DESCRIPTION FOR THE GENERAL PUBLIC

Pyrometallurgical wastes in recent years are the subject of intensive research. These studies cover a wide spectrum of issues including: the possibility of using of slags for commercial purposes; their environmental impact both in terms of storage and usage; as a field of research for crystallization of phases rare in nature (mainly due to the specific chemical composition of slag); for the purpose of restoration of the pyrometallurgical process in historical locations (slags often are the only remnant after the smelting locations). To accomplish all of the mentioned issues it is necessary to determine the crystallization temperature of slags. The importance of the temperature impact on the characteristic of slags is difficult to estimate, but that parameter affects its physical parameters, phase composition, chemical composition and speciation of elements between the phases. Without determining the temperature of the melt it is not possible to fully describe the reaction occurring both between the phases and the melt as well as the distribution of elements between melt and crystallizing phases. Also restoration of pyrometallurgical process without determining of this factor may have no real sense.

Despite this, currently there is no methodology suitable for many types of slags, which could provide precise temperature determinations. One possible solution is to calculate the temperature of crystallization using existing geothermometers and phase diagrams. A main drawback of such calculation is that these methods were developed for the natural systems, so it is not known to what level it is possible to compare them with the conditions of crystallization of synthetic melts, in which the composition is dominated by elements being trace ones in natural rocks.

Thanks to experimental approach it is possible to achieve the most precise approximation of the crystallization temperature on the basis of similarity of experimentally obtained slag, and those actually collected from the slag bed. Precise approximations are possible through the use of multivariate analysis taking into account the similarities in case of: the percentage phase composition; the chemistry of the various phases building the slag; the morphology of the individual minerals. Moreover, due to the possibility of programming the oven temperature, we will be able to designate features indicating different cooling process: steady - slow; multistage; fast. It will be possible to take into account the impact of additional coolant - water; and thus precise simulation of the conditions at the slag dump. In longer perspective, it is possible to extrapolate the results to the volcanic rocks, in fact crystallizing in similar conditions of high temperature, air pressure and possible contact with water.