

Chemical, physical, thermal, textural and mineralogical studies of Natural iron ores from Odisha and Chhattisgarh regions, India

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Abstract: The chemical, physical, thermal and texture properties of iron ores from different regions of Odisha and Chhattisgarh regions, India have been investigated to understand the compositional variations of Fe, Al_2O_3 , SiO_2 , S and P. The present study was analyzed for its susceptibility to meet the industrial requirements, for various iron manufacture techniques. Chemical analysis indicated that the majority of the iron ores is rich in hematite (> 90 wt. %), poor gangue (< 4.09 wt. % SiO_2 and < 3.8 wt. % Al_2O_3) and deleterious elements ($\text{P} < 0.065$ wt. % wt. % and $\text{S} < 0.016$ wt. %) in all these iron ores found to be low. XRD peaks revealed that the gangue is in the form of Kaolinite and quartz, and same was observed in Fourier Transform Infrared (FTIR) spectroscopy in the range of 914 to 1034 cm^{-1} . The iron ores were found to have excellent physical properties exemplify with tumbler index (82-91 wt. %), abrasion index (1.27- 4.87 wt. %) and shatter index (0.87-1.64 wt. %). FTIR and Thermal analysis were performed to assimilate the analysis interpolations. It was found that these iron ores exhibit the three endothermic reactions which are dehydration below 447 K with mass loss of 0.13 to 1.7 wt. %, dehydroxylation at 525-609 K with mass loss of 1.09-4.49 wt. % and decomposition of aluminosilicates at 597 - 850 K with mass loss of 0.13-1.15 wt. % From this study, we can conclude that due to its excellent Physico-chemical characteristics these iron ores are suitable for BF and DRI operations. **More in Journal of Central South University DOI: <https://doi.org/10.1007/s11771-018-3958-6>.**

