A Technique for Maintaining Texture and Permanent Expansion of Smectite Interlayers for TEM Observations

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Abstract: A process for treating smectite-bearing rock samples that utilizes LR White resin; allows TEM observation of expanded smectite interlayers and therefore preservation of original rock textures. Examples of several lattice fringe images are shown, including: (1) Dioctahedral smectite layers from a shale (1388.9 meter depth, Texas Gulf Coast) give fringes that consistently have spacings of 1.2 – 1.3 nm, yet duplicate other features previously observed in collapsed samples. (2) Packets of illite layers give fringes with 1.0-nm spacings coexisting with packets of (dominantly) R1 I/S having 2.1-nm lattice fringe spacings in a Gulf Coast shale from 4742.1 m. (3) Rectorite from Garland Co., Arkansas gives 2.3-nm lattice fringes. Samples with wide ranges of I/S ratios and lithologies have been found to be permanently expanded with retention of original textures, commonly leading to unambiguous identification of illite and smectite interlayers in lattice fringe images.

Key Words: Illite • LR White resin • R1 I/S • Rectorite • Smectite • Transmission electron microscopy (TEM)

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