
Weathering Sequence and Alteration Products in the Genesis of the Graskop Manganese Residua, Republic of South Africa

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Abstract: Although numerous, small, manganese oxide deposits associated with dolomite in the Eastern Transvaal escarpment, Republic of South Africa, have been known for many years, their mineralogical make-up is somewhat controversial. Chemical, mineralogical, and morphological properties of the weathering products of dolomite and the coexisting manganese oxide material in the Graskop area were therefore determined. Mn and Fe occur only in minor accessory minerals in the original rock; however, in the weathering residue, these elements are concentrated and occur as separate mineral phases, chiefly birnessite, nsutite, and goethite. Thin veins of pure muscovite and quartz traverse the residua. Rare, pure calcite and maghemite nodules were noted throughout the residual manganese material. The properties of this weathering sequence suggest that the manganese wad deposits were formed *in situ* as a result of the congruent dissolution of dolomite, leaving a porous, sponge-like structure, highly enriched in Mn and Fe oxides.

Key Words: Birnessite • Dolomite • Infrared spectroscopy • Manganese • Nsutite • Petrography • Wad • Weathering • X-ray powder diffraction

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