Detection of α -Ethinyl Estradiol in Water by Voltammetry: Mechanistic Study and Practical Implications

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Residue amounts of synthetic estradiol; an active ingredient of oral contraceptives finds its way into water bodies. Estrogenic effects on aquatic life as well as on humans and other land animals are of great health concerns. A carbon-based screen-printed disposable electrode was used to detect α -Ethinyl Estradiol by cyclic voltammetry. The data analysis shows that the observed one electron oxidation peak is irreversible. The mechanism of reaction primarily involves adsorption of 17- α -Ethinyl Estradiol (EE2) on the surface of the electrode. The rate constant and adsorption capacity were estimated to be 1.46 s^{-1} and $1.3 \times 10^{-10} \text{ moles/cm}^2$. The peak current vs concentration relationship was found to be linear over the range of concentration investigated. In addition, data on repeatability, sensitivity and detection limits are provided.

Keywords: Cyclic voltammetry, estradiol, biosensor, disposable electrode

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