Mineral chemistry of isotropic gabbros from the Kermanshah ophiolite: Evidence for it's tectonic setting

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Abstract: Isotropic gabbros of Kermanshah ophiolite include olivine gabbro, gabbro, gabbronorite, olivine gabbbronorite and troctolite. The isotropic gabbros are medium to fine grained with euhedral to subhedral orthopyroxenes, clinopyroxenes and subhedral plagioclase, olivine together with rare amphiboles. Mineral chemistry of isotropic gabbros reveal that the clinopyroxenes are diopsidic to augitic in composition within the compositional ranges of En(50.91–45.79), Fs(7.41–3.64), and Wo(48.5–43.81). They are Ca-rich and Na poor (Na₂O < 0.54 wt%) characterized by high-Mg (Mg# 85.62–89.35) and low-Ti (TiO₂ < 0.28 wt%) contents. Plagioclases are bytownite in compositions (An(70.51–90.15), Ab(9.62-29.02) and Or (0/00-0.63), orthopyroxene are mostly enstatites within the compositional ranges of En(78.27-84.94), Fs(13.0-20.07) and Wo(1.43-3.36), olivine, forsterite and amphiboles are Mg-rich (tremolite, actinolite to actinohornblendes) with Mg²⁺ (64.35-84/86). The presence of highly magnesian olivines (Fo 80.07–84.82), clinopyroxenes (Mg# 85.62–89.35), and orthopyroxenes (Mg# 79.59–85.72) as well as highly calcic plagioclases (An 70.51–90.15) and amphiboles in the isotropic gabbros indicates a subduction-related tectonic environment. The tectonic discrimination plots of clinopyroxene data indicate island arc signature of the source magma. The results of studies confirm that the Kermanshah ophiolite formed in a suprasubduction zone environment in the southern branch of Neotethys.

Keywords: Kermanshah ophiolite; Isotropic gabbro; mineral chemistry; suprasubduction zone.