Plasma Reduction Process to Minimise Bauxite Residue

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Abstract

Bauxite of Indian origin typically contains 40 – 50 % Al_2O_3, 20 – 28 % Fe_2O_3, 3 – 10 % TiO_2, 4 –10 % SiO_2, 20 –30% LOI and other associated oxides in minor quantities. Due to the higher percentage of Fe_2O_3 in bauxite, generation of Bauxite Residue (or Red Mud), which is costly and problematic to manage, is substantially increased for these bauxites in the Bayer process. In view of this, the recovery of the iron content in bauxite by Plasma Reduction prior to the Bayer process is an interesting option. In this study, laboratory scale simulations have been made to reduce the Fe_2O_3 content in bauxite using the Plasma Reduction process where metallic iron is recovered. The iron produced by this process contains around 85.5% Fe with 85% recovery. The slag rich in alumina and residual iron in the form of FeO can be fed to the Bayer process for the production of alumina.

Key words: Plasma smelting reduction; Arc Plasma smelting reactor; iron from bauxite; Alumina.