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# Mineralogy and Mineral chemistry of manganese ores of the Proterozoic Sausar Fold Belt (SFB), Central India

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Sausar Fold Belt (SFB), Central India, is the host of some richest manganese ore deposits of India. The belt extends for more than 215 km in E-W to ENE-WSW direction on the southern margin of the Central Indian Tectonic Zone (CITZ), with an average width of 35 km and covers an area of about 7,500 sq km. Mineralisation is associated with the metasediments of Mesoproterzoic Mansar and Lohangi Formations of Sausar Group. The dominant rock types are Tirodi migmatitic gneiss, argillaceous and calcareous rocks. The SFB is intensely deformed and the facies varies from green schist to upper amphibolites. The manganese silicates and Mn-ores from the Mansar Formation have been studied in detail [1, 2, 3, 4], but very little work has been carried out on Mn ore of Lohangi Formation. The study of various mineral phases present in Lohangi Formation of Mukanapur area (south central part of the belt), was carried out using XRD, SEM and EPMA techniques and their paragenesis was discussed.

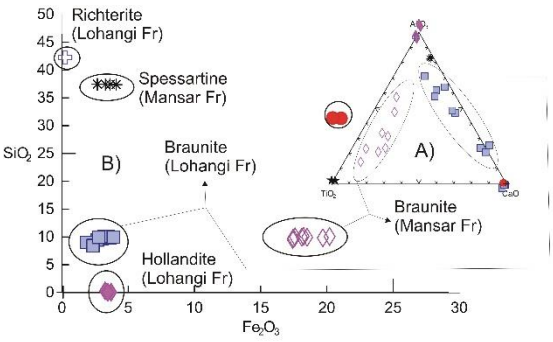


Figure.1 A. Triangular diagram $Al_2O_3$-$TiO_2$-CaO to distinguish barunite formed in different geological environment, B) $SiO_2$-$Fe_2O_3$ diagram to discriminate different members of barunite minerals from Sausar Mn ores, Central India.

The manganese ores of Mansar Formation mainly consists of braunite, jacobsite and spessartine with minor psilomelane. The manganese ores of Lohangi Formation extend over a strike length of 3.2 km, in form of lensoidal bodies and occurs as syn-sedimentry bedded type deposit. The ore body is confined within calcitic marble and occurs as band in contact with calc-silicate rock. The manganese mineralization is lithologically controlled and strata bound within the Lohangi Formation. The average assay (4 nos.) of the ore is ~ 21% Mn with mineral phases mainly braunite and hollandite. The pen contemporaneous structure, pinching and swelling nature of Manganese ore within the marble indicates the soft sediment deformation. The study of Mn-ores from both the Formations indicates braunite is the primary mineral and psilomelane occurs as secondary and show colloform structure. At places, sedimentary and early diagenetic textures are obscured along with mosaic and granoblastic textures which are typical of metamorphosed Mn-ore deposits [2]. The study also suggests that re-crystallisation of early diagenetic braunite-hollandite assemblages took place during metamorphism and $Ba^{2+}$ ions stabilized the hollandite phase comparatively at an intermediate grade of metamorphism. Increase in grade of metamorphism is further supported by the presence of amphiboles and spessartine. Veins and brecciation indicate that the ore bodies are developed in a later stage through dissolution and remobilization. Reprecipitation of manganese oxides also takes place in favorable structural weak planes under supergene environment. From the mineral chemistry two varieties of braunite were observed, i.e. type-I normal braunite with low iron (Lohangi Fr) and type-II braunite (Mansar Fr) with high iron. Both the varieties of braunite occupy non overlapping fields in the $SiO_2$-$Fe_2O_3$ diagram (Fig.1). The iron content of braunite increases with rising temperature in favorable situation. With prograde metamorphism, such braunite become progressively ferrian in braunite-bixbyite-hollandite assemblages. Mineralogy, texture and paragenesis of the manganese ore of the

study area suggest that the primary Mn-oxide and Mn-silicate minerals are formed during the prograde metamorphism and Mn-ores of Mansar Formation has undergone higher grade of metamorphism than that of Lohnagi Formation.

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