GEOCHEMICAL AND MINERALOGICAL CHARACTERIZATION OF THE MOLANGO MN DEPOSITS: CONSTRAITS ON GENESIS

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The Molango deposits of eastern central Mexico are the largest Mn deposits in Northamerica. These deposits are hosted by late Jurassic (Kimmeridgian) black shales belonging to the Chipoco formation. Mineralogical, sedimentological, geochemical and isotopic methods were employed to investigate the genesis of the deposit. Mineralogical and geochemical results of the ore zone reveal a relationship between the host black shales and Mn enrichment. Carbon isotopic values and total organic carbon (TOC) indicate manganese carbonate (rhodochrosite) formation occurred by reduction of manganese oxides concurrent with organic matter oxidation. Sedimentological and microfacies analyses indicate formation under sub oxic conditions , characterized by absence of microfauna in the ore zone. Framboidal pyrite analysis is also consistent with formation under sub oxic to anoxic conditions (Wilkin, 1996). REE multiple-proxy analyses on the other hand indicate possible oxic conditions. Organic matter enrichment and anoxic conditions are a product of high productivity caused by nutrient-rich hydrothermal plumes released during the opening of the Gulf of Mexico. These plumes also acted as carriers of metals to the basin. Anoxic waters of the Huayacocotla basin concentrated Mn^{+2} before its transformation during early diagenesis to manganese carbonate. This process was likely mediated by manganese reducing bacteria. Close analogues of the Molango deposits are the Toarcian Urkut deposits of Hungary.

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