



## Influence of Proximate and Chemical Components of Kitchen Waste, Palm Kernel Waste, and Cow Dung on Electricity Generation in Microbial Fuel Cells (MFCs).

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### Abstract:

A great variety of substrates can be used in MFCs for electricity production, ranging from pure compounds to complex mixtures of organic matter present in wastewater and organic waste. This study was designed to source mainly for agricultural wastes for MFC based on their nutritional components. Three (3) common agricultural wastes in Nigeria, Palm kernel waste (POPW), Kitchen waste (KW) and Cow dung (CD) were utilized singly or in synergy; POPW+ KW, POPW+ CD, POPW+ KW+ CD) as substrate for MFC. The proximate and mineral components of these substrates were analyzed to explicate the nutrient potentials for microorganisms (electrogens) associated with electricity generation. The ash content of the organic wastes ranged from 10.58- 21.78mg/g; fat content (5.84-42.75mg/g); crude fibre (3.95-12.50mg/g); moisture content (8.24-32.24%); crude protein (8.21- 11.69mg/g), while the carbohydrate content was between 12.01 and 40.49%. Meanwhile, the mineral content of the wastes ranged from 1.04 - 3.80 x10<sup>3</sup>ppm for sodium (Na); 2.21-9.51 x 10<sup>4</sup>ppm for potassium (K) and 4.32-8.60x 10<sup>3</sup>ppm for calcium (Ca). The concentration of magnesium (Mg), iron (Fe), zinc (Zn), and lead (Pb) contents was low in each of the wastes. The power density generated in the different bio wastes was between 47.49 and 279.52mW/m<sup>2</sup>. In the meantime, the current and voltage generated ranged between 0.174mA in KW+ CD to 0.650mA in KW and 0.11V in POPW+ CD to 0.59V in KW respectively. The high energy potential derived from the kitchen waste and its synergistic component (s) can be credited to their high carbohydrate contents and the availability of metallic ions of Fe, Mg, Zn and Pb. The physicochemical constituents of these wastes make them good substrates for electricity generation.

### Biography:

Adebule, Adeniyi Philip is a Doctoral student in the field of microbiology and biotechnology. He bagged his B.Sc. (Hons) in General & Applied Microbiology and later received M.Sc. Degree in Microbiology from Ekiti State University, Ado-Ekiti, Nigeria in 2017. Over the year, he had gathered requisite academic and professional experience in both academic and non-academic researches. He has some publication to his credit and several other in the press. His recent publications centred included "Improving Bioelectricity Generation of Microbial Fuel Cell (MFC) With Mediators Using Kitchen Waste as Substrate", "The Occurrence of Pathogenic Factors in Escherichia coli O157 Isolated from Mobile Phones of Ekiti State



University Students Ekiti State, Nigeria" etc. His research interest ranged from Bioremediation of contaminated environment, Bioenergy from Waste, to the impact of microorganisms on the environment and public health.

### Publication of speakers:

1. Adebule, A. P., Adeniyi, B. I. and Adebayo, A. A. (2018). Improving Bioelectricity Generation of Microbial Fuel Cell (MFC) With Mediators Using Kitchen Waste as Substrate. *Annals of Applied Microbiology and Biotechnology Journal*, 2(1): 1- 5.
2. Adeniyi, B. I., Adebule, A. P., Akinyeye, R. O. (2019). Electricity Potentials and Chemical Components Generation from Kitchen Waste, Palm Kernel Waste, and Cow Dung in Microbial Fuel Cells (MFCs). *International Journal of Engineering Science and Computing*, 9 (4): 21291- 21296.
3. Adeniyi, Jadesola & Idowu, Babatunde & Adebule, Adeniyi & Philip, & Akinyeye, Richard. (2020). Electricity Potentials and Chemical Components Generation from Kitchen Waste, Palm Kernel Waste, and Cow Dung in Microbial Fuel Cells (MFCs).
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