VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Project Report

On

DEVELOPMENT OF BIOHYDROGEN DEPENDENT FUEL CELL USING MICROALGAE

Submitted for the award of the Degree of

MASTER OF TECHNOLOGY

IN

CHEMICAL ENGINEERING

by

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ABSTRACT

Hydrogen gas is thought to be the ideal fuel for a world in which air pollution has been alleviated, global warming has been arrested, and the environment has been protected in an economically sustainable manner. Hydrogen and electricity could team to provide attractive options in transportation and power generation. Inter conversion between these two forms of energy suggests on-site utilization of hydrogen to generate electricity, with the electrical power grid serving in energy transportation, distribution utilization, and hydrogen regeneration as needed. A challenging problem in establishing H_2 as a source of energy for the future is the renewable and environmentally friendly generation of large quantities of H_2 gas. Thus, processes that is presently conceptual in nature, or at a developmental stage in the laboratory, need to be encouraged, tested for feasibility, and otherwise applied toward commercialization.

In this project work, the algae culture is to be grown under two conditions – mass cultivation using photo bioreactor and laboratory cultivation using controlled incubator. Under these two conditions, the culture of ***Chlamydomonas reinhardtii*** is grown and the cell growth rate is estimated using Haemocytometer. The amount of **Hydrogen** produced in mass culture and in laboratory studies is estimated by the water displacement method. The Hydrogen produced in mass cultivation is used in the external fuel cell connected to the photo bioreactor and the electricity thus generated is estimated.

In laboratory studies, in algal culture the improvement in the production of hydrogen is estimated by varying sulphur concentration, Dark and Light cycle etc. With reference to these laboratory studies, the estimated parameters are applied for mass cultivation. In the mass cultivation, the production of hydrogen and electricity generated is estimated.

By varying parameters like Temperature, Concentration of Inorganic salts in the algae culture, the Hydrogen production and electricity generated is estimated.

KEYWORDS: ***BioHydrogen, Green Algae, Anaerobiosis, Alternative fuel, Biofuel, Sulfur Deprivation, Optimization Parameters, Chlamydomonas reinhardtii.***