

## **TANTALUM: A STRATEGIC METAL**

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The tantalum is a not very well-known strategic metal; its peculiar physical-chemical properties have turned him essential for the new technologies. The ballistic missiles, the intelligent weapons or the cellular telephones depend on this metal.

Bolivia possesses in the Precambrian area important deposits of this scarce metal, where the tantalite is extracted and it is commercialized as concentrated, and in a good percentage it leaves the country via smuggling.

The work, presents a summary of the uses, prices, production and the metallurgy of this rare metal that has becomes so indispensable for the humanity.

## **ENVIRONMENTAL ASPECTS OF THE METALLURGICAL TREATMENT OF TANTALUM MINERALS**

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In this work, it is carried out a revision of the environmental aspects of the metallurgical processing of tantalites, the physical chemical characteristics of the effluent that are produced during the treatment, a revision of the existent regulation on the topic, and an evaluation is shown about the impact on the environment and the human health.

It concludes that for the implementation in the country of a metallurgical plant for the processing of tantalites, it is necessary the installation of a treatment stage for its effluent that responds to the following goals:

- To recycle reagents to the stages of treatment.
- To recover metals with economic value (W, Sn, Be, Mn, rare earths).
- To precipitate metals in the form of insoluble and inert salts toward the environment.
- To obtain a final effluent free of polluting agents and that it fulfills of the environmental regulations.

## **TREATMENT OF COLUMBIUM AND TANTALUM MINERALS WITH HIGH URANIUM CONTENT**

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The concentrates coming from the Precambrian area are characterized by their high contents of uranium and thorium, with hinders their exploitation and commercialization because it overcomes the permissible limits of radiation.

In this investigation they have been carried out a series of oxidation leaching test in order to clean the uranium from the tantalum and columbium ores, and to facilitate their commercialization and transportation.

Oxidation alternatives have been studied with different oxidizing agents, however, the obtained results have demonstrated that the bacterial oxidation with  $\text{Fe}^{+3}$  is the most effective and it was possible to eliminate the radioactive elements up to 86% of the studied mineral.

## **NUMERICAL SIMULATION OF ALLOY SOLIDIFICATION PROCESSES**

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A numerical formulation based on the finite volume method and the algorithm PRIME of sequential solution, designed for the detailed simulation of alloy solidification process in bidimensional domains, is developed on the present article. The formulation includes the effects of natural convection in the liquid phase, as well as the release of latent heat in the mushy region. The application potential of the formulation is evaluated through an simulation example.

## **OXIDATION OF SULFIDES: IMPORTANT PRELIMINARY TREATMENT PROCESS**

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The oxidation of minerals and concentrates, mainly sulfides, has had, has and will have a significant importance in the impact that causes on the environment and in the mining and metallurgical industry, so much in activities premeditatedly programmed, as well as in preliminary operations before the extraction of metals or like in no programmed operations.

Unfortunately the oxidation generates solutions, many times without control, as the generation of Drainage Acid Rock.

A bibliographical revision is made of the different methods of oxidation highlighting among them, the hydrometallurgical oxidation and the pyrometallurgical oxidation as preliminary treatment processes.

The chemistry and the kinetics of the reactions are analyzed from each of these techniques and the environmental aspect; besides they are analyzed the considerations of each process standing out the advantages and disadvantages.

Finally it concludes showing the more outstanding aspects of the hydrometallurgical oxidation as the pyrometallurgical oxidation.