K/Ar Systematics of Bentonite and Shale in a Contact Metamorphic Zone, Cerrillos, New Mexico[1]

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[1] Contribution No. 158 of the Department of Geological Sciences, Case Western Reserve University.

Abstract: To test the ability of illitic clay minerals to retain argon, K/Ar ages were measured on grain-size separates from the Cretaceous Mancos Shale and associated bentonites that have been transformed into K-bentonite near the contact with a large Tertiary igneous stock. The ages of size separates of illite/smectite from the K-bentonite nearest the contact were internally concordant and matched the hornblende K/Ar age of the stock. In contrast, K/Ar data from day size fractions from shales adjacent to each K-bentonite were internally discordant with measured ages that were much greater than the age of the intrusion. Thus, significant radiogenic argon was retained by fine-grained detrital illite, even in shale samples very near the igneous contact. These results are convincing evidence that illitic clay minerals are excellent K/Ar clocks under conditions prevailing in sedimentary and diagenetic environments.

Key Words: Age dating • Bentonite • Contact metamorphism • Illite • Illite/smectite • K/Ar ages

Clays and Clay Minerals; August 1986 v. 34; no. 4; p. 483-487; DOI: 10.1346/CCMN.1986.0340415

Clay Minerals Society (www.clays.org)