

Catalytic Bio-Slurry Degradation to Bio-hydrogen and Hydrocarbon Fuels Using an Electrolytic Biomass Solar Cell

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Abstract

The disposal of bio-slurry disposal in areas that do not have farmyards, where they can be applied for use as organic manure is a conundrum. Also, there is a developing need to opt for more environmentally friendly processes to generate more efficient and cleaner bio-fuels. This study purposed to Catalyze Bio-Slurry Degradation to Bio-Hydrogen and Hydrocarbon Fuels Using an Electrolytic Biomass Solar Cell and a 40W solar power panel. Design and development of a modified E.B.S.C of a capacity 9,000mL and a solar panel energy source of 40 W (current of Pmax; vmp of 1.13) was used for the electrolysis of bio-slurry. Pre-experimental research design was done in three batch experiments with one design having geo catalyst, another having iron catalyst and the other a control experiment with water as the electrolyte. The rate of degradation of the biomass samples/ gas evolution volumes at the cathode and the anode were measured. The objectives of the study were; design and fabricate a modernized electrolytic biomass solar PV cell, characterization the bio-slurry before and after electrolysis and the catalyst used using LC-MS, FTIR, and pH meter revealed: alcohols , acids and fats present before electrolysis, pH was 8.04, and 7.0 after electrolysis, and the efficacy of the catalysts and the fabricated biomass solar cell in the degradation of bio slurry waste depicted that the geo-catalyst evolved was 250mL averagely per day than that of the iron catalyst. Also, Solid matters in the bio-slurry were effectively reduced by 32.15% while turbidity decreased from 18.92 to 5.82 NTU for the set-up with geo-catalyst while the one with the iron catalyst remained the same 18.92 NTU. Thus, the study successfully generated results that can turn the tide on policy development on management and monitoring of waste conversions.

Key words: Electrolytic biomass solar cell, bio-hydrogen, electrolytic biomass degradation, bio-slurry, electro-catalysts