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Soil Science Department

Fundamentals of Soil Science

#### 4. Chemical Properties of Soils

... The most common colloids can  
be divided into:

##### 1. Mineral Colloids

###### 1.1. Clay Minerals

###### 1.2. Oxide Clays

##### 2. Organic Colloids

#### 4.1. Mineral Colloids

##### 4.1.1. Clay Minerals

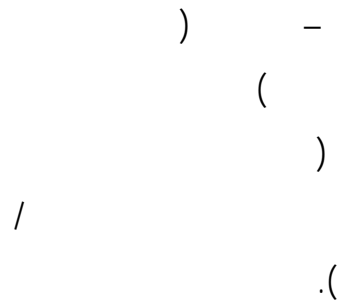
###### 4.1.1.1. Origin of Clay Minerals

... Clay minerals are formed by  
alteration of existing minerals or by  
synthesis. Are silicate clays primary  
or secondary minerals?

###### 4.1.1.2. Structure of Clay Minerals

The silicate clay minerals consist of  
two basic components. One

component is the silicon-oxygen tetrahedron (silicon in four coordination with oxygen) and the other component is the aluminum octahedron (eight sided with aluminum in six coordination with oxygen and/or hydroxyl).



... A summary of ratio of tetrahedral to octahedral sheets and other properties of layered-silicate clays is given in Table (1).

( ) ...

... Cation-exchange sites originate from: (1) the dissociation of H form exposed OH along the edges of particles, and (2) Isomorphous substitution.

( ) : ...  
( )

... Nutrient ions are absorbed strongly enough to slow down their movement out of the soil by leaching but weakly enough to be readily used by plants. In fact, one theory holds that plant roots can exchange hydrogen ions directly with cations on the colloidal surfaces.

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## References

Foth, H. D. 1978. Fundamentals of Soil Science. John Wiley & Sons, New York, USA

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