
Measurement of Exchangeable Cations in Bentonites*

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* Contribution of the Southwest Branch of the Soil and Water Conservation Research Division, Agricultural Research Service, USDA, in cooperation with the Nevada Agricultural Experiment Station.

Abstract: High swelling bentonites cannot be analyzed for exchangeable cations with exactly the same technique as most soils. To resolve varied techniques used in the past and to establish a reliable procedure, the effects of sample size, the number of saturations, washes and extractions, and the volume of extracting solutions were determined on three high-swelling bentonites.

Small samples must be used to insure complete extraction of exchangeable cations, and the 0.5 g weight was the best size of those tested. Most exchangeable cations were removed in three extractions with 25 or 33 ml volumes of ammonium acetate. More extractions could result in excessive solubilization of minerals. Centrifugal force must be sufficient to prevent loss of sample during decantation. This varied from 4500 to 7500 g for 10–20 min, depending on particle size and sample dispersion.

The proposed CEC method requires little time, but still compared closely with Frink's more extensive method and showed no significant difference between treatment means. The procedure was used to analyze high-swelling bentonites from fourteen locations in six Western States. Chemical properties changed within each deposit and with geographical location, but in general the bentonites contained high amounts of exchangeable Na, moderate amounts of exchangeable Ca and Mg, and low amounts of exchangeable K. Total exchangeable cations and CEC agreed well, demonstrating the reliability of the proposed method.

Clays and Clay Minerals; July 1968 v. 16; no. 2; p. 165-172; DOI: [10.1346/CCMN.1968.0160207](https://doi.org/10.1346/CCMN.1968.0160207)

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