

## Microbial Fuel Cells and Their Applications in Electricity Generating and Wastewater Treatment

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**Abstract :** This research is an experimental research which was done about microbial fuel cells in order to study them for electricity generating and wastewater treatment. These days, it is very important to find new, clean and sustainable ways for energy supplying. Because of this reason there are many researchers around the world who are studying about new and sustainable energies. There are different ways to produce these kind of energies like: solar cells, wind turbines, geothermal energy, fuel cells and many other ways. Fuel cells have different types one of these types is microbial fuel cell. In this research, an MFC was built in order to study how it can be used for electricity generating and wastewater treatment. The microbial fuel cell which was used in this research is a reactor that has two tanks with a catalyst solution. The chemical reaction in microbial fuel cells is a redox reaction. The microbial fuel cell in this research is a two chamber MFC. Anode chamber is an anaerobic one (ABR reactor) and the other chamber is a cathode chamber. Anode chamber consists of stabilized sludge which is the source of microorganisms that do redox reaction. The main microorganisms here are: *Propionibacterium* and *Clostridium*. The electrodes of anode chamber are graphite pages. Cathode chamber consists of graphite page electrodes and catalysts like:  $O_2$ ,  $KMnO_4$  and  $C_6N_6FeK_4$ . The membrane which separates the chambers is Nafion117. The reason of choosing this membrane is explained in the complete paper. The main goal of this research is to generate electricity and treating wastewater. It was found that when you use electron receptor compounds like:  $O_2$ ,  $MnO_4^-$ ,  $C_6N_6FeK_4$  the velocity of electron receiving speeds up and in a less time more current will be achieved. It was found that the best compounds for this purpose are compounds which have iron in their chemical formula. It is also important to pay attention to the amount of nutrients which enters to bacteria chamber. By adding extra nutrients in some cases the result will be reverse. By using ABR the amount of chemical oxidation demand reduces per day till it arrives to a stable amount.

**Keywords :** anaerobic baffled reactor, bioenergy, electrode, energy efficient, microbial fuel cell, renewable chemicals, sustainable

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