**Editorial Note**
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# Editorial Note on Environmental Soil Chemistry

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## Editorial Note

Soil chemistry is the analysis of the distribution of the elements and their compounds between the three main phases that form the soil, solid, liquid, and gaseous phases and within them. We aim to understand and predict how positively charged ions are dispersed between the solid and liquid phases by observing cation exchange reactions. Cation exchange is an important and unifying principle in soil science because it affects the flocculation and dispersion of soils and suspended sediments, the availability and transport of nutrient and contaminant cations, and the regulation of soil acidity.

The first systemic studies of cation exchange reactions in soils are credited to J.T. Way. Way determined that equal quantities of Ca2+ were extracted from soils when leached with NH4+, K+, and Na+, based on H.S. Thompson's observation that CaSO4 was leached out when (NH4)2SO4 was applied to soil columns.

Since then, a significant amount of work has been done to apply the cation exchange concept to model the availability of nutrient ions in soils, particularly the exchange of K+, NH4+, and Ca2+. The degree of colloid dispersion, and thus the formation of soil crusts and soil hydraulic conductivity, is directly affected by the relative concentration of sodium on soil surfaces. Na2+-Ca2+ exchange concepts have since been used to reclaim and control saline-sodic soils. The effects of sodium and solution composition, pH, ionic strength, and mineralogy on soil dispersive properties have made significant progress. The effects of acid rain and other anthropogenic inputs on soil acidification have been studied using aluminum–calcium exchange reactions.

As evidenced by the numerous research articles published on the topic, cation exchange reactions have been, and continue to be, an active field of soil chemistry research. Several outstanding reviews are available, including those with background information, experimental methods, and cation exchange kinetic aspects.

In soils, cation exchange occurs as a result of two general phenomena that are easily identified and comprehended. Second, most soils have a net negative charge, except for the very acid and extremely weathered ones. Second, they are electrically neutral in all normal macroscopic environments.

As salts are applied to the soil by natural mineral weathering or decomposition processes of organic matter, some fraction of the added ions accumulate in the interfacial region and displace a charge-equivalent amount of ions from the interfacial region into the soil solution in irrigation water as a fertiliser, acid rain, or other anthropogenic input. When applied to a system as varied and heterogeneous as the soil, the simplicity of these principles belies the difficulty of the cation exchange process.

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