

# ABSTRACTS

## RESOURCE RECOVERY AND RECYCLE

**Dr. Ing. Salustio Guzman**

The vast and ever increasing quantity of depleted materials, materials off-specifications, fabrication cuttings and leftovers and obsolete materials, generated as a direct result of the enormous increase in the production and consumption of materials and artefacts; need to be recognized as **“resources with economic value”** and not as **“worthless and disposable wastes”**, to be recovered and recycled in new products, be used as secondary resources or converted into by-products.

The **“resource recovery and recycle”** practice, provides the avenue for converting “wastes” into re-usable materials of economic value. The small and disseminated industries that practice resource recovery and recycling, do not possess the image of glamour and grandeur the primary industry enjoys however, their contribution is tangible benefiting the economy, conservation of the environment, conservation of primary material resources, conservation of energy resources, efficient use of land and health benefits.

This paper offers definitions and classification of material resources; makes an analysis of: the cycle of production and use of materials in society, the useful life cycle of materials, the total materials cycle, the generic flow of resource recovery and recycle, the factors that facilitate or inhibit the resource recovery and recycle of materials, and provides numeric examples of the contribution on the conservation of primary resources, energy resources and the environment.

## HISTORY OF TIN MINERALS SMELTERS IN BOLIVIA

**Ing. Roberto Arce Alvarez**

The present article, is a fragment taken from the book “Economical and Historical Development of the Mining in Bolivia”, published by Plural Editors in February 2003. In this book, the author examines the outstanding historical events of Bolivia by starting the study of the most important economic activity, developed in our country: the mining. With a simple style, but not superficial, the author provides us valuable information about the characteristics of the mining production in all times.

The author, who is considered one of the main instigators for the creation of the Mining and Metallurgical Research Institute of Oruro, presents in a chronological way the different stages that Bolivia had to pass, so it can install its own smelter of tin minerals.

## DEVELOPMENT OF TWO NEW PROTOTYPES OF FLOTATION CELLS IN THE AUTONOMOUS UNIVERSITY OF SAN LUIS POTOSÍ-MEXICO

**Ing. Marco Aladin Zapata Velásquez e Ing. Jaime Zapata Velásquez**

With the aim to reduce the operation costs, improve the flotation process used in the mining industry, and recover the minerals with economic value, we have been working at the Institute of Metallurgy and at the UASLP School of Engineering since approximately 8 years, and with the support of the industrial sector, we developed a flotation machine that operates with economic advantages compared with the ones of foreign technology that are used at the moment in the process mentioned before.

The purpose of flotation machines is to get the contact of small solid particles in suspension in water, with bubbles of air injected into the system. It is achieved with the present-day equipment with some rigorous agitation or with countercurrent flows which requires driving mechanisms, big structures and sophisticated control systems of high investment and operation costs. In the suggested machines called conventional cell MAZ and vertical cell MAZ, were created curtains of bubbles that crosses the flow of the solid particles in suspension, increasing in that way the probabilities of contact in a system of minimum turbulence and friction,

and without the necessity of driving mechanisms, neither big structures nor expensive control equipments. In direct comparison, at a pilot scale, better results have been accomplished in most cases.

## **CORROSION RESISTANCE OF CONVERSION COATINGS FOR GALVANIZED STEEL IN A NaCl SOLUTION**

**L. A. Hernández-Alvarado, L. S. Hernández, A. A: Tórrez**

Two were the objectives of the present work, on the one hand, conventional tests of loss of weight and electrochemical techniques of continuous current were used to determine if two phosphatized or a chromium-coated processes were able to provide an additional protection to the galvanized steel, without any other coating like painting, under immersion conditions in an aqueous solution of NaCl to 3%; and on the other hand, if the results were acceptable, to substitute the chromium-plated.. The immersion test was carried out at room temperature, without agitation of the electrolyte and during 134 days. The two phosphatized and the chromium-plating take the generic name of conversion coatings and they were obtained by dipping the galvanized steel samples in acid solutions. The electrochemical techniques included: evolution of the corrosion potential, polarization resistance ( $R_p$ ), and potentialdynamic polarization. The two types of tests produced results with a good agreement, pointing that after a considerable initial metallic dissolution, the rate of corrosion decreased because of the formation and growth of films of insoluble products which developed a passivation. The chromium-plated was the conversion coating that more additional protection supplied to the galvanized steel, in the immersion tests in the NaCl solution and in that saline fog, since that additional protection was decreasing when the exposition time was increased. However, the conversion coatings with chromium hexavalente causes problems of health and environmental pollution that obliges its replacement

Key words: Galvanized steel, chromium-plated, electrochemical tests, phosphating, saline fog.

## **BORON MICRONUTRIENTS OBTAINING OF SLOW LOOSENING**

**Ing. Qca. Cecilia Gómez Opazo, Ing. Qco. Horacio R. Flores, Ing. Qca. Leung H. Kwok**

The obtaining of slow release boron micronutrients in water was investigated. The agglomeration, pelletization or sinterization methods are adequated to get the propose, due to they allow to obtain particles which dissolution rate can be controlled by their size and chemical composition (variable with the feed to be agglomerated). The results of boron dissolution rate in water are presented for pellets manufactured with borates concentrates. In addition to the time, the influence of chemical composition, size and calcination temperature of the pellets are studied. The experimental results and the operation conditions are presented by means of tables and figures. Through this analysis, It can be concluded that the pellets of calcined colemanite and those of the tincal-ulexite raw material calcined at 700°C are the better ones as slow release boron micronutrients. Specially, the strict specification of the agricultural fertilizers is fulfilled as the boron concentration in liquid is up to 30 ppm.

## **DIAGNOSTIC OF THE BRICKWORK HANDICRAFTS IN ORURO CITY**

**Ing. Octavio Hinojosa Ledezma, Ing. Carlos Velasco Hurtado**

The production of handmade brick, has become a source of air pollution in our city, however it is not the main one among the others. The fact that most of the brick kilns are located in the urban sector, concern people who live near them, and emerges the necessity to find an effective solution that benefits everybody including brick workers, so that it can be more eco-friendly, and causes no damage to the environment any longer.

In this article, the solution is presented in a brief and concise way, the whole process that takes place to obtain the final output, known as “gambote brick.” The construction of this material is very important in our city, since it is used in most buildings, mainly because of its low price.

At the end of the article, a chart is given with the summary of the thermal balance, made by the method of the finite volumes, whose procedure and detail will be developed in the next number of this technical magazine.