Environmental and Economic Benefits of recovery of iron values from sub-grade iron ores

S. K. Biswal

Abstract

Iron ores are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for iron & steel industries. Management of iron ore resources has, therefore, to be closely integrated with the overall strategy of development; and exploitation of iron ore is to be guided by long-term national goals and perspectives. The available sub-grade iron ore/slimes/tailings should be utilized by adopting scientific methods during beneficiation to make benefit towards the process as well as environment of the surrounding. Indian hematite iron ore contains more goethite and kaolinite clay minerals. It affects adversely in iron ore beneficiation process. The mineralogical, physical and chemical characterization studies of the ores are required in details to develop suitable process flowsheets to treat sub-grade iron ores/slimes/tailings. The suitable dispersing reagent for gangue minerals is vital in the process to make further up-gradation of the concentrate and also improving the rheological characteristics of the slurry in the beneficiation process. Conventional flotation is better solution in comparison with reverse flotation for high clay content tailings/slimes generated from Indian iron ores. BHQ beneficiation becomes essential to make stochiometric balance of the LOI and alumina content with iron ore concentrate generated from sub-grade iron ores. Secondly the tailings from BHQ process will act as the filter aid during the filtration of high clay content tailings to improve the permeability of filter cake. Finally this concentrate is to be made suitable to make requisite quality of the pellets for utilisation in DRI and blast furnace process.

Keywords: Mineral beneficiation, Sub-grade iron ore, Goethite, Kaolinite, Slimes & tailings of iron ore, BHQ