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The Hydrogeochemistry of Mineral Waters Located At The Palu Segment Of Eastern Anatolian Fault Zone, Elazıg, Eastern Anatolia, Turkey

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The hydrogeochemical characteristics and water quality of mineral waters has been investigated in this study. The aim of the study is to define the water- rock interaction mechanism and the source processes of mineral waters by chemical and isotopic analyses. The mineral waters are located along the Palu segment of the Eastern Anatolian Fault Zone. There are 7 mineral and 4 cold springs were sampled for isotopic and chemical analyses in June (wet season) and in November (dry season). The temperature, pH and electrical conductivity (EC) of water samples were measured in situ, which range from 12,9 to 28,2oC; 5,02 to 7,44 and 268,2 to 10850 μS/cm, respectively.

The most of the mineral and cold waters are dominated with Ca+2 and HCO3, whereas Cl is the dominant ion that the concentration of only one water sample (A5) reaching up to 3571 ppm in June and to 3070 ppm in November. The investigated waters generally belong to six hydrogeochemical classes: Ca- Mg- HCO3, Ca- Mg- Na- HCO3, Na- Ca- Mg- Cl- SO4, Mg- HCO3, Cl and HCO3 . Generally, B, Br, Rb, S, Si, Sr concentrations are higher than 1 ppm and the other metal concentrations are lower than 1 ppm in mineral waters. Saturation indices were performed using program PHREEQC and determined that the waters are oversaturated with Ca-montmorillonite, gibbsite, hematite, illite, K-mica, kaolinite and quartz and the waters are likely to precipitate these minerals.
The mineral and cold waters fall on the local meteoric water line of Erzurum region, related to their δ18O and δ2H values, shows that they are meteoric origin. But the A5 and A7 numbered mineral waters fall to the right of Local and Global Meteoric Water Line (GMWL) showing enrichment in δ18O. High concentrations of Cl (3571 ppm), B (29,58 ppm) and K(51,34 ppm) and enrichment of δ18O in A5 mineral water indicate that it may be deep circulated and derived from water- rock interaction in marine sediments or may be a mixture of deep magmatic fluids with meteoric waters.

The As concentration of mineral waters ranges from 0,003 ppm to 0,48 ppm and higher than the cold waters. As concentration of A5, A7 and A10 numbered mineral waters are higher than the maximum limits of The Regulation of Natural Mineral Water Standarts of Turkey (2004) and WHO (World Health Organization)'s mineral water standarts. Eventhough these mineral waters are mostly being used as drinking purposes, they are not appropriate to be used for drinking due to the high concentrations of As.

Key Words: Eastern Anatolian Fault Zone, Elazığ, Mineral Water, Arsenic, Water- rock interaction.