Characterization of Selected Mineral Ores in the Eastern Zone of Kenya: Case Study of Mwingi North Constituency in Kitui County.(2015).

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Abstract

Most of the minerals found in Kenya still remain unexploited due to inadequate knowledge on their status, economic viability and requisite mining technologies. Importing metallic products such as lead, iron, zinc, copper etc. from other countries are very expensive despite Kenya's potential to exploit existing mineral resources. This study aimed at characterizing the selected mineral ore deposit from Katse area in Mwingi North Constituency in Kitui County, Kenya. The quality of the iron ore was evaluated to establish its suitability as a raw material for iron production in Kenya. Samples were obtained along the perimeter vertices and centre of a land parcel measuring 150m^2 with each excavation being 50cm length, 50 cm width and 500cm depth. Detailed studies were conducted to establish the composition and properties of the 5 samples. X-ray Diffraction (XRD), X-ray Fluorescence (XRF), Atomic Absorption Spectrometry (AAS) and Petrography microscopy techniques were employed in the investigation. XRD studies revealed magnetite in excess of (86%) as the major mineral with subordinate amounts of hematite and quartz. XRF studies indicated a high content of iron (above 80%) with minor amounts of (5% Al_2O_3, < 5% TiO_2, 1-44% SiO_2, <1% of MnO, P_2O_5, SO_3, K_2O, V_2O_5). AAS experiment results indicated that the Iron content was above 90% with minor amounts of SiO_2, Al_2O_3, CaO, MgO, Na_2O, K_2O, TiO_2 and MnO elements. Petrography results indicated the major minerals in the iron ore to be magnetite with minor amounts of hematite and quartz; however, the iron ore is characterized by simple lamellar and specula texture with mutual grain boundaries between individual minerals suggesting the minerals breakage along grain boundaries. The quality of this ore was compared to generalized world market standards and ores from other nations. The results indicated that Katse ore is a rich Magnetite grade with Fe content above 80% with minor amounts of hematite, with quartz and clay as the major gangue (<1% SiO_2 and <1% Al_2O_3) and low contents of the deleterious elements (<1%), which correspond to acceptable levels for commercial iron ores.

Keywords: Characterization, Magnetite, Iron ore, Composition, Analysis

International Journal of Mining Engineering and Mineral Processing Vol. 4(1)pp 8-1(2015)**.**
See more at: http://article.sapub.org/10.5923.j.mining.20150401.02.html