THE BIOSYNTHESIS OF ETHANOL

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Introduction

RENEWABLE/NON-RENEWABLE SOURCES

- **Non-Renewable:**
- Resources that cannot be replaced once supply is used up
- Examples: Oil, Uranium, and Coal

- **Renewable:**
- Sources that can be replaced once they are used up
- Examples: Soil, Water, and Sunlight

FERMENTATION

- Fermentation is a chemical breakdown of a substance by yeast or other microorganisms
- Used for thousands of years for baking and brewing

WHAT IS ETHANOL?

- An intoxicating agent used in fermentation and distilled liquids
- Used in beer and wines
- Most widely used in biofuels
- Comes from two main sources: Sugarcane and corn

WHAT IS ETHANOL USED FOR?

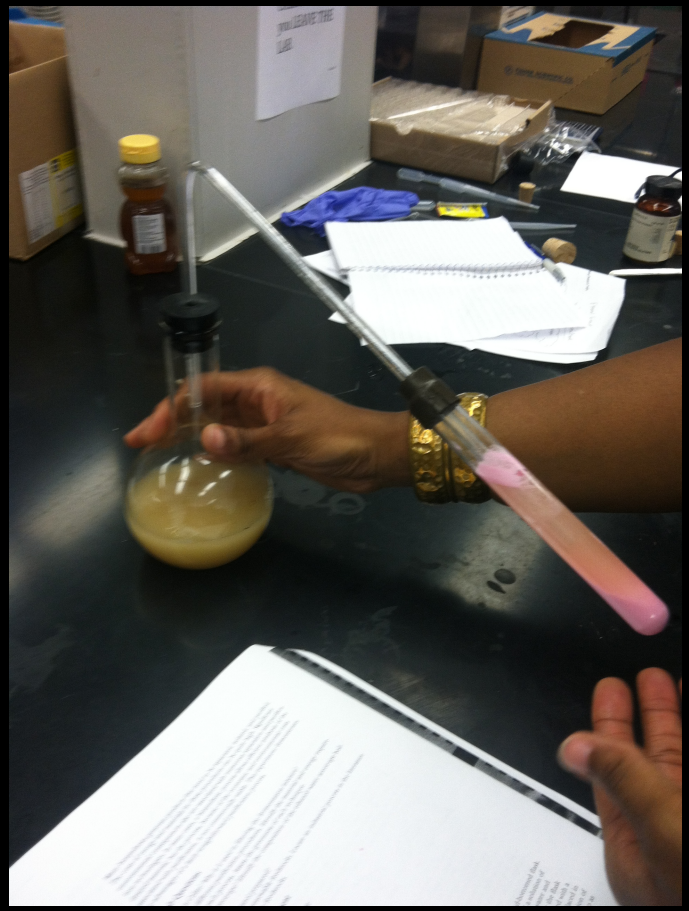
- Solvent used in medicines, cleaning solutions, colognes, and after shave
- Clean burning alternative to gasoline
- Most gas in the United States is blended with Ethanol
- The most ethanol currently in gasoline is 15%

STUDY OF PURPOSE

- Synthesize the ethanol and see which of the products produces the most ethanol.
- Which test substance is the purest in comparison to pure ethanol?

METHODOLOGY

- Make 500 milliliter flasks of sucrose, yeast, disodium phosphate, and water ; bread, sucrose, disodium phosphate, and water; and fructose, disodium phosphate, water, and yeast (Following packet)
- Connect flask with glass rod to test tube of calcium carbonate
- Let it ferment overnight



Picture 1

ethanol - is an alcohol which is made by fermenting the sugar and starch components of plant materials by using yeast such as saccharomyces cerevisae.

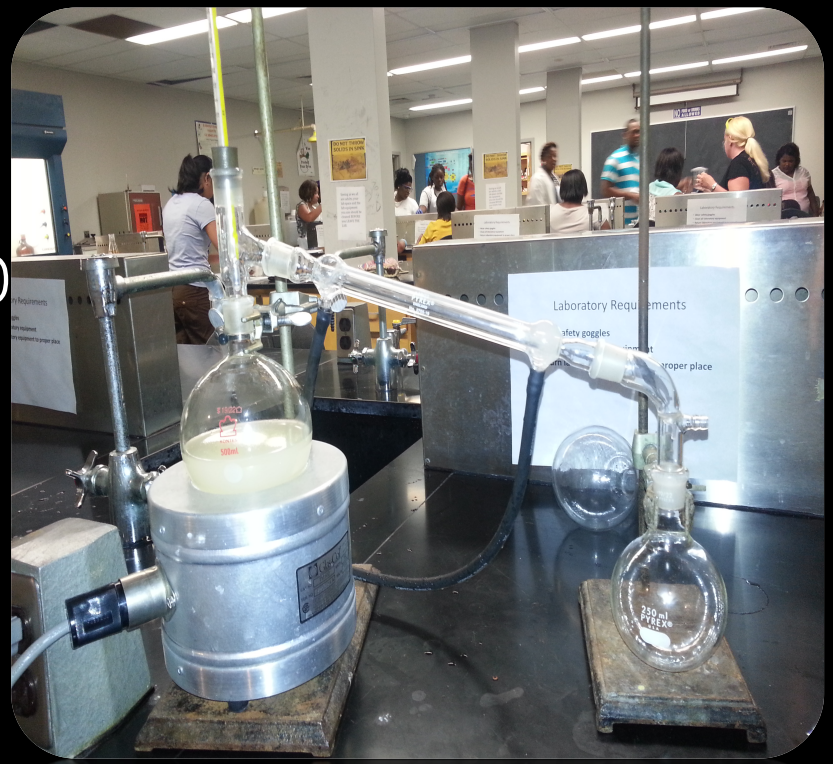
FILTERING PROCESS

- Prepare filter paper in Buchner funnel for filtering
- Pour fermented solution through Buchner funnel while running vacuum to remove solids

Picture 2

DISTILLATION PROCESS

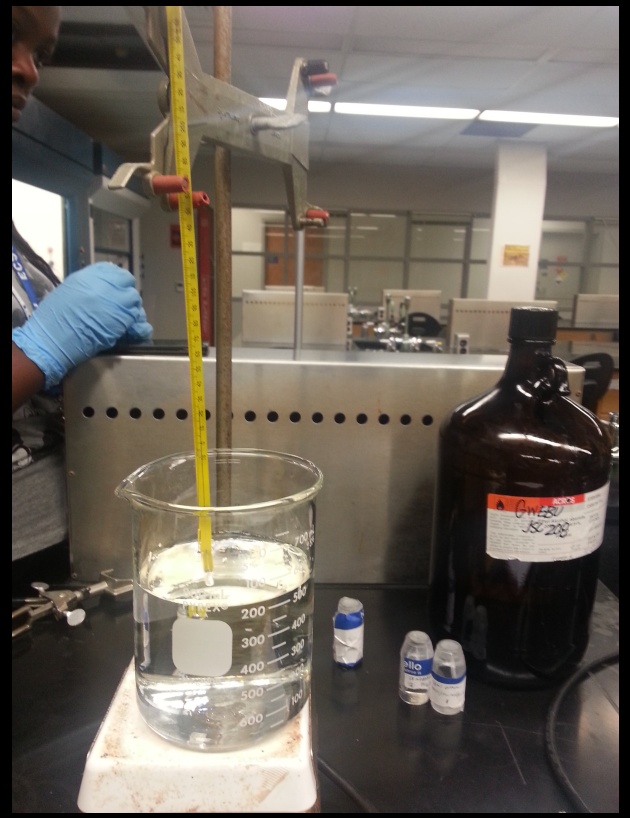
- SET UP DISTILLATION APPARATUS (MAKE SURE ALL PARTS MATCH)
- Pour each solution 19/22 or 22/40 500 milliliter flasks
- Sit flasks in heating mantle (set on ringstands)
- Collect each ethanol sample from each solution



Picture 3

PURITY TEST

- Dip a capillary tube into each ethanol solution
- Boil 500 milliliters of water while inserting capillary tubes beside thermometer into the water
- Check tubes to see at what temperature the ethanol boils



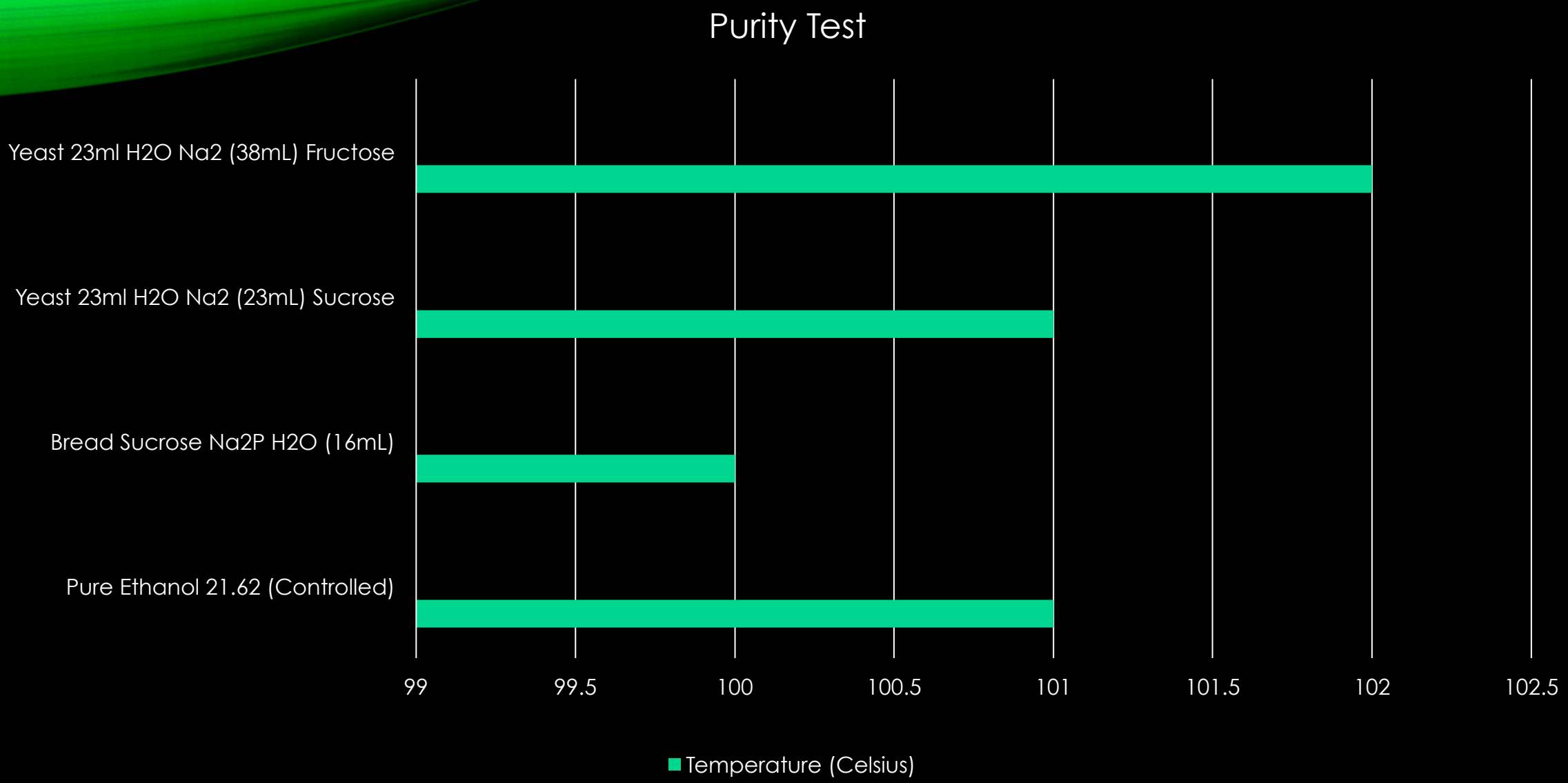
Picture 4

Picture 5

Distilled Ethanol

Bread, Sucrose, Water, Disodium Phosphate	16 Milliliters
Yeast, Sucrose, Water, Disodium Phosphate	23 Milliliters
Fructose, Yeast, Water, Disodium Phosphate	38 Milliliters

Table 1


Purity Test
Yeast 23ml H2O Na2 (38mL) Fructose
Yeast 23ml H2O Na2 (23mL) Sucrose
Bread Sucrose Na2P H2O (16mL)
Pure Ethanol 21.62 (Controlled)
99
99.5
100
100.5
101
101.5
102
102.5
Temperature (Celsius)

Graph 1

DISCUSSION

- Did the results support the hypothesis? If no, why not?
- Elements that could have negatively affected the outcome

- Significance of the experiment as a whole
- How could this experiment be improved?

FUTURE WORK

- Used for environmental gas conservation
- More efficient ways to make common household products such as medicine, cologne, and cleaning supplies

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ACKNOWLEDGEMENTS

Special thanks to:

God,

V.E.S.T.E.M. and the L.S.A.M.P. programs and the mentors involved,

Mrs. Shanta Outlaw,

Ms. Jennifer Vanwyck,

Mr. Raynard Townsel,

Mrs. Prudentia Ngwainbi

Dean Bass,

and Dr. Khan for making all this possible aiding in the research and analysis process. This would not have happened without all your help and support. Thanks!