

Mineralogy and geochemistry of the Sari-Tappeh kaolin deposit, Northeast of Marand, NW Iran

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Abstract: The Sari-Tappeh kaolin deposit is located ~10 km northeast of Marand, Azarbaijan province, northwestern Iran and is hosted by Oligocene volcanic igneous rocks (dacite-andesite). Kaolinite, quartz, alunite, halloysite, rutile and pyrite are the minerals of the central part of the deposit. Meanwhile, the outer part of the deposit consists of kaolinite, quartz, smectite, illite, chlorite, goethite and plagioclase minerals. The negative correlations between Al_2O_3 - SiO_2 , SiO_2 -LOI and Al_2O_3 - K_2O reveal that kaolinitization in Sari Tappeh has been developed by function of hydrothermal processes. The increase in the ratios of $(\text{La}/\text{Yb})_N$ and $(\text{LREE}/\text{HREE})_N$ from the center to the outside of the deposit and mineralogical changes are a reason for the increase in the pH of hydrothermal solutions due to the reaction with host rocks and the preferential absorption of LREE by clays (kaolinite, smectite and illite) and goethite. The effective role of hypogene processes and high-temperature fluids during the development of the kaolin deposit can be inferred with strong negative anomalies of Ce and Eu, and strong positive correlations between P_2O_5 with $(\text{La}/\text{Lu})_N$ and $(\text{LREE}/\text{HREE})_N$. Furthermore, the values of geochemical parameters such as $\text{TiO}_2+\text{Fe}_2\text{O}_3$ and $\text{La}+\text{Ce}+\text{Y}$ suggest the limited overlapping of supergene processes on hypogene processes during the development and formation of the Sari Tappeh kaolin deposit. Combining the results obtained from mineralogical and geochemical studies show that acid-sulfate solutions have played an important role in the formation of deposit.

Keywords: Mineralogy; Geochemistry; Kaolin; Distribution of elements; hydrothermal processes; Hypogene; Marand.