BUSITEMA UNIVERSITY
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FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR PROJECT REPORT

DESIGN AND CONSTRUCTION OF A FUEL PRODUCTION SYSTEM FROM WATER

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This report is presented to the faculty of Engineering as a partial fulfillment of the requirements for the award of a bachelor's degree in Water Resources Engineering of Busitema University.

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EXECUTIVE SUMMARY

Electrolytic production of hydrogen from water is gradually gaining its importance among the other conventional process of hydrogen production in the context of renewable energy source utilization and environmentally clean technology. The present work study focuses on hydrogen gas production in a form called Brown's gas or HHO gas by alkaline water electrolysis with KOH as electrolyte. The variation of HHO gas flow at different concentrations of electrolyte, current density, voltage was investigated. During electrolysis the temperature of the electrolytic solution is also found to increase gradually with time due to over voltages, which further affects the current, electrical and gas production rate. The effects of different parameters on the HHO gas production rate and energy efficiency of electrolysis process are discussed.

DECLARATION

I **NIRINGIYE ERNEST** hereby declare that this report is a true work of my hands and has never been presented by any person or institution for an academic award.

Signature: Nernest.....

Date: 12/06/2018.....

APPROVAL

This final year project report has been submitted to the faculty of Engineering for examination with approval of my supervisors mentioned below

MAIN SUPERVISOR: Mr. Maseruka. S. Bendicto

Signature..... Date.....

CO-SUPERVISOR: Mr. Ddumba Joseph Lwanyaga

Signature..... Date.....

ACKNOWLEDGEMENT

I thank the Almighty God for the far that He has brought me, the gift of life, protection and his provision to me during and throughout the writing of this project report.

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Lastly, I thank all those who were involved directly or indirectly during my project writing. May the good Lord reward you all

DEDICATION

I dedicate this report to all my family members for the love and efforts they rendered to me. They nurtured me in the best way so that I become the person I am today. So may the almighty God bless and reward them abundantly. **AMEN.**

LIST OF ACRONYMS

HHO gas	Hydroxyl gas
DC	Direct current
ICE	Internal combustion engines
PWD	Pulse width modulation
SMR	Steam methane reforming
EIA	Environmental Impact assessment

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

There is a strong synergy between hydrogen and renewable energy sources *(Veziroglu TN, 1991)*.On one side, full benefits of hydrogen as a clean, versatile and efficient fuel may be realized only if hydrogen is produced from renewable energy sources. On the other side, renewable energy, particularly solar and wind need storage because of their variable and intermittent intensity. Hydrogen can be stored easier than electricity, particularly in large quantities, and later used to generate electricity (in fuel cells) or as a fuel for transportation. Presently, the need for storage exists only for relatively small, standalone systems. For the grid-connected systems there is no need for storage, but only up to certain share of the renewably produced electricity in the energy mix. As more and more electricity is produced from renewable energy the need for large scale energy storage will become necessary. Although in some cases and/or in some geographic locations other storage options and other transportation fuels may be better than hydrogen, none of them provide the complete solution. Only hydrogen has potential to satisfy energy storage needs on the scale that would be needed in a future global energy system based predominantly on renewable energy sources Hydrogen can be produced from solar energy and water by water electrolysis. Although the photo electrochemical methods for direct water splitting are being developed, the technically most viable path is by coupling a PV photovoltaic module or array to an electrolyzer. Most of the industrial electrolyzers used today in capacities up to several thousand m3/hr are based on alkaline (KOH) electrolyte. Electrolyzers using a polymer, proton-conducting membrane (PEM) as the electrolyte are being developed, particularly for small-scale hydrogen generation.

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Conclusion.

- The different components of the system were successfully selected and designed.
- The construction was done using the locally available materials on the market.
- The prototype was tested and production of the gas was optimal at the current of 1A and a voltage of 5V.

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