Abstract

Present study describes the construction of double chamber microbial fuel cell for optimized electricity generation using domestic wastewater as organic substrate in anode chamber and potassium chloride as electrolyte in cathode chamber where graphite rods were used as electrodes.Chambers were connected by salt bridge made up of potassium chloride and agarose gel. Differentparameters including cathodic electrolyte solution, electrode material, diameter of salt bridge,percentage of agarose gel in salt bridge, molarity of potassium chloride in salt bridge, purity ofcarbon substrates, concentration of carbon substrate, microbial inoculum, type and amount ofwastewater and pH of anode chamber were optimized to get higher voltage generation. Maximumvoltage of 690±0.05 mV, maximum current of 1.2 mA, maximum current density of 750 mA/m2,maximum power of 0.84 mW, and maximum power density of 526 mW/m2 was obtained at 8thday, when anode chamber was filled with 500 mL of municipal sewage wastewater along with 1
g/L of xylose having pH 8.8 in anaerobic condition while cathode chamber was filled with 500 mL 1 M potassium chloride solution provided with continuous supply of air through an aerator pump. Both of the chambers were connected externally with salt bridge of diameter 7 mm having 7% agarose concentration and 2 M potassium chloride while graphite rods having area 16.16 cm2 were immersed in both chambers connected with external circuit copper wire having external resistance of 561 Ω operated at room temperature. This research demonstrates that voltage and current generation can be increased in microbial fuel cell by changing and optimizing different physical and biological parameters of double chamber microbial fuel cell. The study concludes that a double chamber microbial fuel cell (MFC) is an efficient system for simultaneous wastewater treatment and electricity generation.