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Production of Bioethanol from Waste Banana Peel

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Abstract: *The production of bioethanol is a renewable form of energy that is prepared from natural substituents. The resources of fossil fuels or the conventional fuels are now decreasing. To meet the needs of the fuel an alternative source is required which can be accomplished by bioethanol. United states leading producer of fuel ethanol in the world and the another type of country like Brazil, and European union production process will be occurs. The ethanol is prepared from the various stages such as Growing , feedstock transport, pretreatment , fermentation, distillation benedict test and dehydration. The production of bioethanol is mainly depending upon pretreatment step. lignocellulosic agriculture waste of potential to produce of bioethanol.*

Keywords: Banana peels, Bioethanol, Fermentation, Hydrolysis, Pretreatment, S.Cerevisiae

I. INTRODUCTION

Global warming urban pollution and reserves depition of fossils biofuels is defines as any fuel sourced derived from biomass otherwise known as organic matter. this includes any plant or algae material {including good} as well as animal waste. Since these types of fuels are continually being replenished naturally by the cycle of life, the primary biofuels are defined as organics material that are deployed as an energy source immediately, without any prior treatment or processing .[1]Fossil fuels are the major source of energy worldwide. The requirement of these fuels can be replaced by bioethanol. Bioethanol is a result of fermentation of carbohydrate rich source employing different types of yeast and bacterial cells.

The Ethanol is also called alcohol. It is colorless, flammable, volatile liquid.

The molar mass of ethanol is 46.07g/mol,0.789g/cm^3 is the density, -114º C is the melting point and boiling point of 78. 37°C.It also used in production of useful chemicals and widely used as solvent, fuel, antiseptic. Bioethanol is a result of fermentation of carbohydrate rich source employing different types of yeast and bacterial cells. A primary tool to analyze the ethanol production process from an integrated point of view is offered by energy analysis. Banana fruit and its associated residual biomass are amilaceous and lignocellulosic compound.

1.1 Production of Banana

Bananas are predominately produced in Asia, Latin, America and Africa. The largest producers for domestic consumption are India an China.

1.2. What Bioethanol

- Renewable biofuelsthat oxygenated 35%.
- It providing the potential activity to reduces automobile.
- Reduce the pollution.
- The ethanol is producing the more energy.
- It can be made available at low cost for consumers.
- Increasing the income of the farmers and rural employment.
- Reduces the carbon emission.

1.3 Uses of Fossils Fuels

Three types of fossils fuels exists in three different forms.oil being in liquid form coal being in solid from and natural gas being in gaseous forms below are the fossils fuels in different filed:

- Uses of oil

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- Uses of coal
- Uses of natural gas

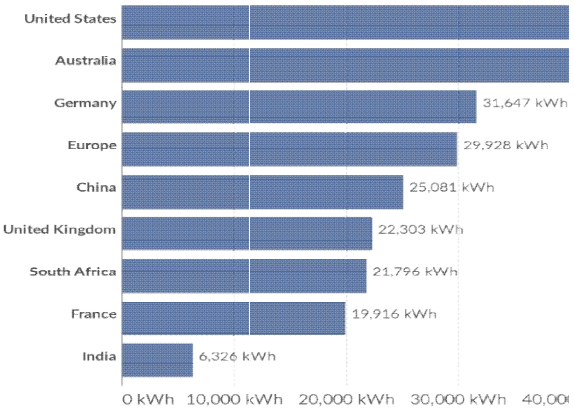
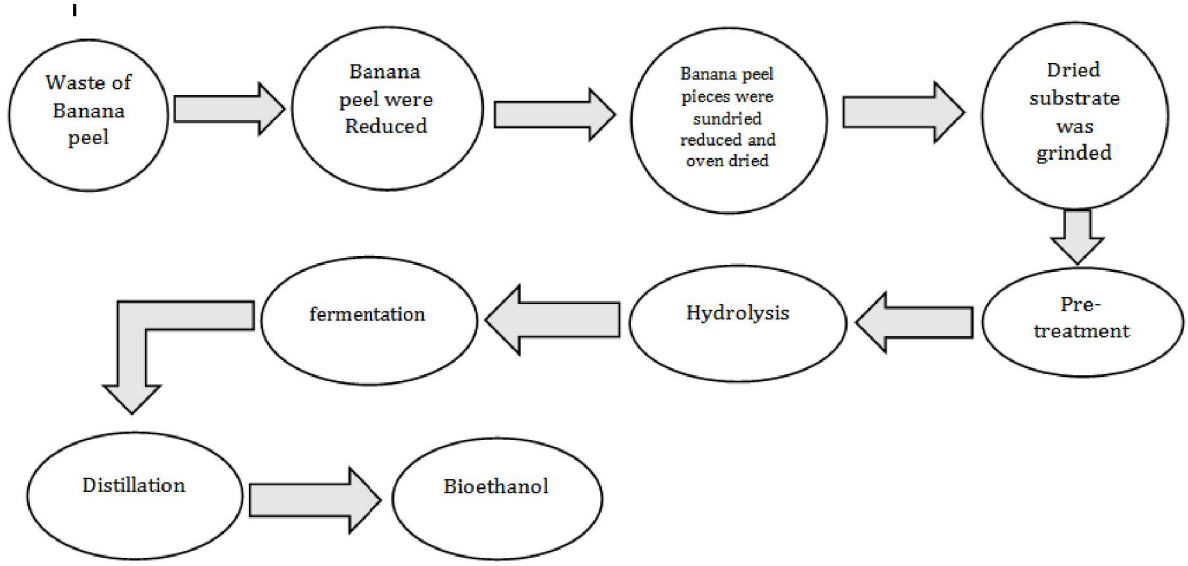


Figure 1: Consumption of fossils fuel in the world

1.4 About Bioethanol from Waste Banana Peel

The production of bioethanol as renewable form of energy is produced by using banana peel .The lignocellulosic agriculture waste has a potential to produce bioethanol. The vital steps in bioethanol production are pretreatment and hydrolysis both the technique are applied.

II. METHODOLOGY



1.5 Preparation of Raw Material

Figure 3: Collection of waste banana peel **Figure 4:** Banana peels were cut into small pieces and sun dried for 2days

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Waste of banana peel is collected from the fruit juices Centre that peel can be reduced in small pieces in sizes make it is can be easily handled it .There will be dried in sun light as well as dried oven . The dried substrate was grinded into powdered, packed in polyethylene bag at 0°C temperature for further analysis .

Figure 5: Oven dried Banana peels at 60°C

Figure 6: Powdered banana peel

1.6 Pre-treatment of Waste Banana Peel

This process pre-treatment is probably the most crucial step since it has large impact on the efficiency of the overall bioconversion. pre-treatment is performed in order to remove foreign material from fabrics and to improve the uniformity, hydrophilic, characteristics, and affinity for dye stuffs. Banana peel powder was absorbed by the water {200 ml} for 40 – 170 min and then autoclaved at 120°C for 20 min. The pretreatment waste was filtered and filtrate will be formed.

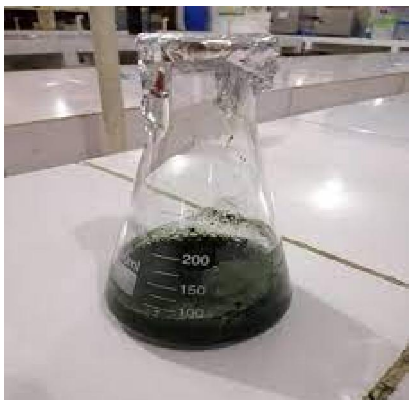

Figure 7: Pre-treated banana peel solution

1.7 Hydrolysis

Enzymatic hydrolysis in bioethanol production presents an important step, where sugars that are fermented are obtained in the final fermentation process. In the process of enzymatic hydrolysis.that process is a breakdown of polysaccharide into monosaccharides components 1.0 % of sulphuric acid , wasprepared and mixed with pretreated banana solution . the solution is treated at 120°C for about 5 hours and allowed to cool .

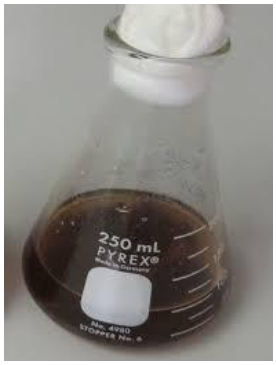

Figure 8: Hydrolysed banana peel solution

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The Benedicts test is a chemical test that can be used to check for the presence of reducing sugars and nonreducing sugars before fermentation process.

1.8 Benedict Test

It is confirmed to check the presence or absence of sugars for the fermentation process save the time and efforts . Benedicts test is determine the amount of sugar generated.

1.9 Performance of Benedict Test

In the test tube 1ml of sample solution 2 ml of benedicts reagent mixed thoroughly and keep the boiling water bath about 14 to 25 min. that can be changed the color from blue to green and they will presence of reducing sugars.

Figure 9: Benedict test

1.10 Fermentation

The Fermentation is the final process of bioethanol production. saccharomyces, cerevisiae was, used to convert the monosaccharides and disaccharides produced during hydrolysis into bioethanol with the help of invertase and zymase enzyme. The enzyme that can be found to be present in saccharomyces, cerevisiae. The yeast cell is added in the hydrolyzed solution. The fermentation process will be started at one week and finally that can be prepared and that sample is passed through the distillation process .

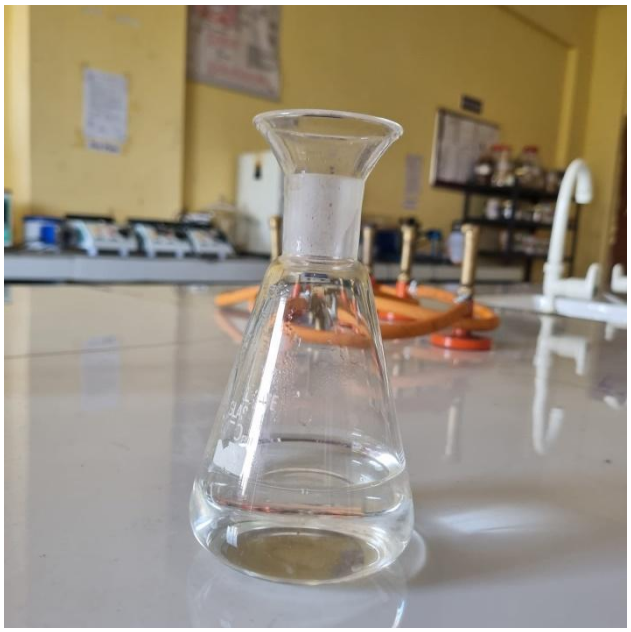

Figure 10: Distillated bioethanol

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III. RESULT AND DISCUSSION

The result of the investigation showed that, the fermented banana peels produced a significant amount of ethanol. The solution was kept for 7-8days for the production of ethanol, regularly note down the changes. The required for the fermentation process decreases dramatically with increase in the concentration of yeast. The Bioethanol estimation done by potassium dichromate method (Five different test tubes were taken and to each test tube ethanol is added in the increasing concentration and then 2ml of potassium dichromate solution is added to each test tube and Shaked well. Incubate it for 20min in room temperature and check for O.D. the graph was plotted concentration versus O.D).The graph was plotted ethanol concentration versus O.D and by graph obtained the percentage of bioethanol is 6.5%.

IV. CONCLUSION

The work reveals the possibility of producing bioethanol from fermentation of banana peel and which may serve as cheap alternative source of fuel and energy generation. The use of banana peel is means to reduce the pollution and biological conversion of cellulose to fermentable sugar for the process of bioethanol which ecofriendly.

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