

Influence of Fabric on Upgradation of Low-Grade Manganese Ores from Bonai-Keonjhar Belt, Orissa

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Abstract

Enrichment of manganese value through physical beneficiation techniques from two types of low-grade manganese ore viz. siliceous and aluminous types from Bonai-Keonjhar belt of Orissa have been undertaken. The influence of mineral fabric on the upgradation potential was established.

The siliceous crystalline variety where large saccaroidal quartz veins filled the inter-granular space of manganese grains responded well to simple dry magnetic separation at 1.00 tesla. A low-grade ore with 26% Mn could be upgraded to > 45% Mn with 70% recovery. In contrast, the siliceous cherty variety where fine quartz grains occur intimately associated with manganese phase did not respond to any kind of physical separation. The primary depositional nature of both silica and manganese inhibits liberation of any phase.

The manganese ores engulfed/coated with alumina phase could suitably be upgraded by simple jigging. Similarly, alumina finely distributed within Mn ore can be crushed to a suitable size and upgraded through hydrocyclone. Thus a low-grade ore having 16% Mn in the feed could be upgraded up to 32% Mn with 65% recovery. But the Mn ores occurring alternatively with Al-rich laminae could not be upgraded to a usable one by any physical beneficiation method because of their intricate association.

Thus out of the five types of low-grade manganese ores showing different mineral fabric, selective types like crystalline saccaroidal variety (low grade siliceous Mn ore and disseminated variety (low grade aluminous Mn ore) could be upgraded cost effectively.