Mineralogy and geochemistry of ignimbrite-related bentonitic clay in Tashtab, southwest of Khur and Biabanak, Isfahan Province

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Abstract: The Tashtab bentonitic clay deposit is located about 25 km southwest of Khur and Biabanak, Isfahan Province. This deposit is a product of alteration of ignimbrites with the age of early Eocene. Mineralogical examinations demonstrated that montmorillonite, saponite, quartz, nontronite, beidellite, microcline, anorthite, illite, albite, and calcite are the major mineral phases which are accompanied by lesser amounts of minerals such as vermiculite, sanidine, chlorite, orthoclase, actinolite, and dolomite in this deposit. Further investigations revealed that the studied samples are classified as dioctahedral smectites group and their mineralogical composition lies within the range of beidellite-montmorillonite-nontronite. Based upon geochemical studies, the processes of conversion of ignimbrite into bentonitic clays have been accompanied by enrichment of Mg; leaching-fixation of Si, Ca, Mn, Cr, Ba, Co, Cs, Rb, Ta, U, Zn, Cu, and Ni; and depletion of Al, Fe, K, Ti, P, Na, Hf, Nb, Sr, Th, V, Zr, Y, and RREs. Considering the obtained results, it seems that the development of the bentonitic clay deposit at Tashtab was controlled by structural processes. Discrepancy in the rate of alteration intensity of the source materials, chemistry of altering solutions, adsorption, incorporation in crystal lattice, to complex-forming ligands, and difference in the stability scale of primary minerals against alteration are the six key factors controlling the mobilization, distribution, and concentration of elements in the bentonitic clay deposit of the Tashtab area.

Keywords: Mineralogy; bentonitic clay; mobilization of elements; Tashtab; Khur and Biabanak.