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Manganese Deposits of Africa – Black Shale Associated Deposits.

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Africa hosts just over 80 percent of the world's known land-based manganese mineral resources. The deposits are mainly of sedimentary and supergene origin comprising four major types, namely BIF-hosted, black shale-hosted, oolitic and supergene/karst-hosted deposits. The black shale associated deposits include major deposits present in the Francevillian of Gabon, represented by high-grade supergene manganese oxide ores derived from weathering of rhodochrosite-bearing black shale source rock, and manganese carbonates interbedded with black shale and greywackes associated with volcanic-dominated orogenic belts in the Birimian of West Africa and Lukoshi Complex at Kisenge in the DRC. High-grade supergene manganese oxide ores cap these manganese carbonate beds. All these major ore deposits were deposited in the interval 2 - 2,2 Ga.

The Francevillian associated manganese deposits in Gabon represent the second largest concentration of economic manganese deposits in Africa. They consist of supergene manganocrete developed on relatively unmetamorphosed and undeformed manganese-bearing black carbonaceous shale of the 2.3 – 2.0 Ga Francevillian Supergroup. They are large (~100 – 500Mt scale) and shallow open pittable deposits with high value oxide ore. The deposits occur on flat plateaus that are relicts of an old Cenozoic lateritized land surface that has been incised by the Ogouee River and its tributaries. The manganocrete profile of the plateaus near Moanda, ranges in thickness from about 9 – 17 m. It typically consists of a thin basal unit of massive manganese oxides and hydroxides overlain by a platy (plaquette) 3 to 9 m thick economic zone. The latter is overlain by an alumina- and iron-rich sub-economic manganiferous pisolite horizon.

In West Africa a cluster of black shale-hosted carbonate manganese deposits with cappings of high-grade oxide ore are hosted by the middle Paleoproterozoic Birimian Supergroup. The best-known are Nsuta in southern Ghana, Tambao in Burkina Faso and Grand Lahou in Côte D'Ivoire. Manganese deposits of the area occur in two different settings. Those in Ghana all appear to be associated with upper strata of mafic-dominated volcanic belts in the transition zone to overlying sediment-dominated belts. In contrast the deposits of Côte d'Ivoire and Burkina Faso are located in the series of long, narrow, felsic-dominated belts that appear to be more abundantly developed along the western side of the Birimian terrain with mafic-dominated belts being more common to the east in Ghana. In both the mafic- and felsic-dominated volcanic belts the manganese protore is composed of manganese carbonate (rhodochrosite) beds containing in the order of 20 – 30 wt % Mn. The supergene Mn (IV) oxide ore caps, are developed over thicknesses of up to 70m and form positive topographic ridges. They are typically 10 – 20 Mt in size, but constitute premium high-grade metallurgical ores containing 45 – 50 wt % Mn with high Mn/Fe ratios.

The Kisenge manganese deposit in the Democratic Republic of the Congo is situated in metamorphosed sedimentary strata of the Lukoshi Complex. The manganese ore beds occur in a succession dominated

by steeply dipping sericite schists. Manganese carbonate beds separated by manganiferous garnet-bearing carbonaceous phyllite are present. High-grade supergene manganese oxide ores, (~80m thick) with grades of 38 – 51 wt % Mn are developed above the manganese carbonate protore beds that have grades of 30 – 40 wt % Mn.

References:

[1] Beukes N.J., Swindell E.P.W., and Wabo H., (2016) Manganese Deposit of Africa, Episodes 35 IGC

