

DEDICATION

This work is dedicated to my parents Mr. Olusola R. Adekola and Mrs. Jumoke M. Adekola who stood up to their responsibility by ensuring my education so that I do not suffer from ignorance. I am most grateful to them.

This work is also dedicated to God, for HIS infinite mercies and unending love.

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I am also grateful to other members of staff of the department of Industrial Chemistry, headed by Dr. (Mrs.) C.O. Akintayo, for impacting knowledge in me during the course of my stay in the university.

I am also grateful to all my siblings and friends for their solidarity throughout my stay in the university.

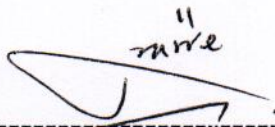
ABSTRACT

Fermentation is a metabolic process which involves the microbial degradation of sugars, resulting to the conversion of sugar to acids, gases and/or alcohol. It is also used more broadly to refer to the bulk growth of microorganisms on a growth medium.

This research project was carried out to produce ethanol from two locally available varieties of sweet potatoes within Nigeria (Carolina Ruby and O'Henry) while varying the fermentation parameters such as temperature, time and mass ratio of yeast to potato. The ethanol produced from each experiment was then titrated to calculate the amount of ethanol produced (in percentage) in order to discover the most efficient temperature, time and mass ratio of yeast to potato for the fermentation process within our country. From this study, the most efficient fermentation conditions have been established i.e. 48 hours fermentation time, fermentation temperature of 35°C and a mass ratio of yeast to potato that would not be oversaturated on the potato mash.

CERTIFICATION

This is to certify that this research project was duly supervised by me and approved in accordance with the partial fulfillment of the requirements for the award of a B.Sc. (Hons.) degree in Industrial Chemistry Department, Federal University Oye - Ekiti, Ekiti State, Nigeria.



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CONTENTS

PAGE

| | |
|-------------------|------|
| Title | i |
| Dedication | ii |
| Acknowledgment | iii |
| Abstract | iv |
| Certification | v |
| Table of contents | vi |
| List of tables | viii |
| List of figures | ix |

CHAPTER ONE

| | |
|---|---|
| 1.1 Introduction | 1 |
| 1.2 Global survey of bio-ethanol production | 6 |
| 1.3 Chemistry of Fermentation | 8 |
| 1.3.1 Ethanol fermentation | 9 |

CHAPTER TWO

EXPERIMENTAL:

| | |
|---|----|
| 2.1 Apparatus | 11 |
| 2.2 Fermentation procedures | 12 |
| 2.2.1 Cooking of sweet potatoes | 12 |
| 2.2.2 Mash cooling and dilution of mash | 12 |
| 2.2.3 Determination of alcoholic content via titrimetric analysis | 14 |
| 2.2.4 Product recovery | 15 |

CONTENT (CONTD)

PAGES

CHAPTER THREE

RESULTS

- 3.1 Determination of alcoholic content using titrimetric analysis 16

CHAPTER FOUR

- 4.1 Discussion of results 20
- 4.1.1 Effect of time on fermentation efficiency 20
- 4.1.2 Effect of mass ratio of yeast to sweet potato on fermentation efficiency 20
- 4.1.3 Effect of temperature on fermentation efficiency 21
- 4.1.4 Effect of sweet potato variation on alcohol production 22
- 4.2.1 Conclusion 23
- 4.2.2 Recommendation 23

REFERENCES

25

LIST OF TABLES

PAGES

| | | |
|----------|---|----|
| Table 1: | Varieties of sweet potatoes cultivated in various parts of the world. | 2 |
| Table 2: | Comparison of sugar content of sweet potatoes with other major staple. | 4 |
| Table 3: | Alcohol content calculated for Carolina Ruby sweet potatoes at different fermentation parameters. | 18 |
| Table 4: | Alcohol content calculated for O'Henry sweet potatoes at different fermentation parameters. | 19 |

LIST OF FIGURES

PAGES

Figure 1: Flowchart for the production of ethanol from sweet potatoes 13

CHAPTER ONE

INTRODUCTION

There is considerable interest in developing bio-renewable alternatives (such as bio-ethanol) to fossil fuels as transportation fuel. Bio-ethanol is expected to diminish petroleum dependency and generate new development opportunities in the agricultural and agro-industrial sectors of the economy that has great environment benefits.

Over the years, main feedstocks for bio-ethanol production are sugarcane and corn grain. However, because of the increasing demand for ethanol, research efforts in recent years are being directed towards the use of non-conventional raw materials.¹

Sweet potato (*Ipomea batatas*) has been considered a promising substrate for alcohol fermentation since it has a higher starch yield per unit land cultivated than grains.^{2,3,4,5} The edible tuberous root is long and tapered, with a smooth skin whose colour ranges between yellow, orange, red, brown, purple and over four hundred (400) species round the world. Table 1 showed some species of sweet potato known.

Table 1: Varieties of sweet potatoes cultivated in various parts of the world

| Variety | Outer (skin) colour | Inner (flesh) colour |
|----------------------|-------------------------------|----------------------|
| Beauregard | Rose | Orange |
| Hernandez | Burnt orange | Deep orange |
| Jewel | Copper | Deep orange |
| Carolina Ruby | Dark red to purple red | Dark orange |
| Porto Rico | Rose-pink | Orange |
| Cordner | Copper | Medium orange |
| Covington | Orange | Orange |
| Darby | Dark red | Deep orange |
| Evangeline | Rose | Moist deep orange |
| Georgia Jet | Red-almost purple | Deep orange |
| Nancy Hall | Light skin | Yellow |
| Red Garnet | Deep red or purple | Moist orange |
| Okinawa | Light brown | Unusual purple |
| O'Henry | Light skin | Yellow |
| Oriental | Beautiful pink to purple | White |
| Sumor | Smooth, light tan skin | White to yellow |
| Vardaman | Golden yellow | Deep orange |