

Title: **Study of the phosphorus adsorption capacity of synthetic basaluminite using a fixed-bed column**

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During the last decades, the phosphorus concentration in wastewaters has increased worldwide causing water eutrophication. Thus, many studies have focused on looking for conventional and non-conventional methods and materials for phosphorus removal. One of the non-conventional materials is the acid mine drainage sludge which has been previously studied as phosphorus adsorbent with good results. This fact motivates the study of basaluminite, an aluminum oxy-hydroxysulfate, one of the compounds of the sludge that can precipitate separated from the rest of acid mine drainage sludge, and which is expected to be a good phosphorus adsorbent.

A fixed-bed column using synthetic basaluminite has been constructed to know the P sorption capacity in this mineral. First, a tracer test has been carried out to determine the porosity and the average residence time of the column with a result of 0.34 and 31.20 minutes, respectively. After that, a breakthrough curve has performed measuring daily the phosphorus concentration from column effluent daily in order to calculate the adsorption phosphorus capacity in basaluminite. These results conclude that synthetic basaluminite presented a maximum phosphorus adsorption capacity of 46.0 mg P/g adsorbent. It has a similar adsorption capacity than schwertmannite and natural basaluminite and, a better capacity than other sorbents such as activated aluminum oxide or magnetic iron oxide. As a conclusion, the basaluminite, a non-conventional material which was a residue at first, has proved to be a remarkable P adsorbent compared to other commercial adsorbents.