

## Extraction of imogolite from Andisols using cationic and non-ionic surfactants

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Imogolite is a paracrystalline aluminosilicate having an ideal end-member composition of  $\text{SiAl}_2\text{O}_5 \cdot 2.5 \text{H}_2\text{O}$ . Wada reports that measured Si:Al ratios fall within a narrow range, from 1.05:1 to 1.15:1, but this is in direct conflict with the structural formula he provides, which predicts Si:Al ratios near 1:2. Imogolite occurs as very small nano-tubes having inside diameters of 10 Å and outside diameters of 20 Å. These tubes may be several  $\mu\text{m}$  in length, and often form bundles of two to several hundred tubes. Occasional branching of tubes may occur. The imogolite structure has Si in tetrahedral coordination and Al in octahedral coordination, though not in sheets as in the phyllosilicates.

Imogolite can readily be formed via precipitation reactions. It is commonly formed in the laboratory to provide pure substrates for experiments. Soils containing imogolite and allophane form very complex associations with organic matter in soil. These complexes are very stable, and appear to protect the organic fraction from degradation by soil microbes. This stability in some previous researches has been ascribed to the formation of allophane-organic and imogolite-organic complexes. Recently, the interests for imogolite with tube form have been attracted with researchers how to extract pure imogolite and apply it. Little is known about the extraction method of imogolite from volcanogenic soils.

Therefore, we propose here a new procedure for isolating imogolite using cationic or nonionic surfactants. Our procedure includes the separation of pure imogolite from Fe rich soils through the concentration adjustment of surfactants and the selection of appropriate extraction solvents. This study will also elucidate about the interaction between surfactants and surface hydroxyl groups based on the extraction of imogolite using surfactants for clay minerals taken from Bo horizon soils of Andisols of the Jeju Island in Korea.

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**Key words;** imogolite, nano-tube silicate, surfactant, extraction method, Andisols

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