Mineralogical and geochemical characteristics of clay deposits from Northwest Gonabad District of clay Deposit (East Iran)
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Kaoalin deposits, situated approximately northwest of Gonabad (east Iran), have been formed by the intrusion of hydrothermal fluids from granite dikes and alteration of rhyolite, dacite and rhyodacite related to the Eocene volcanism [1]. Fore clay deposits have been located in this area. The area is covered by the mikaschist, dacite, rhyolite, trachiandesite, lithic tuff and acidic tuff rocks.

The mineralogical compositions are dominated by quartz, kaolinite, dickite, illite, baidelite and minor phases include chlorite, albite, hematite, montmorillonite, pyrite and gypsum. We analyzed for mineralogical and chemical composition, including the rare earth element contents.

Whole rock chemistry shows that samples rich in SiO2 and Al2O3. Enrichment of Sr in altered and partially altered rocks relative to fresh volcanic-rock samples demonstrates retention of Sr and depletion of Rb, Ba, Ca, and K during hydrothermal alteration of sanidine and plagioclase within the volcanic units. The chondrite-normalized Rare earth element patterns of the clay deposites show LREE enrichments ((La/Lu)n = 6.75 to 57.74) and a negative Eu anomaly. The negative Eu anomaly suggests the alteration of feldspar by hydrothermal fluids [2].

The mineralogical composition, REE contents, main elements discrimination diagram and elemental ratios in these deposites suggest a provenance mainly felsic rocks and also, a high amounts of weathering have occurred in Kaoalin's source.


Anorthosite dikes from Cyprus: Phase relations in the system CaAl2Si2O8 – CaMgSi2O6 – Mg2SiO4 at 5 Wt.% H2O
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Massive anorthosite dikes are documented for the first time from the Limassol Forest Complex (LFC) of Cyprus, a deformed equivalent of the Troodos ultramafic massif. Both the Troodos and LFC complexes are part of a Cretaceous oceanic crust that formed within a backarc basin 90 Ma ago and was obducted during late Miocene.

From crosscutting relations with the sheeted dike complex, it follows that the anorthosites belong to one of the latest magmatic events on Cyprus. In hand specimen, the rocks appear massive and unaltered, although in thin section magmatic Pl (An93) is partially replaced by Zo. Where magmatic textures are preserved, Pl forms cm-sized, acicular, radially arranged crystal aggregates reminiscent of spinifex textures.

The origin of these anorthosites remains poorly understood. Even though they occur as intrusive dikes, it is evident they cannot represent liquid compositions, at least under dry conditions. Whole-sale melting of a pure An93 would require temperatures in excess of 1450 °C, which is a quite unrealistic temperature of the modern Earth’s crust.

We are exploring experimentally if such lithologies can be generated by medium-pressure fractional crystallisation of hydrous basaltic melts followed by decomposition-degassing. High pH2O stabilizes Ol and Spl but tends to suppress Pl, hence may allow the An-component to be accumulated in late-stage melts. Hydrous melts do occur on Cyprus, in form of high-Ca boninites with ~ 5 wt.% H2O. Experiments are being performed in the Ol-Cpx-Pl-H2O system, with Ol (Fo95), Pl (An93), and Cpx (Di95) separates as starting materials. The separates are ground, mixed in the desired proportions, then equilibrated with 4 wt.% H2O at 0.5 GPa total pressure from 1000 to 1300 °C in a piston-cylinder press. Aim is to delineate the An saturation field in the Ol-Cpx-Pl-H2O system, and assess to what extent Pl can be suppressed as a liquidus phase in a basalt fractionating under hydrous conditions.