World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:10, No:07, 2016

Co-Disposal of Coal Ash with Mine Tailings in Surface Paste Disposal Practices: A Gold Mining Case Study

Authors : M. L. Dinis, M. C. Vila, A. Fiúza, A. Futuro, C. Nunes

Abstract : The present paper describes the study of paste tailings prepared in laboratory using gold tailings, produced in a Finnish gold mine with the incorporation of coal ash. Natural leaching tests were conducted with the original materials (tailings, fly and bottom ashes) and also with paste mixtures that were prepared with different percentages of tailings and ashes. After leaching, the solid wastes were physically and chemically characterized and the results were compared to those selected as blank – the unleached samples. The tailings and the coal ash, as well as the prepared mixtures, were characterized, in addition to the textural parameters, by the following measurements: grain size distribution, chemical composition and pH. Mixtures were also tested in order to characterize their mechanical behavior by measuring the flexural strength, the compressive strength and the consistency. The original tailing samples presented an alkaline pH because during their processing they were previously submitted to pressure oxidation with destruction of the sulfides. Therefore, it was not possible to ascertain the effect of the coal ashes in the acid mine drainage. However, it was possible to verify that the paste reactivity was affected mostly by the bottom ash and that the tailings blended with bottom ash present lower mechanical strength than when blended with a combination of fly and bottom ash. Surface paste disposal offer an attractive alternative to traditional methods in addition to the environmental benefits of incorporating large-volume wastes (e.g. bottom ash). However, a comprehensive characterization of the paste mixtures is crucial to optimize paste design in order to enhance engineer and environmental properties.

Keywords : coal ash, mine tailings, paste blends, surface disposal
Conference Title : ICWMEE 2016 : International Conference on Waste Management and Environmental Engineering
Conference Location : Stockholm, Sweden
Conference Dates : July 11-12, 2016

Open Science Index, Environmental and Ecological Engineering Vol:10, No:07, 2016 publications.waset.org/abstracts/47824/pdf