A Rapid and Accurate Multi-Matrix Analysis Method for Slag Using WDXRF

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Slag is the singular name given to a by-product formed during ore smelting consisting of the removed impurities from the desired metal fraction. Slag also assists in furnace temperature control of the smelting process, protection of the refractory linings of the furnace, and the end product can be sold for other uses.

The main components of slag consist of the various oxides of Si, Al, Ca, Fe and Mg depending on the nature of the metal being manufactured. Contained also are the various impurities (tramp metals) extracted during the refining process which will differ depending on the initial components and the type/grade of metal being manufactured. Because slag is such an intricate part of successful metal production, samplings of the melts are frequently taken during the process. Since the entire melt is waiting for these results the turnaround analysis time must be fast and accurate.

Many metal manufacturers are presently performing slag analysis using individual, matrix specific routines. Blast Furnace, Ladle, Converter, etc contain differences in their compositions which can lead one to believe that different calibrations are required in order to obtain accuracies specific to the melt. An example would be Electric Arc Furnace slag which may contain up to 40% FeO while Ladle slag is almost 0%.

What will be presented here is a modified analytical routine incorporating a number of different slag matrices into a more singular program offering rapid analysis though the matrices are at times wide-ranging. Using a sequential WDXRF system to analyze 19 elements (including V and B3 ratios) the total turnaround time for each sample is 3 minutes.