

Notes on CEC and Bound Water

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In the Schlumberger and Shell papers on the Waxman-Smiths and Dual-Water Equations, the effects on cation exchange capacity (CEC) and its relationship to the amount of bound water in a rock are oversimplified. Most of the work on the CEC of clays and other rocks has been done by soil scientists and scientists that study ceramic and porcelain clays. A wealth of detail on CEC is available from these other groups and it is well summarized in the classic volume "Clay Mineralogy," edited by Ralph Grim from the International Series in the Earth and Planetary Sciences, published in 1968.

Clay-bound water is not equal to bound water, but is a subset of it. CEC is not a static mineral property, but changes radically depending upon the surrounding water salinity, pH, the type of cations and temperature. CEC is also dependant upon grain size and the surface area of the pore space. Thus, the appropriate standard for the volume of bound water are capillary pressure measurements. If these are not available, then downhole log measurements in a "type shale" should be used to estimate the bound water properties.