

SPECTRAL STUDIES OF TRANSFORMATIONS OF MINE TAILINGS OF REDI MINES, SINDHUDURG DISTRICT, MAHARASHTRA

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Abstract

Mining is considered to be one of the major causative activity of environmental degradation. However exploration of minerals and metals is required for industry and even for energy production. Mining involves removal of soils and extraction of minerals resulting in environmental pollution and tailing effect in particular which degrade the surrounding environment. The effect can be more detrimental when it results in spreading of hazardous elements. The mine considered here as a case study is the Redi Mine located at the border of Maharashtra and Goa States. This mine operates to extract 0.035 to 0.04 million of tones of iron and manganese ore annually of which the major component is exported. Representative Ore, tailings and soil samples have been analysed using classical and instrumental methods in this study.

Composition of high grade ores showed the concentrations as(wt.%): Fe 75.36%, Mn 53%, Al 0.36%, Si 0.27%; Low grade ores showed Fe 72.90%, Mn 0.20%, Al 0.30%, Si 0.66%, P 1.26%; Tailing sample analysis showed Fe 24.10%, Mn 0.11%, Al 2.12%, Si 9.95%, P 0.83%; Surrounding soil showed Fe 13.98-42.41%, Mn 0.09-0.46%, Al 0.38-3.36% and Si 6.86-17.76%; P 0.13-1.51%; while Cr, Pb, As, Sb, Cu, Ni are in very minute proportion. Control soil analysis showed Fe 0.098-0.49%, Mn 0.06-0.17%, Cu 0.047-0.078%, Zn 0.01-0.04%, P 4.3-14.3% and Si 1.12%. X-Ray Diffraction studies indicate the presence of haematite as the dominant component. Goethite, gibbsite, clinocllore, kaolinite, quartz and mica are also noticed in the overall mineralogical composition of the ore. FTIR studies carried out in the range of 4000-1000 cm⁻¹ and Far FTIR in the range of 600-100cm⁻¹ confirm the presence of haematite (2Fe₂O₃), hausmanite (8Mn₃O₄), pyrolusite (2MnO₂) and ramsdelite (4MnO₂). Therefore the studies carried indicates significant tailing effect of the Redi Mine on the surrounding environment

Keywords: Iron, Manganese, Mining, Spectral studies, Tailings effects, Far-FTIR, XRD, ICP-AES, Sindhudurg district