
Thermodynamic Characterization of Clay/Electrolyte Systems

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Abstract: Clay/electrolyte systems are best characterized using a new variable, notional interfacial content (NIC). The NIC approach emphasizes that any division of the total amount of a species present in a clay/electrolyte system into that part which 'belongs' to the clay and that part which 'belongs' to solution is necessarily arbitrary. It carries out this division by choosing one of the species as a reference species and defining it as being completely in a notional bulk solution which had the same composition, but not extent, as the real bulk solution. The NIC of each of the other species present, that is that part of their total amount not in the notional bulk solution, therefore represents the amounts of those species 'belonging' to the clay.

The NIC concept is universal and hence encompasses several other, older terms. For example, by choosing different reference species, the variables hitherto called 'water adsorption' and 'negative adsorption' (which have been used to describe the same phenomenon) may be obtained. Similarly, certain earlier definitions of exchangeable and adsorbed cations (some being pragmatic are not included) as well as that of ion surface excesses may be accounted for. The NIC approach thus provides a rationalization of several earlier terms which are, in fact, plagued by a multiplicity of definition which makes their use very complicated.

Key Words: Adsorption • Cation exchange • Electrolyte • Negative adsorption • Thermodynamics • Water

Clays and Clay Minerals; August 1982 v. 30; no. 4; p. 291-296; DOI: [10.1346/CCMN.1982.0300407](https://doi.org/10.1346/CCMN.1982.0300407)

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