THE MEASUREMENT OF THE CATION EXCHANGE CAPACITY OF CORE PLUGS BY A NON-DESTRUCTIVE 'WET' CHEMICAL METHOD

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Abstract A new method for measuring the Cation Exchange Capacity (CEC) of core material has been developed. The technique measures the CEC of solid core plugs and thus circumvents the problem of creating additional cation exchange sites through crushing, which is a feature of the conventional 'wet' chemical method. The new method also offers advantages over other techniques in current use since it is faster (and cheaper) than the multiple salinity (Co/Cw) method and is experimentally less complex than the membrane potential method.

Measurements made to date indicate that results from the proposed technique are reliable. Indeed they produce more convincing and repeatable plots of Qv (the cation exchange capacity per unit pore volume) versus the reciprocal of porosity, than those from results of conventional 'wet' chemical methods.

The analysis procedure involves passing a series of metal bearing solvent solutions through the sample plug. This is done using an HPLC (High Performance Liquid Chromatography) pump, with the plug mounted in a Hassler tube. The exchangeable cations in the plug (e.g. Na^{+}, K^{+}, Mg^{2+}, Ca^{2+}, etc.) are first replaced with Ferric Ions (Fe^{3+}). All excess Fe^{3+} ions are removed from the pore spaces within the plug. The plug is then treated with a solvent solution containing Na^{+} ions, this enables the Fe^{3+} ions to be stripped from the exchange sites, at which point they are collected in a volumetric flask. The quantity of Fe^{3+} ions recovered after stripping is determined by standard analytical procedures. Finally, the mass and porosity of the plug are measured, and used to calculate the CEC and Qv values.