ABSTRACS

PREDICTIONS OF ACID ROCK DRAINAGE BY MEANS OF GEO-CHEMICAL STATIC AND DYNAMIC TESTS

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The geo-chemical static and dynamic tests are frequently used to predict the rate generation of Acid Rock Drainage of mining residuals and the quality of generated leached solutions. Starting from this information, it is possible then to define the procedures for their appropriate environmental handling or to evaluate the effect of the environmental impact that they generate.

The mining operations developed in the country have left big volumes of residuals and tailings, which without considering environmental measures in their deposition, at the moment both the residuals, the tailings and the evacuations of acid waters of mine become the main potential sources of pollution of the superficial and underground waters.

The aim of the present work is to present different case studies where several mining residuals have been tested by means of geo-chemical static and dynamics tests to predict the acid rock drainage.

The geo-chemical static and dynamic tests, have been carried out in the laboratories of the URSTM (Unit of Investigation and Services in Mineral Technology) of the University of Québec in Abitibi-Temiscamingue-Canada.

The methodology presented on the execution of the tests and their respective evaluation, could constitute in an useful guide for technicians who are involved in the evaluation of environmental impacts generated by residuals and tailings of mining operations.

MITIGATION BY MEANS OF BIO-OXIDATION OF THE ENVIRONMEN-TAL IMPACT GENERATED BY THE ROASTING OF TIN CONCEN-TRATES

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The roasting of sulfurous tin concentrates , as a pyrometallurgical oxidation process in the Vinto smelting plant, is an operation that is practiced with the purpose of eliminating the sulfur of the sulfurous components of iron, arsenic, lead and others. The emitted gases are sent, after a dry filtration , directly to the environment, generating in this way a potential source of environmental contamination.

In this research work, the applicability of the bio-oxidation to the sulfurous tin concentrates is studied, based on the experience and information that one has of this process in minerals and complex auriferous concentrates, in order to oxidize the sulfurous compounds, as mitigation alternative to the environmental impact, generated by the roasting, using bacteria of the type thiobacillus ferrooxidants cultivated from the acidic waters of the mine San José.

It was established that in the process of the bio-oxidation, the best operation conditions are: pH, 1.5; temperature, 35 ^{o}C; nutritious medium, tuovinen; grain size, 80% -75 microns; % solids, 20; time of treatment, 18 days (3 stages of 6 days). Under these conditions, it is eliminated or it oxidizes 90% of the sulfur and 75% of the arsenic.

The bio-oxidized product from the Vinto concentrate presents the following chemical composition: 46.2% Sn; 0.77% S; 0.05% As; 3.42% Fe; 0.02% Zn and 0.04% Sb.

The neutralization-precipitation of the dissolved metals, in the effluents of the bio-oxidation, should be done in two stages, first to pH 5 and then to pH 8; it allows to eliminate these metals reaching concentration values below those demanded in the normative of liquid discharges settled down in the Environmental Regulation. The product of the obtained precipitation is also stable.

OBTAINING OF ANTIMONY BY REDUCCIÓN OF GASSY ANTIMONY TRIOXIDE

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The classic processing of the antimonite concentrates requires two furnace units, in which they are carried out the production of powdered antimony trioxide and the reduction of this with coal to obtain the regulus.

The obtaining of metallic antimony for reduction of the gassy antimony trioxide in the same volatilization furnace presents several advantages, among the main ones are: a better use of the energy produced by the exothermic reactions and a diminishing of the processing time.

The research work carried out in laboratory scale, was done in a reactor with an oxidizing area where the antimonite volatilizes , and a reducing area where the metallic antimony is obtained. This work shows that it is possible the reduction of the gassy antimony trioxide to obtain regulus, and that the temperature has an adverse effect on the metalization degree that is attributed to the high stability of the compound SbO(g) at high temperatures. The highest degrees in antimony metalization have been obtained at 700 ºC.

OBTAINING OF K_2TaF_7 FROM TANTALITE

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Tantalum is a strategic metal, of great demand in the electronic industry and scarce in the world, that is the reason of its high price.

There are tantalite-columbite deposits in the Bolivian precambric, that are generally exploited by foreign companies that take out the mineral of the country in a legal way and through the smuggling.

In the Department of Metallurgy of the UTO, a technology has been developed for the treatment of these tantalites, so obtain intermediate products and final products which have high value.

For this process it has been obtained K_2TaK_7 and other products of commercial quality

PIRO/HIDROMETALLURGICAL TREATMENT OF MINERALS OF HIGH CONTENT OF MANGANESE

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The current crisis of the Bolivian mining that face low price rates and high production costs in the minerals that were traditionally produced in the country, has lead to the necessity to investigate the treatment of other non-traditional minerals, such as the case of the manganese minerals (pyrolusite).

The objective of the research work, is to study the metallurgical treatment of minerals with high manganese content and to establish the possible application of the acidic component of the mine waters as leaching agent.

The proposed treatment, consists of a first stage of the carbothermic reduction of the pyrolusite (MnO_2) to manganosite (MnO), and a second stage where the product of the reduction is submitted to an acid leaching.

In the stage of carbothermic reduction, it has been established that the conditions that allow the total reduction of the pyrolusite are 900 ºC of temperature, 637.5 microns of grain size of the mineral, the relationship of C/MnO_2 of 1.25 and a residence time of two hours.

The recovery of manganese from the product of the carbothermic reduction, during the leaching stage with H_2SO_4 , has been of 85% for a relationship of 1.5 regarding to the estequiometric and 13.5% solids.

The application of acid water of mine as leaching agent, has allowed to obtain extractions up to 96% under the following operation conditions; 10% of percentage of solids, relationship of acidic water /H_2SO_4 of 5/1, speed of agitation of 600 rpm. and a leaching time of up to two hours.

The use of acid water of mine reduces the consumption of sulfuric acid substantially, and in turn, a resource that is considered as pollutant in the sectors of the mining production takes advantage.