

# The synthesis of the anion adsorbent from the slag and its adsorption character

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The disposal of granulated blast furnace slag which forms from the iron manufacturing process is met with two challenges: (1) fluorine should not leach out; and (2) efficient recycling method for an enormous amount of slag material. In this study, the synthesis of hydrotalcite-like materials (HT) from the slag is investigated. Furthermore, ion-exchange reactions with the synthesized HT were performed to assess if fluorine can be stabilized.

The synthesis of HT was performed under various conditions. The liquid to slag mass ratio are 2, 10, 50 and 100; at either room temperature or 50C. Ageing times (also the reaction time) range from 1, 24, 120, 168, 240 and 408 hours. The suspension pH was measured after the ageing and filtered to remove the solids for X-ray diffraction (XRD) analyses. The liquid was analyzed for fluorine concentration. Results show that a water to slag ratio of 2 at 50C is the most favourable condition for synthesizing HT. Fluorine concentrations are also below the set environmental limits.

Fluorine adsorption experiments were performed at 50C with reaction times of 1, 3, 6, 12 and 24 hours. The initial sorbate concentration is 100 mg/L fluorine with a solid to solution ration of 2. The suspension is then filtered, and the fluorine concentration is measured. Results show that fluorine concentrations were reduced from 100 mg/L to 20 mg/L after 1 hour.

These results have shown the feasibility of synthesizing HT from granulated blast furnace slag, and the HT can also serve as an effective adsorbent for fluorine.