Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.4989

Alkaline treatment of highly acidic and polluted effluents from the fertilizer industry

RICARDO MILLÁN BECERRO, CARLOS R. CÁNOVAS, FRANCISCO MACÍAS AND RAFAEL PÉREZ LÓPEZ

Department of Earth Sciences and Research Center on Natural Resources, Health and the Environment (RENSMA), University of Huelva, Campus 'El Carmen', 21071

Presenting Author: ricardo.millan@dct.uhu.es

This study focuses on the search of a sustainable treatment and valuable metal recovery scheme for highly acidic and polluted leachates from a phosphogypsum pile in SW Spain. The methodology consists of the addition of an alkaline industrial waste (biomass ashes) to phosphogypsum leachates to rise the pH and precipitate the dissolved elements. Batch reactions between biomass ashes and phosphogypsum-related leachates at different solid-liquid ratios (S:L) (i.e. 1:2.5, 1:5 and 1:10) were studied. The alkaline treatment at a S:L ratio of 1:2.5 showed a high degree of success in the depletion of pollutants such as F, Fe, Zn, Al, Cr, U, Cu and Cd, reaching removal values close to 100%. However, the treatment seems not to be totally effective for other contaminants such as PO_4 (removal of 73%) or As (removal of 13%). The removal of pollutants from solution occured mainly by co-precipitation and/or adsorption onto phosphate minerals, as well as precipitation of fluorides. Moreover, the newly-formed precipitates (around 50 g for each 1 L of treated acidic solution) during the treatment contained technology elements of high economic interest such as rare earth elements plus Y (353 mg/kg), Sc (21 mg/kg), Be (5.0 mg/kg), V (1036 mg/kg), Ga (16 mg/kg) or U (721 mg/kg). This research proposes an environmentally-friendly solution for fertilizer industry effluents, removing selectively impurities and target elements and producing a potential explotaible metal ore. In this sense, the recovery of valuable elements contained in the solids formed could help to offset the costs associated with the treatment of these highly polluted waters.