

## Mineral chemistry of ultramafic rocks from the Southern Caspian Sea Ophiolite (Eastern Guilan): evidence for a high-pressure crystal fractionation

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**Abstract:** The Southern Caspian Sea ophiolite complex (SCO) is one of the Late Cretaceous discontinuous oceanic lithosphere remnants in northern Iran. This complex is almost a complete sequence from bottom to top, ultramafic cumulates, layered gabbros, isotropic gabbros, dike complex and basaltic lavas which is covered by Late Cretaceous (Companion-maastrichtian) pelagic limestone. Crustal ultramafic cumulative rocks are mainly composed of dunite, wehrlite, olivine clinopyroxenite and clinopyroxenite. The crystallization order in the ultramafic rocks is: olivine (with high Mg# in clinopyroxene) + clinopyroxene (cumulus and with high Mg#) + olivine (intercumulus and with low Mg#). The mineral chemistry of the ultramafic cumulates of the Southern Caspian Sea ophiolite (SCO) is not consistent with crystal-liquid fractionation of primitive mid oceanic ridge basalts at low pressures. The presence of highly magnesian clinopyroxene (Mg# = 81-90), homogeneous composition of clinopyroxene, absence of zoning in clinopyroxene together with the absence of plagioclase, as early fractionating phases, indicate medium- to high-pressure (up to 10 kbar) crystal fractionation of primary basaltic melts. Mineralogical and geochemical data suggest that the ultramafic cumulates are distinct from rocks in mid oceanic ridge ophiolites. Mineral composition of clinopyroxene shows that the ultramafic rocks of Southern Caspian Sea ophiolite, were formed from the basaltic magma in an island arc/suprasubduction zone tectonic setting.

**Keywords:** *Ultramafic cumulates, Southern Caspian Sea, high-pressure crystal fractionation, Suprasubduction zone.*