

# Distillation of Fermented Biomass “A Scope for Future Bio-Methanol”

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**Abstract:** Energy is one the essential constituent of modern society. Now a day's energy comes for the greatest part from fossil fuel like oil, natural gas and coal. The proven fossil fuel reserves are declining in most part of the world. This demands for the development of sustainable alternative energy sources. Renewable energy is generally defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves and geothermal heat. Renewable energy often provides in four important areas: electricity generation, air and water heating/cooling, transportation and rural (off-grid) energy services. Methanol is an alternative fuel for internal combustion and other engines, either in combination with gasoline or directly ("neat"). It is used in racing cars in many countries. In the U.S., methanol fuel has received less attention than ethanol fuel as an alternative to petroleum-based fuels, because in the 2000 particularly, the support of corn-based ethanol offered certain political advantages. In general, ethanol is less toxic and has higher energy density, although methanol is less expensive to produce sustainably and is a less expensive way to reduce the carbon footprint. However, for optimizing engine performance, fuel availability, toxicity and political advantage, a blend of ethanol, methanol and petroleum is likely to be preferable to using any of these individual substances alone. Methanol may be made from hydrocarbon or renewable resources, in particular natural gas and biomass respectively. It can also be synthesized from CO<sub>2</sub> and hydrogen.

**Keywords:** Bio-methanol, methanol, carbon footprint, biomass, synthesized etc.

## 1. Introduction

Most of the renewable energies depend in one way or another on sunlight. Wind and hydroelectric power are the direct result of differential heating of the Earth's surface which leads to air moving about (wind) and precipitation forming as the air is lifted. Solar energy is the direct conversion of sunlight using panels or collectors. Biomass energy is stored sunlight contained in plants. Other renewable energies that do not depend on sunlight are geothermal energy, which is a result of radioactive decay in the crust combined with the original heat of accreting the Earth, and tidal energy, which is a conversion of gravitational energy.

## 2. Research Objective

Methanol The objective of this study is to investigate the optimization process parameter for the production of Bio-Methanol by Co-Fermentation process of Biomass.

The following objectives were set for the present work:

1. Idealization or study about the substrate where Bio may be exact.
2. Collection and Characterization of biomass.
3. Testing and analysis of substrate.
  - Moisture content
  - TOC Content
  - Ash Content
  - Nitrogen Content
  - pH
4. Distillation of fermented biomass

## 3. Methodology

### Distillation of the Sample

- Lie big condenser was used for the distillation process.
- Sample was poured into the distillation flask. Then vapours are converted into droplets in the condenser.
- Condenser consist of outlet (discharge of hot circulated) for water and inlet (for connection with tap)for water.
- The heat was adjusted in such a way that the drops come at the rate of one per second. Distilled liquid were then the collected.



Lie big condenser

## 4. Determination of Methanol

- Preparation of 1% to 5% alcohol in various test tubes.
- 1ml of various concentration of alcohol was poured into the 25 ml of water.
- Then the sample was distilled and 15 ml of distillate was collected.

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- In 15ml of distillate 25 ml of  $K_2Cr_2O_7$  was added. Make the volume up to 50ml.
- Then the alcohol potassium dichromate complex was kept for water bath at temperature 60 for 30 min.

Then OD was measured at 600nm. Standard curve graph was plotted with concentration of alcohol on x axis and y axis at OD 600nm. Some important instruments used some in CSIR-CIMFR laboratory, are enlisted in figure, 4.5. CHNS analyzer is a scientific instrument which can determine the carbon (C), hydrogen (H), and nitrogen (N)

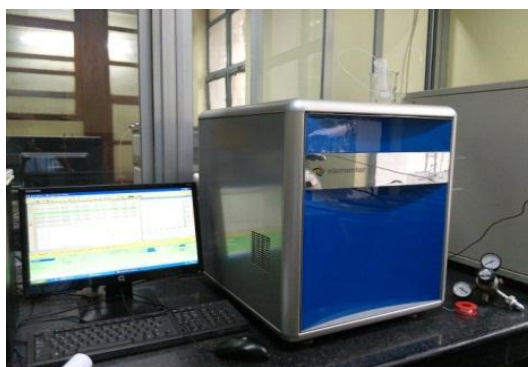
elemental concentrations. A typical analysis for TOC measures both the total carbon present and the so-called "inorganic carbon" (IC), the latter representing the content of dissolved carbon dioxide and carbonic acid salts, Subtracting the inorganic carbon from the total carbon yields TOC. Spectrophotometer is the quantitative measurement of the reflection or transmission properties of a material as a function of wavelength. Kjeldhal is a device, for nitrogen estimation. Other some important devices used: Dry oven, Desiccators, Water bath, Incubators, etc.



(i) Dry Oven



(ii) TOC Analyser



(iii) CHNS Analyser (Vario macro cube)



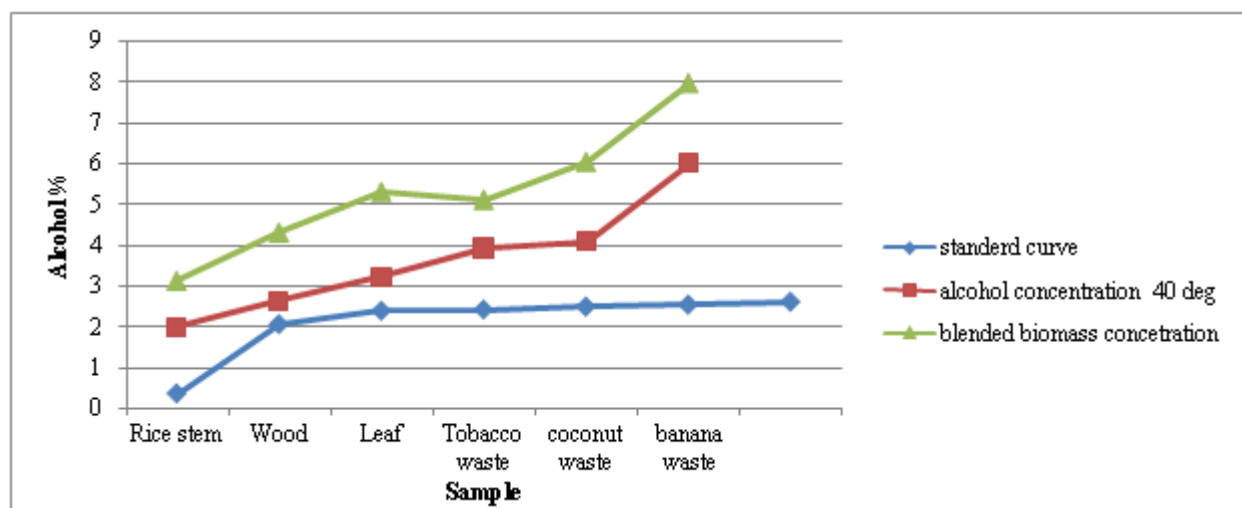
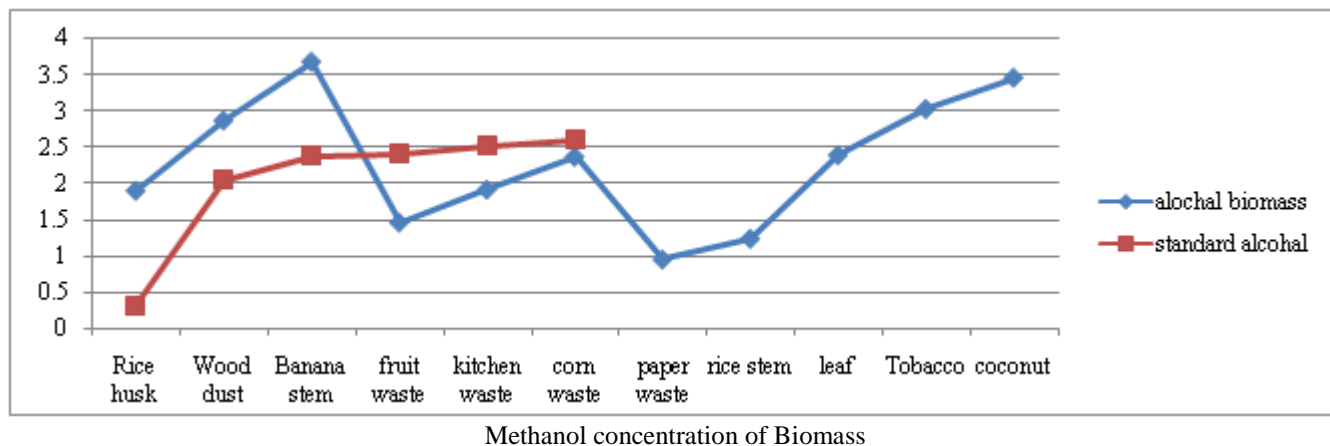
(iv) Proximate Analysis (Thermogravimetric Analyzer)



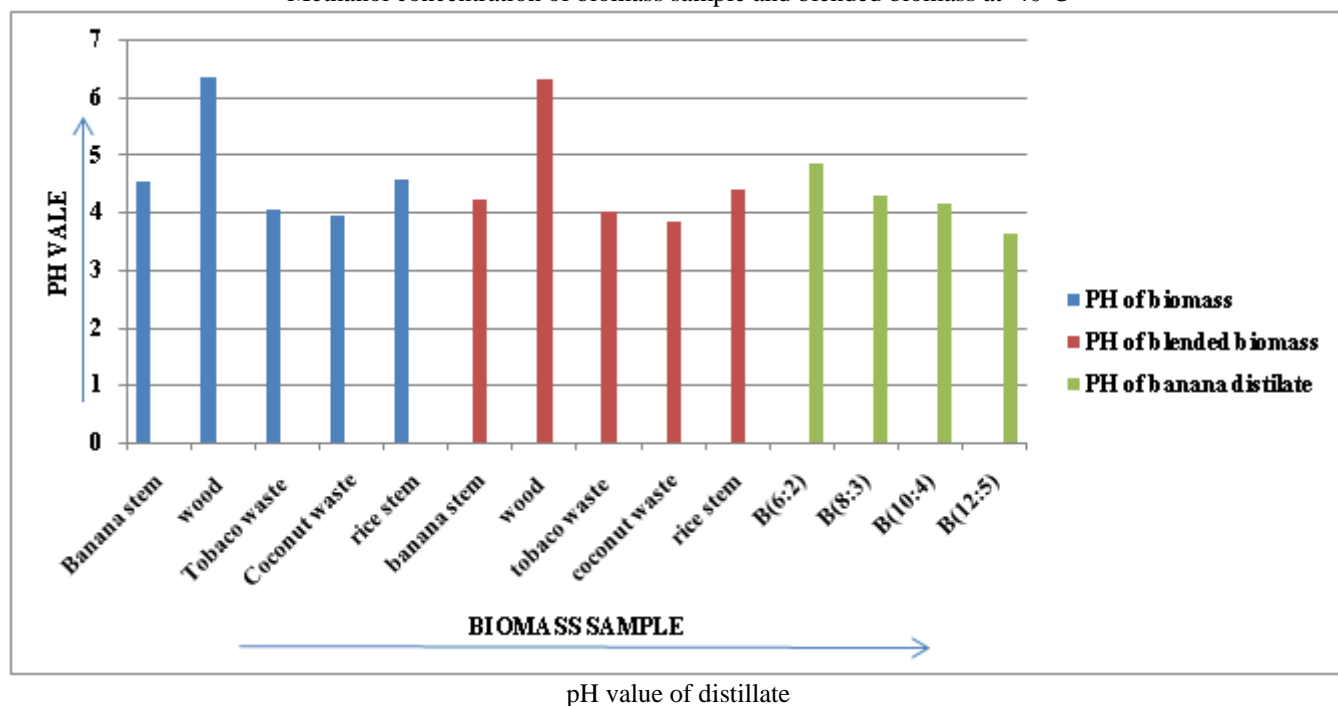
(v) Thermo scientific pH meter, (Orion Star A214)



(vi) Kjeldhal Analyzer



Methanol concentration of biomass sample and blended biomass at 40°C



pH value of distillate

## 5. Conclusion

From this experiment it can be concluded that production of methanol from different biomass sample is much easier, cheaper and efficient than petroleum products. However, the use of biomass feedstock to produce bio-methanol may

compete with the use of biomass for other products and commodities, such as biofuels for transportation, electricity and heat from biomass, and other biomass-based products, such as biogas, chemicals and plastics. In this situation, it is important that the available biomass feedstock is used in an optimal way. One way to promote the optimal use of

biomass is to fully credit the environmental advantages across the entire life cycle, from feedstock production to the end use. A range of policy options, including eco labeling, incentives, carbon tax and information campaigns, can help promote the optimal use of the biomass resources

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