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# Structure of Some Allophanes from New Zealand

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**Abstract:** Allophane samples from soils, pumice, and stream beds have been studied by electron optical, infrared absorption, X-ray fluorescence, gas chromatography, and phosphate adsorption methods. The allophane particles were hollow spherules or polyhedra 35 and 50 Å in diameter with molar Al/Si ratios close to 2.0. The thickness of the wall of the spherules was estimated to be 7 Å. For the pumice allophanes, the wall was largely composed of imogolite structural units  $(\text{OH})_3\text{Al}_2\text{O}_3\text{SiOH}$ . Defects or pores were present in the wall and probably were the sites where phosphate was adsorbed. It is suggested that these allophanes with molar Al/Si ratios close to 2.0 should be called " proto-imogolite" allophane.

Two soil allophanes had a similar structure to the allophane from Stratford pumice, but small amounts of layer silicates, including halloysite, were also present in the soil samples, as indicated by infrared bands at 470, 1030, and 1100  $\text{cm}^{-1}$ . The allophane from the stream bed at Silica Springs had an infrared spectrum similar to feldspathoids, and it did not have the imogolite structure.

**Key Words:** Allophane • Crystal structure • Imogolite • Infrared spectroscopy • Phosphate adsorption • Volcanic ash

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