



Occurrence of palygorskite in Tertiary sediments of Central Iran

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Palygorskite is a fibrous clay mineral reported to be very common in soils and sediments from arid to semi-arid areas. This clay mineral has been widely reported from the Near and Middle East, from North Africa, USA and Australia. While there is abundant information on the distribution of palygorskite in the soils of arid regions, there are few comprehensive investigations that have examined the soil parent materials to elucidate the origin of palygorskite. Besides, despite the fact that Tertiary sediments in the Middle East have been reported to contain considerable quantity of palygorskite, there have been no studies on the possibility of palygorskite occurrence in Iranian Tertiary sediments. These sediments are among the major soil parent materials in central Iran where soils have been reported to be highly palygorskitic. The main objective of this investigation was to examine the distribution of palygorskite in Tertiary sediment of the Isfahan Province, Central Iran.

Based on the geology map, samples were taken from 40 geological formations of Tertiary age in the Isfahan Province, Central Iran. They were ground to pass a 2mm sieve. Carbonates were removed from samples using Na acetate (pH=5). Carbonate free clay fraction of all the samples was separated by centrifuge and analyzed by X-ray diffractometer. Clay fractions were also examined by a transmission electron microscope. Besides, undisturbed sediment samples were studied by a scanning electron microscope equipped with EDX for elemental analysis.

The results of XRD studies indicated that most of the samples contained palygorskite but with different quantities. While the clay fraction of such geological formations as

Qom Formation and Upper and Lower Red Formations was dominated by palygorskite (more than 80% in some samples), other samples contained much less quantity of palygorskite. Besides, while palygorskite could not be detected in some samples by XRD, both SEM and TEM showed that there were up to about 10% palygorskite in the samples. Smectites were found to be highly associated with palygorskite in most of the samples. Chlorite and micas were the other clay minerals present in the samples. In conclusion, the post_Tethys Sea environment of central Iran appears to have been suitable for the formation of palygorskite. The presence of palygorskite in the Tertiary sediments indicates that this mineral in Iranian soils is, at least, partly inherited.