

Bio ethanol fuel out of fermented banana essay sample



Bio-ethanol fuel has been used through these times and produced in many places specifically in Brazil and United States which contributes to the 87.1% bio-ethanol production in the world. Besides from being eco-friendly, inexpensive and less toxic, it is more preferred as a fuel for the materials used are the ones easy to find. (http://en.wikipedia.org/wiki/Bio_ethanol)

As different from other fuels, bio-ethanol fuel is a form of renewable energy because the energy is generated using resources which cannot be depleted. It is usually obtained from the conversion of carbon-based feedstock which is considered as a renewable energy for it gets the energy from the sun by means of the process of photosynthesis. The photosynthesis itself performs due to the energy of the sun. (http://en.wikipedia.org/wiki/Bio_ethanol)

In the production of bio ethanol fuel, the process of anaerobic respiration is included in the process of fermentation. In this process, the glucose ($C_6H_{12}O_6$) from the feedstock is broken down into two molecules of pyruvic acid through glycolysis. With the presence of yeast molecules from the yeast (*Saccharomyces cerevisiae*), the pyruvic acid is broken down into Carbon Dioxide (CO_2) and Acetaldehyde. The acetaldehyde then acts as acceptor of the hydrogen which enables to produce a molecule of ethyl alcohol (C_2H_6O). This alcohol serves as a bio ethanol fuel for it comes from a carbon-based feedstock.

Statement of the Problem

In our society, commuters and fuel-consumers use not only one kind of fuel. Some use ordinary fuel, leaded or unleaded but bio ethanol fuel is the known

cheapest and eco-friendly fuel of all. (<http://www.guardian.co.uk/environment/2007/mar/31/motoring.money>)

The use of bio ethanol is not new nowadays. In fact, there are many variations of bio ethanol fuel through the past times. There are some that perform different bio ethanol fuel from other carbon-based feedstock. As a new argument, the wastes of was used as the carbon-based feedstock to produce bio ethanol fuel. The peelings were then abundant in our society. We can see them evidently that people trash them. As it continue, the peelings are excessive. Good thing it is biodegradable so it does not affect pollution.

The researchers attempted whether the banana peelings can be used as the feedstock to produce bio ethanol fuel.

Significance of the Study

Bio-ethanol fuel has different advantages and importance to our economy. At the same time, it helps people to be creative in terms of being eco-friendly. According to Nuffield of Bioethics, Bio-ethanol fuel helps people in different ways. It is affordable. You can even make bio ethanol fuel from resources around you. Meaning, a big sum of money is not required to produce this fuel. It is also helpful in terms of people's health. In many studies, bio ethanol is proven to release less toxic chemicals compared to commercially-distributed fuel. It releases less hydrocarbon which can be harmful to us. There are other fuels that have harmful chemicals that can affect the body system specifically, the lungs and the skin. Also based on Nuffield of Bioethics, this fuel can be described as an eco-friendly matter because of its

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main component, a carbon-based feedstock which is an organic matter. This type of fuel contributes to our environment for it lessens air pollution by not releasing harmful chemicals which are present in black smoke. Hypothesis

This study focuses on the quality of bio ethanol fuel out of banana peelings.

The null hypothesis (H_0) states that bio ethanol fuel would not be of good quality in terms of firing duration and substances it releases than other fuels.

The alternative hypothesis (H_a) states that bio ethanol fuel would be of good lighting quality and be better than other fuels in terms of firing duration and substances it releases.

Scope and Limitations

This experimentation and process deals with the production of bio ethanol fuel out of fermented banana peelings and the comparative analysis of the fuel from other fuels in terms of firing duration and chemical composition during smoke emission.

This requires wide area and space because the banana peelings had undergone through the process of fermentation, evaporation and self-condensation. The involvement of fire in this study and experimentation is included so a wide area is more preferred.

As for now, the bio ethanol fuel from banana peelings cannot be tested in vehicles due to lack of tools and facilities which will require big amount.

In the process, a long time is needed for the process will undergo self-condensation. Meaning, the process will take long in the room temperature.

Review of Related Literature and Studies

Bio ethanol fuel has been used since. This kind of fuel has been tested <https://assignbuster.com/bio-ethanol-fuel-out-of-fermented-banana-essay-sample/>

through varied ingredients, tools and processes that somehow change the effect and quality of the bio ethanol fuel. (<http://en.wikipedia.org/wiki/Ethanol-Fuel>)

In some countries, bio ethanol fuel is used to power automobiles, vehicles and machineries. Bio ethanol used in automobiles consumes approximately 51% higher than ordinary gasoline which results to give slightly better torque output. (<http://en.wikipedia.org/wiki/Ethanol-fuel>)

There are different crops that can be made into bio ethanol fuel. These substances which have the energy came mainly from the sunlight. Some of the materials which make a good quality of bio ethanol fuel are corn, sugarcane, and animal feces. Because bio ethanol fuel is usually obtained from carbon-based feedstock, producers were the best source of bio ethanol fuel. (http://en.wikipedia.org/wiki/Bio_ethanol)

Besides from the organic substances which make the bio ethanol fuel, the process in which ingredients undergo is also one of the factors that may vary the quality of bio ethanol fuel. It is the process in which people living in urbanized zones let the organic material ferment in a long time. In these times of fermentation, the compartment where the organic matter ferments is connected to another compartment. As the result of time, the compartment produces flammable gas which later turns to liquid fuel. With the use of the new technology, another process is created which is used most. Instead of fermenting the organic matter, for weeks and months, it is fermented for some time only. Then, the organic matter undergoes the process of evaporation and condensation. Bio Ethanol from Cow Feces

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Students in Kapayapaan National High School made another variation of bio ethanol last January, 2012. The use of feces of cow serves as the material of the bio ethanol fuel. Same process was used, which is the process of evaporation and condensation. The bio ethanol from cow was compared with kerosene and an ordinary gasoline. It was found out that bio ethanol emits white smoke and then the other fuel emits dark smoke. Bio Ethanol from Sugar Cane in Brazil

Brazil is the most productive in bio ethanol fuel-making. In 2007, they started to produce bio ethanol fuel out of sugar cane. Until the year of 2010, they remain as the most productive. As for now, there are no light vehicles in Brazil which runs pure gasoline. Sooner, Brazil aims to make all of their vehicles to run using bio ethanol fuel. Brazil uses sugar cane, specifically the bagasse which is the fibrous matter after the sugar cane had undergone the process of juice extraction. In the making of this sugar cane, bio ethanol is quite different from the traditional and conventional way. After harvesting, the sugar cane undergoes to the milling and refining to extract the largest amount of sucrose which makes and releases energy. The result of the milling and refining will undergo next to the process of fermentation. In this fermentation, the addition of yeast will make it possible to transform to ethanol.

This fermentation varies from four to twelve hours which results to the production of 7-10% of alcohol content which makes it flammable. With the use of different alcohol boiling points, the ethanol undergoes to the heating process which allows the solid components to be separated. During the process of heating, the container is connected to another container by a <https://assignbuster.com/bio-ethanol-fuel-out-of-fermented-banana-essay-sample/>

tube. This tube allows the process of condensation which makes ethanol result to fuel. (http://en.wikipedia.org/wiki/Bio_ethanol) Bio Ethanol Out of Pig Poo in United Kingdom

In United Kingdom, pig manure was used to produce bio ethanol. The process that was used was called anaerobic digestion - digestion in absence of oxygen. This process produces methane which is siphoned off, clean and filtered. Bio ' Lec in North Carolina

North Carolina also uses bio ethanol. But the difference in this, they use bio ethanol as the source of some power plants. They produce first the science of making the fuel and then transform it to electricity. (www.thebioenergysite.com/news/7125) They named the ethanol as " Bio ' Lec" coming from the combination of the words " bio ethanol" and " electricity." To make the fuel work, they use generators to transform the fuel into electricity. In order to avoid pollution by the use of fuel, the Bio ' Lec is cleaned and dehydrated. As for the process, the conventional way was used in order to produce it. Corn Bio Ethanol in United States of America

Other ingredient for bio ethanol is corn. The use of corn in bio ethanol initiated from the United States of America which is the second in the most productive countries in terms of ethanol-production. The discovery of corn as a bio ethanol is reasonable. USA finds alternatives for the alternative fuel for the ordinary fuel price at those times increase. They also discovered it out when they are finding alternatives when they run out of usable fuel. As for pollution, there are tests proving that corn bio ethanol emits fewer greenhouse gases. By this production, a problem somehow stroked the

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families in USA. The prices of corn and other grains increased for it is somehow a necessity for the families which uses this kind of bio ethanol.

With the high demand of these grains, the price of corn increased dramatically. (www. nuffieldbioethics.

org/sites/default/files/files/1_5_Biofuels_case_studies. pdf) Bio Ethanol from Palm Oil in Malaysia

Another kind of bio ethanol uses palm oil. This is used in Malaysia. Malaysia has a national policy to promote renewable energy. This is the root of the production of bio ethanol. As like other producers of bio ethanol, the same procedures was used. The main difference is the ingredient used which is the palm oil. Bio Ethanol from Pineapple Peelings

As a waste from pineapple, pineapple peel still contains high carbohydrates and glucose which makes it a very good source of bio ethanol. As it differs to the last studies, these pineapple peelings were fermented for months. This is made the same as the traditional way of making this bio ethanol.

In some countries, bio ethanol fuel is used to power automobiles, vehicles and machineries. Bio ethanol used in automobiles consumes approximately 51% higher than ordinary gasoline which results to give slightly better torque output. (en. wikipedia. org/wiki/Ethanol-fuel) Sea Oil Fuel with 10% Bio Ethanol

Bio ethanol is also used even in our country. A big company of gasoline, namely Sea Oil, is using bio ethanol fuel. They mix 10% bio ethanol fuel to the real gasoline so the prices of their gasoline are indeed cheaper than other gasoline companies. The quality of the gasoline slightly differs. As a <https://assignbuster.com/bio-ethanol-fuel-out-of-fermented-banana-essay-sample/>

result, other consumers prefer Sea Oil gasoline for it is: (1) cheaper (2) better quality and (3) eco-friendly. Methodology and Research Design

Location of the Study

This study was conducted in Phase V, Villa de Calamba, Brgy. Lamesa in Calamba, Laguna. The analysis of the chemical composition of the fuel was done in LTO Emission Test in Halang, Calamba, Laguna. This study prefers a wide area because the heating process of the fermented banana peelings needs an open place to prevent fire accidents. Instruments

The banana peelings mixed with yeast was fermented in a tin can or a container with cover to make sure of the absence of oxygen connected to another small container through a glass or metallic tube. The containers should not have holes to prevent oxygen to enter the fermentation process.

After the process of fermentation, from one to two weeks, the fermented banana peelings underwent the process of evaporation of the liquid inside by heating the tin can. The tin can and the other small container was elevated from the ground for the charcoal was placed under the can. The bio ethanol fuel will be tested by duration by placing it in a cotton ball. The cotton ball with bio ethanol was fired. This process tested the duration and darkness of the smoke produced by bio ethanol. The duration and the darkness of the smoke emitted by kerosene and diesel will also be tested and compared with bio ethanol. Also, the bio ethanol was tested for the chemical composition emitted when it was fired. The process was also done to kerosene and diesel.

Data Gathering

After the three fuels had been placed each in a cotton ball and fired, the researchers took note of the duration of the fuels by seconds. The duration was then compared to each other by the use of statistical analysis.

The smoke emission was also tested for the presence of excessive hydrocarbon. The fuels were tested twice, for twenty-second and thirty-second analysis. The data were gathered with the help of LTO Emission Test.

Statistical Treatment of Data

The use of ANOVA or the Analysis of Variance was used in the study to analyze the difference of the duration and the amount of hydrocarbon of the fuels.

Presentation, Analysis and Interpretation of Data

Duration of Fire

To get the duration of each of the fuel, the fuels were tested using a cotton ball, adding ten drops each of the designated fuel. After getting the time, each fuel stood to various duration and time. The researchers held three trials to compare and see the difference.

The Bio Ethanol gained 87 seconds in the first trial, 90 seconds for the second and 85 seconds for the last trial. Likewise, the Kerosene resulted to 65, 59 and 53 seconds consecutively. Lastly, the Diesel took 84, 81 and 72 seconds before it was burnt. These data were analyzed to see the difference using the statistical analysis.

Before the computation for the value of F for the data, two hypotheses for the ANOVA were made. The null hypothesis (H_0) states that there was no

significant difference between the three set of data from the duration of bio ethanol, kerosene and diesel ($x_1 = x_2 = x_3$). Accordingly, the alternative hypothesis (H_a) states that there is a significant difference between the three set of data ($x_1 \neq x_2 \neq x_3$).

Based from the computed value using ANOVA at 5% level of confidence, the value of F is greater than the critical value which is 5. 14. Meaning, the null hypothesis is accepted while the alternative hypothesis of the analysis is rejected. Chemical Composition of Smoke Emitted

The fuels were also tested in terms of chemical composition of the smoke emitted. It was held in LTO. They assisted the researchers to further examine the composition of the fuel. The fuels are detected to contain amounts of hydrocarbon in ppm (parts per million).

These are the hydrocarbon findings in each of the fuels. Each of the fuels was analyzed by ANOVA.

The Bio Ethanol released 159 ppm in the 30-second trial and 127 ppm in the 20-second trial. The kerosene gained 372 ppm and 336 ppm consecutively. Lastly, the diesel emitted 324 ppm and 336 ppm for the 30-second and 20-second trial. These data were also analyzed using the ANOVA to see if there was difference between the set of data from the emitted hydrocarbon. Again, before the computation for the value of F for the data, two hypotheses for the ANOVA were made. The null hypothesis (H_0) states that there was no significant difference between the three set of data from the amount of hydrocarbon emitted by the bio ethanol, kerosene and diesel ($x_1 = x_2 = x_3$).

Accordingly, the alternative hypothesis (H_a) states that there is a significant difference between the three set of data ($x_1 \neq x_2 \neq x_3$).

Based from the computed value using ANOVA at 5% level of confidence, the value of F is greater than the critical value which is 9.55. Meaning, the null hypothesis is accepted while the alternative hypothesis of the analysis is rejected.

Summary, Conclusion and Recommendations

As the researchers held their experimentations on finding if there was difference between the duration of the fuels, the Analysis of Variance stated that the value of F is greater than the critical value ($F > cr$). Therefore, the null hypothesis of the duration of the fuels was accepted and the alternative hypothesis was rejected. Thus, there is no significant difference between the set of data which came from the duration of the bio ethanol, diesel and kerosene.

Without further analysis of the data, the bio ethanol fuel had a longer duration of fire than diesel and kerosene which comes from the mean duration of the fuels. On the other section of this study, the hydrocarbon findings, the ANOVA revealed that the value of F is also greater than the critical value ($F > cr$). Therefore, the null hypothesis of the chemical composition was accepted and the alternative hypothesis was rejected. The researchers concluded that there is also no significant difference between the data from the hydrocarbon emitted in each of the fuel.

Based on the mean of the emitted hydrocarbon in different fuel, the bio ethanol had less. Therefore, it is safer to use than kerosene and/or diesel.
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The presence of hydrocarbon in these fuels suggests that too much use of them might also be harmful.

This study accepts the alternative hypothesis (H_a) and rejects the null hypothesis (H_0). The difference between the fuels are rejected but by examining the mean of each of the fuel, we can conclude that the bio ethanol out of fermented banana peelings have a good quality in terms of firing duration and substances it releases than other fuels.

The researchers recommend to the next researchers to add more different kind of fuel to be exact in terms of finding their difference. Next, we would like to recommend that the further analysis of the other composition of the fuels is included such as CO₂ and Oil Temperature.