

PROJECT REPORT

TITLED

“BIOHYDROGEN FUEL FROM CELLULOSE RICH COWDUNG-ENRICHED BETEL NUT SHELLS”

Submitted by:

POOJA J. KOTIAN 4PA06BT018

JAIVIKA J. G. 4PA06BT009

LORENE WILINDA PINTO 4PA06BT011

MADEEHA MAJEED 4PA06BT012

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Under the guidance of: Dr. Krishna Prasad Nooralabettu



DEPARTMENT OF BIOTECHNOLOGY

P.A. COLLEGE OF ENGINEERING

(Affiliated to Visvesvaraya Technological University and recognized by AICTE)

Near Mangalore University, Mangalore- 574 153, Karnataka

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ABSTRACT

Microbial conversion of acid hydrolysed microcrystalline betel nut (*Areca catechu*) shell cellulose enriched with cow dung to hydrogen is a fascinating way to provide a sustainable renewable energy source as only by-product of reacting H_2 with oxygen is water, and no carbon dioxide or other green house gases are produced. A mesophilic bacterial strain of hydrogen production activity was isolated from aging cow dung available in the Dakshina Kannada District and identified as *Clostridium acetobutylicum*. The isolate was Gram positive, obligatory anaerobic, motile, non-sulphate reducing, spore forming, rod shaped organism, with growth optimum of 60°C, catalase test negative, indole test positive, MR test positive, VP test negative, citrate test negative, cellulose positive, and utilised glucose, fructose, lactose and sucrose with acid and gas production. Microcrystalline cellulose was hydrolysed by sulphuric acid and hydrochloric acid at 0.5, 1.0, 1.5, 2, 2.5, 3, 4 and 5% .Hydrochloric acid at 5% was efficient in hydrolyzing cellulose as it produced highest percentage of glucose of 0.23g/ml. A bio hydrogen production capped reactor was designed for the conversion of acid hydrolysed microcrystalline celluloses at 5% of HCL enriched with cow dung at 1:1 into hydrogen using *Clostridium acetobutylicum*. Hence, it has a potential to produce bio hydrogen.