
The Determination of Adsorbed Na, K, Mg and Ca on Sediments Containing CaCO₃ and MgCO₃

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Abstract: A method for the determination of the cations of Na, K, Mg and Ca adsorbed on clay minerals mixed with CaCO₃ and MgCO₃ is described. An ethanolic solution of LiCl-CsCl is used to displace the exchangeable cations. Blank determinations performed using either a second ethanolic leach or a second LiCl-CsCl leach, are used to correct for carbonate dissolution. Details of the methods development are given.

The method has been tested using mixtures of homoionic forms (Na, K, Mg, Ca) of smectite and kaolinite with either CaCO₃ or MgCO₃. The smectite and kaolinite were found to have total CECs (with standard deviations) of 765 (4.4) and 39.8 (0.52) mequiv kg⁻¹, respectively. The amount of cation exchanged was found to vary directly with the proportion of clay mineral in the mixture; regression coefficients consistently greater than 0.997 were obtained.

Other tests with smectite-CaCO₃ mixtures in sea-waters of various salinity vindicated the use of the method with heteroionic forms of smectite. These tests also suggest that the phenomenon of fixation observed in most other studies of clay minerals in estuarine conditions might be redundant. It is contended that there is an urgent need for this suggestion to be tested.

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