
Palygorskite and Sepiolite Alteration to Smectite Under Alkaline Conditions

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Abstract: The instability of palygorskite and sepiolite under soil conditions was investigated to determine if these fibrous minerals transform directly to smectite under laboratory conditions. The treatment of 100 mg (0.12 mmole) of palygorskite with 1 mmole of NaOH solution (17 ml) at 150° C for 24 hr yielded a smectite. Analcime and smectite were formed when > 3 mmole of NaOH was used. The addition of <6 mmole NaOH to sepiolite destroyed it gradually. On addition of >8 mmole NaOH, sepiolite altered to an X-ray amorphous material. In the presence of Al and Si, however, it transformed to smectite and analcime. Transmission electron microscopy, cation-exchange capacity, and X-ray powder diffraction studies of the products suggest that alteration was (1) via solution, or (2) by a structural reorganization wherein the basic 2:1 silicate structural units were unchanged.

Key Words: Alteration • Analcime • Cation-exchange capacity • Palygorskite • Sepiolite • Smectite • Sodium hydroxide

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