

ABSTRACT

*The increasing amount of seafood industrial waste contains protein, oil, carotenoids, minerals and other compounds that can reduce the availability of oxygen in the ecosystem. For environmentally friendly waste processing, a microbial fuel cell (MFC) with halophilic bacteria that can survive in high salinity conditions with the type *Bacillus clausii* JIG-0%B is used as a biocatalyst to convert starch into a possible and potential complex carbon source without further damage into electrical energy. This research was conducted through MFC testing with variations in starch concentration of 10, 30, 50 mg/ml by comparing simple sugar substrates (glucose and sucrose) at the same concentration. MFC characterization includes two stages, namely, a half-cell test which includes: cyclic voltammetry (CV); rate determination step (RDS); electron transfer rate constant (k_s); pH change test and ammonia level test as a supporting test, the next stage is a full cell test which includes: kurtum making; voltage analysis; maximum power density analysis, biofilm analysis. Based on the results of the half-cell and full-cell electrochemical tests, it is known that among the starch variations tested, the 10 mg/ml starch variation is the condition for the largest optimal electron transfer rate, namely $0.834 \pm 0.170 \text{ s}^{-1}$ and an MPD value of 4.134 mW/m_2 , with cytochrome a $\text{Fe}^{2+}/\text{Fe}^{3+}$ and c_1 $\text{Fe}^{2+}/\text{Fe}^{3+}$ molecules acting as carrier molecules. The performance of starch carbon sources is still far behind the most optimal conditions overall achieved by 50 mg/ml glucose producing an electron transfer rate of $1.356 \pm 0.224 \text{ s}^{-1}$ and an MPD of 30.359 mW/m_2 . These results indicate that starch cannot be used optimally to increase the output power of MFC by *Bacillus clausii* JIG-0%B bacteria due to the complexity of the polysaccharide structure which hinders the efficiency of electron transfer.*

Keywords: *Starch, Bioenergy, Bioresource, Electron transfer*