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Biological production of biohydrogen from organic substrates: Review

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The high demand for clean energy source has in recent past created a great interest in biofuels. Among the biofuels that are highly investigated include; bioethanol, biohydrogen, biodiesel and biomethane. Biohydrogen has a special advantage in that no greenhouse gas is emitted during its combustion. It can be produced from organic wastewater but the yields remain low. The survey of the published data shows that the most promising production method is the dark hydrogen fermentation. Some of the strategies for improving biohydrogen production from organic effluents include: bioreactor modifications, microbial culture immobilization, culture selection and enrichments, substrate choice, optimization of process conditions (temperature, pH, organic loading rates and hydraulic retention time). The recommended biohydrogen production method is a sequential combination of biohydrogen and biomethanation production phases which has the potential for producing the highest bioenergy recovery from organic wastewater. The biorefinery production concept where biohydrogen is produced together with other biofuels and bio products is the ultimate cost effective production process. The reactor configuration that helps retain biomass in bio-hydrogen fermenters is the Upward Sludge Bed Reactor. Immobilization of biomass should be considered to improve bio-hydrogen productivity. The use of appropriate biohydrogen specialists and biomass recirculation will also improve the process effectiveness.

Biography

Milton M. M'Arimi is upcoming Researcher, senior lecturer and a consultant in matters of energy and environment. His PhD was carried out in Germany where he researched and co-authored publications in areas of bioenergy production and environment. His research interest is bioenergy production from cheap substrates common in tropical countries. His research interests are on biofuels and environment. He is the Head of Department, Chemical & Process Engineering, Moi University and Environmental & Social Safeguards director of World Bank Funded Africa Centre of Excellence in Phytochemicals, Textile and Renewable Energy based at MOI University, Kenya.

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