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Characterization, management strategies and an alternative recycling process for secondary lead smelting industry slags

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Lead is one of the most produced, shipped and processed base metal that is usually extracted in combination with zinc, silver and copper. Nowadays, important works are being carried out to obtain lead from secondary sources and to increase pollution control during metal production. Lead scrap is the main raw material that feeds furnaces of the smelters. It normally comes from recycling lead-acid car batteries. Lead smelting plants produce ingots of high purity lead and/or lead mixed with different alloying elements as arsenic, antimony, tin, copper and nickel. This production process generates high quantity of slags that contain several toxic heavy metals. Hence, due to the toxicity and environmental impact of these slags a particular waste management strategy must be conducted by smelters.This work deals with the characterization of the different generated slags depending on the obtained product, the management strategy following the environmental laws and finally, the proposal of an alternative treatment and recycling process. The first part of this study is to characterize chemical composition and mineralogical and morphological properties of these slags. Based on these characterization results, a management strategy must be carefully designed in order to minimize the environmental impact of the plant. The use of scrap as lead source in the smelting process and the optimal disposal of the generated wastes, following the applicable environmental legislation, increase the sustainability of the lead production industry. Finally, in order to increase environmental and economic viability of the lead smelters and considering the characterization of the generated slags a novelty treatment and recycling process is proposed. A key step to design such recycling process is the solubility differences between lead, iron and other compounds present in the slag. The enounced treatment of slag permits the lead recycling (increasing metallic yield), iron recovery as an iron oxides concentrate and the minimization of generated residues during lead production.

Biography

Néstor Antuñano has completed his Chemical Engineering Degree from Higher Technical Engineering School of Bilbao (ETSIB), being complemented with a Post-graduate in Advance Materials Engineering, specializing in Metallurgical Engineering from the same University in 2009. He is a PhD candidate in Extractive Metallurgy at University of Basque Country, working in the SuPrEn Research Group (Sustainable Process Engineering) in collaboration with BEFESA STEEL R&D.

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