Multiple Cation-Exchange Capacity Measurements on Standard Clays Using a Commercial Mechanical Extractor[1]

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Abstract: Sequential cation-exchange capacity (CEC) measurements were obtained from standard clays using a mechanized, variable-rate leaching device. The device consists of a motorized screwjack and as many as 24 leaching tubes coupled to 60-ml plastic syringes. Controlled withdrawal of the syringe plungers produces a vacuum that permits samples in the leaching tubes to be extracted at a uniform rate. A single, 8-hr leaching of clays with 35 ml of salt solution was found to be comparable to multiple saturations or displacements using a centrifuge. CECs consistent with published values were obtained for reference 2:1 clay minerals using both acetate and chloride salts of Na, Ca, and Mg. Potassium-exchange capacities were also successfully measured following *in situ* thermal treatment of samples in the leaching tubes. Variations in measured CECs for kaolin-group minerals due to salt intercalation were minimized by using chloride rather than acetate salts and by washing with a dilute aqueous solution of the saturating cation following initial saturation. The mechanical extractor significantly reduced the effort required to perform conventional CEC determinations without sacrificing analytical precision.

Key Words: Apparatus • Cation-exchange capacity • Ion-exchange method • K-fixation • Leaching tube • 2:1 clay minerals

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