 and 0.70795, respectively. The $\delta^{34}S$ values in the range of 22 to 24 ‰ are resemble to Messinian evaporites while higher values may be sourced from isotope fractionation during microbially reduction of SO_4^{2-} to S^{2-} bearing species. The Sr, Li and B content of evaporites showed strong positive correlation between Sr and Li (r=0.84), and between B and Li (r=0.89) indicating that these ions can be related to volcanism.

Key words: Evaporate, Gypsum, Tuzgölü, Türkiye