Type of presentation: Poster

IT-4-P-2654 POROSITY DETERMINATION ON IRON ORE PELLETS USING OPTICAL MICROSCOPE AND ELECTRON MICROSCOPE

Graça L. M.[1], Lagoeiro L. E.[2], Vicente T. M.[3]

[1]Geology Department, School of Mines, Federal University of Ouro Preto, [2]Geology Department, School of Mines, Federal University of Ouro Preto, [3]Mining Department, School of Mines, Federal University of Ouro Preto.

Email of the presenting author: vicente_thais@hotmail.com

New procedures have been developed with the aim of improving the iron ore characterization and its agglomerated product, the pellets. The pelletizing plants have a considerable importance worldwide, as it becomes feasibly economic to use the fine particles (P90 of 0.045 mm). One of the main physical characteristics of pellets is its porosity, which directly interferes on its geometallurgical quality. Facing the lack of specific equipment to determine the porosity in indurated pellet; two methodologies were evaluated in order to determine the values for this variable: the reflected light optical microscope (OM) with and the scanning electron microscopy with the electron backscatter diffraction (SEM-EBSD). The same areas of the pellets (edge and center) were analyzed in both techniques, and with equal magnification (100X), in order to compare the results. Considering the MO results, mosaics of each examined area were created for subsequent imaging treatment that consisted of manual outline of regions that corresponds to the pore areas. The marked areas were subsequently quantified by specific software and it represented the pore percentages for each evaluated area. Considering the SEM-EBSD results, indexing maps of the crystal lattices of hematite, magnetite, wusthite and quartz phases were produced. In addition to the percentage of each mineral phase, the generated map determines the zero solution, which represents the regions of no indexing and therefore with no mineral phase. The percentage of zero solution in this technique represents the existing pores on the investigated area. It was collected three pellet samples, in each one the center and the edge were investigated. The percentages determined by EBSD were higher than those found by MO, both on border and center areas. The outline of the pores from MO was manual, which depends on the observer judgment and that may influence the final results. On the other hand, the SEM-EBSD does not index the amorphous phases, which is generated by the induration process. Although the amorphous material occurs in low percentages, it increases the zero solution. The determined porosity in both methods was higher on the central region of the pellet, as it was expected, since this region settles the nucleating particles. As in the MO, the average of the results obtained in edge regions of the pellet was 48.8% and in the central region of the pellet 51.8%. From the SEM, the average results obtained at the edge of the pellets was 53.66% and at the center 55.63%. Regions with higher porosity showed more differences in results between the methodologies. The analyzes made by the OM and EBSD showed coherent and consistent data when two methods were compared.

Acknowledgement: This study was partially supported by the FAPEMIG and the CNPq. All the analyses were performed in the MICROLAB at the Federal University of Ouro Preto.