Chapter 2
The Effect of Internal Parameters on Biodehydrogen Production in Batch Microbial Electrolysis Cell Reactor

M. Asaw, M. A. Hassan and A. K. Abd-ul-Wahab

Abstract: Biodehydrogen has the potential to be a renewable energy alternative in current technology. Microbial electrolysis cell (MEC) systems now bio-electrochemical processes that are capable of producing hydrogen gas and has higher efficiency when compared with other processes. This study describes the mathematical model of MEC in a biodehydrogen production from wastewater batch reactor. The model is based on material balances with the integration of bio-electrochemical reactions describing the steady-state behavior of biomass growth, consumption of substrates, hydrogen production and power current characteristics. The model predicts the coexistence of anaerobic, autotrophic methane-producing and hydrogenotrophic methanogenic microorganisms. In this study the effect of varying charge of initial concentration, effect of stoichiometric and kinetic parameters on MEC in a batch reactor is modeled with an open-loop identification test. This model will also be examined effect of competition between the three microbial populations between anaerobic, hydrogenotrophic and acetoclastic.

Keywords: Mathematical model - Batch microbial electrolysis cells reactor - Biodehydrogen gas - Internal parameter

List of Symbols

1. Substrate concentration (mg L^-1)
2. Concentration of anaerobic microorganisms
3. Concentration of autotrophic microorganisms
4. Concentration of hydrogenotrophic microorganisms

M. Asaw
Faculty of Engineering, Department of Chemical Engineering, University of Sistan Baluchestan, Zahedan, Iran
Email: m-amir@sbu.ac.ir