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# Palygorskite Separation from Dodecylammonium-Treated Clays

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**Abstract:** Three methods were investigated to separate palygorskite from mixtures of clay minerals in soils and sediments. The methods were based on the hydrophobic properties of a dodecylammonium-smectite complex and used the <0.2- $\mu\text{m}$  fractions of reference palygorskites that contained smectite and sepiolite impurities. Palygorskite was separated from dodecylammonium-clay complexes by: (1) selective dispersion of palygorskite in  $\text{H}_2\text{O}$ ; (2) selective extraction of palygorskite by a water:decanol phase separation; and (3) selective extraction of palygorskite by a water: nitrobenzene phase separation. Whereas all three methods resulted in palygorskite separation, selective dispersion was the simplest and employed the more desirable reagents. Small amounts of relatively pure palygorskite in the <0.2- $\mu\text{m}$  fractions were concentrated from palygorskite-containing clays from Texas, Saudi Arabia, and Libya as shown by X-ray powder diffraction and transmission electron microscopy data. A sepiolite impurity in the Georgia palygorskite was concentrated with the palygorskite. Hydrolysis of the dodecylammonium-smectite complex was suggested by the decrease in d-spacing of some samples after the extensive washing necessary for dispersion. An appreciable amount of the fibrous mineral was intimately associated with layer silicates and could not be separated.

**Key Words:** Dodecylammonium smectite • Hydrophobic properties • Mineral separation • Palygorskite • Sepiolite • Smectite

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