Facile Synthesis of Mn_2O_3 for Highly Active Catalytic Oxidation and Reduction of Organic Substances and Electrochemical Determination of L-Methionine

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This paper reports the electrochemical determination of L-Methionine (L-Met) in phosphate buffer solution (pH = 7.0) utilizing the Mn_2O_3 on screen-printed carbon electrode ($\text{Mn}_2\text{O}_3/\text{SPCE}$) and Mn_2O_3 catalyst display excellent activity for catalytic reduction of p-Nitrophenol. Initially, as-prepared Mn_2O_3 were characterized by various analytical methods. From the electrochemical studies bare SPCE showed an ill-defined oxidation peak around 1.214 (± 0.02) V for L-Met whereas $\text{Mn}_2\text{O}_3/\text{SPCE}$ showed a well-defined oxidation peak at 1.173 (± 0.02) V. Under optimum conditions, the $\text{Mn}_2\text{O}_3/\text{SPCE}$ showed a linear range of L-Met concentrations of 1.0×10^{-6} to 6.1×10^{-4} M. The limit of detection is about 1.0×10^{-9} M (S/N = 3). The presently modified working electrode has also been effectively applied for the determination of L-Met in real sea food samples. The Mn_2O_3 signifies user-friendly, strong and high sensitive with real applications for electrochemical determination of amino acids as well as catalytic reduction of p-Nitrophenol.

Keywords: Manganese oxide, amino acid, L-Methionine, p-Nitrophenol, Wild Salman.

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