The effects of various cations in the exchange complex upon the physical and chemical properties of soils have been receiving increasing study since Gedroiz and De Sigmond first pointed out their importance. While such studies have been carried out with various objectives in mind, no comprehensive study, insofar as the authors are aware, has been made upon the stability of soil clays saturated with various cations, nor has a comprehensive investigation been made of the products produced through hydrolytic action. Data obtained from such a study, it is believed, would enable soil workers to explain more adequately various perplexing problems connected with soil genesis and morphology. With this objective in mind, the authors have begun what is planned to be a series of closely related studies in the field of soil colloids. It is specifically pointed out that this first paper is more in the nature of a preliminary report; its purpose is primarily to indicate the lines of endeavor which appear to be the most fruitful for future work and at the same time furnish data for more comprehensive conclusions that may be drawn after additional related studies have been made. The authors, in presenting this report, wish to point out certain relationships found to exist; and, inasmuch as this is a preliminary investigation, the conclusions will necessarily be rather conservative until more evidence is obtained.

General Procedure

Soil from the A-horizon of a Crowley silt loam was dispersed by shaking for twenty-four hours with 0.8 molar ammonium hydroxide, and the colloidal fraction was drawn after a minimum settling time of four hours and at a maximum depth of 9 cm. Eight such withdrawals were made. The colloidal fraction was concentrated by Sharples supercentrifuge and separate portions were saturated three times with one normal chloride solutions of sodium, calcium, magnesium, and potassium. The hydrogen colloid was prepared by treating three times with 0.02 normal hydrochloric acid (instead of one molar) to avoid destruction of the mineral particles by too high concentration of hydrogen ions. Each saturation treatment consisted of dispersing for one hour with chloride solution followed by supercentrifuging to separate the filtrate from the solid. After the third saturation, the colloid was washed with water an equal number of times until practically free of chlorides.

These saturated colloid samples were subjected to the hydrolytic action of distilled water by means of a rotary shaker. Samples were withdrawn at zero, six, twelve, twenty-four, thirty-six, forty-eight, ninety-six, and one hundred forty-four hour totals of eight samples.

The hydrolytic effects were measured by making the following determinations:

1. pH of liquid mixture
2. An aliquot was filtered by means of Pasteur-Chamberland filters and the following determinations made upon the filtrate:
   a. Cation used in saturation
   b. Silicon
   c. Aluminum
   d. Iron