

## **Bioelectrochemical System: An Alternative Technology for Metal Removal from Industrial Wastewater and Factors Affecting Its Efficiency**

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**Abstract :** Bioelectrochemical system (BES) is an alternative technology for chromium Cr (VI) removal from industrial wastewater to overcome the existing drawbacks of high chemical and energy consumption by conventional metal removal technologies. A well developed anaerobic sludge was developed in laboratory and used in the batch study of BES at different Cr (VI) concentrations (10, 20, 50, and 50 mg/L) with different COD concentrations (500, 1000, 1500 and 2000 mg/L). Sodium acetate was used as carbon source, whereas Cr (VI) contaminated synthetic wastewater was prepared and added to the cathode chamber. Initially, operating conditions for the BES experiments were optimized. During the study, optimum cathode pH of 2, whereas optimum HRT of 72 hr was obtained. During the study, cathode pH  $2 \pm 0.1$  showed maximum chromium removal efficiency (CRE) of  $88.36 \pm 8.16\%$  as compared to other pH (1-7) in the cathode chamber. Maximum CRE obtained was  $85.93 \pm 9.62\%$  at  $40^\circ\text{C}$  within the temperature range of  $25^\circ\text{C}$  to  $45^\circ\text{C}$ . Conducting the BES experiments at optimized operating conditions, CRE of 90.2 %, 93.7 %, 83.75 % and 74.6 % were obtained at cathodic Cr concentration of 10, 20, 50, and 50 mg/L, respectively. BES is a sustainable, energy efficient technology which can be suitably used for metal removal from industrial wastewater.

**Keywords :** bioelectrochemical system, metal removal, microorganisms, pH and temperature, substrate

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