

Recovery of Iron Values from Plant Tailings by Physical Beneficiation

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Abstract

Iron ore is a valuable natural resource being finite and non-renewable. It is the vital raw material for iron and steel industries. The planet is not endowed with enough quantities of high grade requisite iron ore resources. It is, therefore, imperative to make best use of the huge amounts of low grade iron ore resources, slimes and tailings through proper scientific methods of beneficiation. Huge quantities of slimes and tailings are generated from iron ore washing and beneficiation plants respectively. These should be utilized for recovery of iron values by application of advanced technologies and at the same time environmental problems of the surroundings can be reduced considerably. Based on present day techno-economic considerations and with cut-off limits of 45% Fe in the ore (in India), it is worthwhile to extract iron values from the tailings and slimes. As a result, it will not only help in improving the conservation of iron ores but also in reducing the huge land requirements for disposal of these wastes.

In this study, iron ore tailings samples have been collected from two iron ore beneficiation plants i.e., BMM Ispat Ltd., Hospet and Essar Steel Ltd., Kirandul, India, having different mineralogical, physical and chemical characteristics. The detailed quantitative mineralogical study has been carried out to determine the percentage of different mineral phases present in these samples. It has been observed that, goethite and kaolinite percentages are more in BMM Ispat sample. By flotation process, it is possible to get iron ore concentrate of about 59% Fe with around 25% yield. In case of Essar Steel sample, goethite amount is high. By magnetic separation or flotation or combination of both the processes, it is possible to get around 25 - 30% yield with 65 - 66% Fe content.

Keywords: Iron ore tailings; mineralogical study, Column flotation; Magnetic Separation, Recovery of iron values