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Liquid-Liquid Extraction and Spectrophotometric Determination of Mn(II) in Geochemical Samples

by P.K. Tarafder*, R.K. Mondal, L. Kunkal, P. Murugan and D.P.S. Rathore

Atomic Minerals Directorate for Exploration and Research, Department of Atomic Energy, Khasmahal, Jamshedpur, 831002 (India)

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A new, simple, precise, selective and sensitive method for the extraction and spectrophotometric determination of manganese has been described. Manganese(II) forms a bluish-violet anionic chelate, $[MnL_2]^{2-}$ with 2,3-dihydroxynaphthalene(H_2L) in alkaline medium (pH 11–12). The colour of the anionic chelate intensifies when the compound is extracted to ethyl acetate as an ion-associate, $Q_2[MnL_2]$ with a cetyltrimethylammonium(Q^+) counter cation. The molar absorptivity of the complex at 547 nm (λ_{max}) is 1.2×10^4 L mol^{-1} cm^{-1} with the detection limit of 0.04 μg mL^{-1} for Mn. The Beer's law is obeyed in the concentration range from 0 to 5 μg mL^{-1}. Zn, Cd, Cu, Co, Ni, Al, Be, La, Ti, Zr, Y, Ta, W, U, Mo, As, Se and Bi do not interfere, while Fe does, so should be removed by prior extraction at pH 4–5 using the same reagent. The method has been also applied to the recovery studies on Mn present in silicate rocks, ores, minerals, soils, plant ash and hydrogeochemical samples. The results differed favourable from those obtained by oxidation of Mn with KIO_4 to $KMnO_4$ and further spectrophotometrical and AAS investigations.