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Performance of the Salt Bridge Based Microbial Fuel Cell

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Abstract

Electricity generation from readily biodegradable organic substrates accompanied by decolorization of azo dye was investigated using a Microbial fuel cell (MFC). Biodegradation was the dominant mechanism of the dye removal, and glucose was the optimal substrate for Red Cibacron-2G (RC) decolorization. Batch experiments were conducted to evaluate the performance of the MFC. As compared to traditional anaerobic technology higher decolorization efficiency was achieved by MFC. Effect of initial dye concentration and external resistance on power generation were studied. Polarization experiments were also directed to find the maximum power density. Maximum Power density of 100mW/m^2 (1.04A/m^2) was recorded at optimum operating conditions.

Keywords: *Decolorization; Microbial Fuel Cell; Polarization; Salt Bridge*

1 Introduction

Sustainable energy production and wastewater treatments are a top priority in the developing global community. Many industrially developed or developing countries had a lot of problems to treat some of the industrial waste materials, which cause pollution to the environment. Azo dyes which constitute the largest chemical class of synthetic dyes are extensively contained in effluent discharged from dye-manufacturing industries and dye-consuming industries. The intense color of dye-containing wastewater leads to severe aesthetic problems and obstructs light penetration and oxygen transfer into water bodies, thus affecting aquatic life.

In most cases wastewater from different industries disposed to the water basins without treatment brings disaster to people, plants, rivers and the eco-system. Treatment of dye-containing wastewater still presents a technical challenge. Most physicochemical methods can remove dye efficiently but are not feasible due to their expensive cost, limited versatility and sensitivity to other wastewater constituents. Alternatively, biological treatment may present a relatively inexpensive way to remove dyes from wastewater [1]. All the conventional wastewater treatment is usually the most energy-intensive unit