

Classification of amorphous aluminum silicate -Is amorphous Imogolite categorized as Allophane or Imogolite-

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[Introduction]

Allophane and Imogolite are typically associated with the weathering of volcanic ash deposits. Allophane is an amorphous aluminum silicate mineral that consists of a spherule with 3.5-5.0nm in diameter. Imogolite is a low crystalline aluminum silicate mineral that consists of a tube with the external diameter of about 2.0nm. These materials have good properties of absorbing much water, so they are gaining increasing attention as materials for humidity self-control material, heat exchange absorbents and speedy drying desiccant.

[Methods]

The 150ml of a 0.1mol/l Na_4SiO_4 solution was mixing with the 150ml of a 0.15mol/l AlCl_3 solution. After agitation, the 24.5ml of a 1.0mol/l NaOH was added to 300ml of the stirred solutions at the rate of 1.0ml/min in order to adjust the pH of the solution to about 6.0. Next to remove of the salt from the solution, it was centrifuged two times. The desalting precursor was diluted with distilled water, and the 8ml of 1mol/l HCl solution was added to 1500ml of the stirred solutions. After heating for 24h at 100 degree, the solution was cooled down to the room temperature, and dried for 2 days at 100 degree. The dried product was examined by powder X-ray diffraction, nitrogen absorption and water vapor absorption.

[Results and Discussion]

The X-ray diffraction profiles of the product showed no clear diffraction peak, so this material was amorphous aluminum silicate. This profiles was similar to that of Allophane. From the result of the pore size distribution, the pore size radius was approximately 0.6nm. The pore size of this material was same as that of Imogolite. From the result of the water vapor adsorption isotherm, this material had similar pore of Imogolite.

From these results, this material had tube type pore, which was same as that of Imogolite, but it was amorphous by X-ray diffraction. This material was categorized as Imogolite from the results of the pore size distribution and water vapor adsorption isotherm, and it was categorized of Allophane from the results of X-ray diffraction pattern. So the classification of amorphous aluminum silicate are needed.