Mineralogy and stable isotope geochemistry of hydrothermally altered volcanic rocks in SE of Kashan
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Abstract: The submarine volcanic rocks of Totmaj volcano-sedimentary sequence, located at 25 Km southeast of Kashan city, have suffered extensive non-uniform propylitization. Based on field and petrographical studies, the volcanic rocks can be classified into three alteration zones: chlorite-epidote zone, epidote zone and hematite zone. The secondary hydrothermal minerals formed in the volcanic rocks include epidote-chlorite, calcite and hematite. These minerals have pseudomorphly replaced the primary phenocrysts (e.g. plagioclase, amphibole, and pyroxene) or have filled veins and vesicles. Stable carbon and oxygen isotope analysis of the hydrothermal calcite indicate that the δ¹⁸O and δ¹³C values range from -9.2 to -11.3 and -2.02 to -6.02 per mil respectively. Thus, seawater has been a source for hydrothermal fluid which by circulation into the hot submarine lavas, caused to leaching of some elements such as Fe and Mg from the altered rocks with the exception of epidote-chlorite zone. Also, the seawater circulation leads to an increase in Na ratio in the rocks. Geothermometrical studies on hydrothermal chlorite showed that these minerals have formed at a temperature between 240 to 300°C. Furthermore, the ranges of temperature stability of coexisting secondary minerals in the volcanic rocks are compatible with those of the green schist facies.

Keywords: hydrothermal alteration, geothermometry, stable isotope, basalt, Totmaj.