
Water Retention by Colloidal Allophane and Imogolite with Different Charges

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Abstract: Water retention curves of colloidal allophane and imogolite with different charges and different pretreatments were measured using a tension plate and a pressure plate apparatus. An irreversible effect of air-drying was found for the water retention of colloidal allophane even for particles of less than 50 nm in Stokes' diameter collected from air-dried soil. This was attributed to the irreversible submicroscopic aggregation of allophane. Fresh allophane colloids with a low absolute net charge retained more water above -100 J Kg^{-1} than did highly charged ones due to the formation of a microporous structure. Allophane did not swell under ordinary conditions, but the relatively highly charged allophane recovered water retention above -100 J kg^{-1} during the wetting process. Imogolite retained 1.5 times more water than Na-montmorillonite at about -650 J kg^{-1} due to micropores formed by intertwining fibrous particles.

Key Words: Allophane • Imogolite • Net Charge • pH • Pressure Potential • Water Retention

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