

## Fluorine removal from water by allophane and hydrotalcite

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Adsorption behaviors of allophane and hydrotalcite were tested to remove fluorine from aqueous solution under laboratory conditions. Allophane was extracted and purified from Kanuma soil, which is made of weathered pumice. Refined allophane was verified by X-ray diffractometer (XRD).

The affinity of these materials with  $F^-$  was studied as a function of duration of mixing, initial pH of the solutions, adsorbents quantities and  $F^-$  concentration. Equilibrium in fluorine adsorption was achieved in less than 30 min for allophane and in less than 60 min for hydrotalcite. The most effective pH values for removal of fluorine by allophane and hydrotalcite were 3 and 9, respectively. The adsorption capacity increased with increasing of the adsorbent quantity.

The removal abilities of both allophane and hydrotalcite presumably relate to their surface charge. Under low pH conditions, surface of allophane charges positively and adsorbs anions. On the other hand, positively charged surface of hydrotalcite is neutralized by acid under low pH conditions but adsorbs  $OH^-$  under high pH conditions. Therefore, hydrotalcite effectively adsorbs anions under weak alkaline conditions.