

# **Electrochemical Determination of Zn<sup>2+</sup> ion using Diphenylamine/Single Walled Carbon Nanotube/Cetyltrimethylammonium Bromide Modified Glassy Carbon Electrode**

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**Abstract** — Diphenylamine encapsulated inside a composite film of single walled carbon nano tube (SWCNT) and cationic cetyltrimethylammonium bromide (CTAB) on the surface of Glassy Carbon (GC) electrode can be converted into diphenylbenzidine on application of a potential of +0.600 V versus Ag-AgCl reference electrode for 60 seconds. This modified electrode, in tris buffer solution (pH 7.0), shows reversible cyclic voltammogram due to diphenylbenzidine / diphenylbenzidine violet redox couple. This cyclic voltammogram is observed in pure CTAB film but not observed inside the film of pure SWCNT, polyvinyl pyrrolidone or TX-100. In the SWCNT + CTAB film the redox potential is ca. +0.430 V. The oxidation and reduction currents of the modified electrode decreases with the increase in the concentration of Zn<sup>2+</sup> ion in the electrolytic solution. The relative decrease is found to be 0.60 to 0.65. The ions such as Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup> and Mg<sup>2+</sup>, do not affect the redox currents. Diphenylbenzidine / SWCNT / CTAB modified GC electrode can determine Zn<sup>2+</sup> ion concentration in the range 20 × 10<sup>-6</sup> mol L<sup>-1</sup> to 200 × 10<sup>-6</sup> mol L<sup>-1</sup> while diphenylbenzidine/CTAB modified GC electrode can determine between 0.2 × 10<sup>-6</sup> mol L<sup>-1</sup> to 2 × 10<sup>-6</sup> mol L<sup>-1</sup>. A mechanism for the electrochemical inactivation of the electrode by Zn<sup>2+</sup> ions has been proposed.

**Keywords :** *Diphenylamine, zinc, cyclic voltammetry, surfactant, glassy carbon electrode, indium doped glass electrode.*