A Comparative Study on the Energy Generation Through Wastewater Purification in Microbial Fuel Cell

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ABSTRACT

Rapid depletion of fossil fuel resources because of the increase in energy demands and increasing climate change phenomena due to global warming by green-house gases have raised demand for cleaner energy. Therefore, probing a simple and cost-effective electrochemical energy conversion and treatment technology is a promising as well as an alternative to produce power through the treatment of wastewater. The Microbial Fuel Cell (MFC) is thus an emerging technology device to treat wastewater and simultaneously producing green energy and reducing the energy crisis and global warming. This novel technology is cost effective as well as proves itself as an alternative energy source for off-grid power solutions. One of the major drawbacks for producing electricity from wastewater is it's low buffering capacity. A buffer is added to maintain pH, thus decreasing the voltage efficiency in microbial systems. In this study, the performance of the Single Chamber MFC is reported for the sodium bicarbonate buffer solution for the treatment of wastewater. Moreover, the results were compared with the various buffer solution as reported elsewhere. The different types of buffer solutions were comparted like Phosphate Buffer Solution (PBS), Borax Buffer Solution, and Bicarbonate Buffer Solution to improve production of electrical energy. This communication tries to highlight the comparison of quantity, effectiveness, removal of Chemical Oxygen Demand (COD) and analysis of free proton transfer rates, rate of diffusion and the electricity generated by different buffer solution. The optimum power density was found to be 50.25 mW/cm^2 for the sodium bicarbonate buffer solution. A comparison among three types of PEM also make us aware of the power outputs in microbial fuel cells.

Keywords: Buffer solution, MFC, Proton Exchange Membrane, Power density, Wastewater Treatment

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