

Ethanol distillation assignment



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Peelings through the Process of Fermentation and Distillation Abstract Apple (Malls domestic) and banana (Mums accumulate Cola) peelings are common household waste products. This study sought to extract biathlon from these two peelings and to compare which sample can produce more biathlon.

About 400 grams of apple and banana peeling was obtained from the 1 kilogram bought from the supermarket and allowed to ferment for one to two weeks.

The mash was placed in an improvised pressure cooker still. The temperature was monitored at 70 °C to assure that alcohol content of the mash would be attained and not just water which boils and evaporates at 100 °C. The liquid yield was repeatedly distilled in the improvised still. The banana mash produced more biathlon with 140 ml of yield as compared with the apple puree that produced 120 ml. The results validate the original hypothesis that apple and banana can be a source of biathlon. The 40% and 46.7% biathlon yield from apple peelings mash and banana peelings mash respectively represents a significant amount of alcohol.

Introduction In a recent study, it has been stated that combustion of the fossil fuels at the current rate would contribute to the environmental crisis globally (Channel et al. , 2007). Global climate shift can be felt all-over the world. An evidence of which is the sudden average temperature drop that has been recorded here in the Philippines?? lower than previous existing temperature data. In lieu with this and due to the increasing demand of fossil fuels combined with depletion of reserve crude oil, it has led to the development and innovation of various CEO-friendly concepts.

In addition, demand of the energy increases with the increase of the world population and urbanization and thus, development of pioneering as alternative energy might help to reduce these problems. Pioneering can be defined as energy obtained from biomass, which is the biodegradable fraction of products, waste and residues from agriculture like vegetables and animal origin, forestry and related industries and also, from the biodegradable fraction of industrial and municipal waste (FAA, 2008). Different forms of pioneering can be produced from a wide range of biomass sources, for example, agricultural residues.

One of these possible products is biogas. There are many countries that use waste biomass as option rather than use food supply for energy production. In Zanzibar, some researches have been conducted on energy production from crop residues. Meanwhile, banana waste has been used to produce biogas using fed-batch digestion in Australia (Biopic, 2008). It is with this thought in mind that the researchers would like to observe if the common household wastes, such as apple and banana peelings, are suitable source of bio-ethanol using the steam distillation process.

In addition, the researchers would like: to evaluate how apple and banana peelings can create more biogas, to determine the highest amount of alcohol yielded from the apple and banana peelings sample; and * to observe the quality of the biogas obtained from the apple and banana peelings. II. Significance of the Study The effect global warming to man and earth itself has always been underrated. The sudden changes in global weather patterns resulting to disasters is but a tip of the

iceberg of what would be unleashed if global warming is continuously left unimpeded.

The steady increase of carbon emission due to burning of fossil fuel and coal in the advent of the industrial revolution has been pointed out as one of the key actors leading to global warming. Finding an alternative source of energy I. E. Befoul has been the holy grail of science this days. The main objective of this investigation is to determine the efficacy of apple (Malls domestic) and banana (Mums accumulate Cola) peelings as an alternative source to biathlon. If the study proves to be effective, this may be an important find in the quest for new and viable energy source.

Moreover, considering the upsurge in the prices of fuel and their increasing demand, this study would provide an economically invaluable use for common household waste such apple and banana peelings. III. Scope and Limitations This study is limited to the use of apple and banana peelings only. The edible parts and other fruit parts were not considered in this research. In addition, fruits aside from apple and banana were not covered in this study. The research delimits itself in using only these two fruits. Moreover, further analysis of the liquid yield such as alcohol proofing and pH test were not conducted by the researchers.

The test for the possibility of ethanol production was limited to a flame test?? where the liquid yield is dropped in cloth and tested for possible combustibility. Further analysis of the liquid yield was not done in this investigation. ' V. Review of Related Literature The recent aftermaths of tropical storms after tropical storms that pounded the Philippines has raised

an alarm of the many. This may be a clear evidence of the gradual but very much evident climate change. Backed by years of extensive studies, one of the primary culprits is dumping of carbon into the atmosphere observed through the practice of fossil fuel combustion e. . Running car engines. One possible solution many countries have considered is the use of alternative pioneering. Pioneering can be defined as energy obtained from biomass, which is the agricultural residues. One AT tense possible products is Delineation. According to a news report dated July 2009, Philippines will need to build eight biathlon plants with an average capacity of 30 million liters/year in order to meet the required 208 million liters of biathlon for 2009 as defined in the country's Befoul Law.

Biathlon is manufactured from various agricultural feedstock containing sugar and starch. In Europe, cereals and sugar beet are used, while sugar cane is used in Brazil and maize in the USA. As with conventional alcohol, fermenting sugars using yeasts produces biathlon, followed by a purification process. If cereals are used, the starches are first enigmatically converted into sugars. Biathlon is primarily used in differing concentrations in petrol. In Brazil, it is also used in its pure form (OHIO). The regulatory framework for a national allowance of 10 % volt. Ethanol in petrol (EIA) was laid down in the 2009/30/SEC directive in April 2009 and the national standard DIN 51626-1. The basic steps for large scale production of ethanol are: fermentation of sugars, distillation, dehydration and denaturing. Prior to fermentation, some crops require scarification or hydrolysis of carbohydrates such as cellulose and starch into sugars. Scarification of cellulose is called celluloid's. Enzymes are used to convert starch into sugar. Ethanol is produced by microbial

fermentation of the sugar. Microbial fermentation will currently only work directly with sugars.

Two major components of plants, starch and cellulose, are both made up of sugars, and can in principle be converted to sugars for fermentation.

Currently, only the sugar (e. G. Sugar cane) and starch (e. G. Corn) portions can be economically converted. However, there is much activity in the area of celluloses ethanol, where the cellulose part of a plant is broken down to sugars and subsequently converted to ethanol. For the ethanol to be usable as a fuel, water must be removed. Most of the water is removed by distillation. Distillation is a common method for the separation and purification of organic compounds.

These are usually liquids at room temperature although numerous lower melting solids can be distilled at higher temperatures, say above 1 ICC. Steam distillation is another way to distill high boiling substances and is useful for the isolation of oils, waxes, and some complex fats. Any organic liquid that is immiscible with water can be distilled at a temperature around 10000C, the boiling point of water. ' V. Methodology Approximately 400 grams each of apple and banana peelings will be collected. These will then be combined with water and active dried yeast for distilling in a plastic container.

This mixture will be allowed to ferment for approximately one to two weeks in a warm, dark environment. The fermented substance will then be placed in a simple pressure cooker still and will be distilled into alcohol. The alcohol will then e tested for combustibility. Collection of Apple and Banana Peelings

About 1 kilogram each of apple and banana were bought from the supermarket and peeled to obtain about 400 grams each of peelings. It is then carefully washed to remove ten Impurities. I nee peelings are teen Telnet canap?? s Ana placed In separate container.

The container with apple peelings is labeled as A and the banana peelings container labeled as B. A liter of boiling water is added to each container and is each initially boiled for about 30 minutes. Each mixture is pureed in a blender to obtain 1. 5 liters of apple and banana peelings puree. Building Still The researcher found a simple methodology to be able to build to reconstruct a laboratory set up of the distillation. It consists of constructing a simple still out of pressure cooker. Diagram 1 is a sample picture. Diagram 1. Improved still for alcohol extraction. Construct a simple pressure cooker still.

Coil half of the copper tubing five times (leaving the other half extended) and fit the coil within the coffee can so that the end of the coil bends down and out of the bottom of the can into a bowl. Bend the remaining extended copper tubing in an arc over to the pressure cooker. The end of the tubing should hook over the top of the stem on the cooker's lid (Figure 1). Remove the pin from the lid of the pressure cooker and place the oven thermometer in its place. This will measure the temperature of the alcohol within the pot. Fermentation The obtained apple puree and banana puree samples are placed inside two separate plastic containers.

The apple peeling sample container was labeled as A and the banana, B. Each sample container is mixed with 2 tablespoons of active dry yeast and h

cup of granulated sugar to further increase the rate of fermentation. The notations are kept tightly sealed to avoid air from coming in or out. Both containers will be kept inside a dark room or inside the cabinet and allowed to ferment from one to two weeks. Alcohol Extraction Using the Improvised Still After fermentation, strain the mash through cheesecloth and measure the amount of liquid yield.

Then place the liquid into the pot of the pressure cooker and attach the lid with its copper coil system that was built. Fill the coffee can unit with ice. Place the still unit onto a stove and heat the contents to about 78°C (the temperature at which alcohol boils). Open a window or a vent to provide proper ventilation of the fumes. During this distillation process, the alcohol vapors running through the coils will condense within the coffee can filled with ice and come out of the other end of the copper coil into the bowl (see Figure 1).

Pour it back into the pot again to be distilled a second time in order to attain an even alcohol concentration. Repeat this process until the highest possible proof of alcohol from the still has been determined. Measure the amount of alcohol fuel produced with the 300 millimeters of mass. V. Results and Discussion About 400 grams of apple and banana peeling was obtained from the 1 kilogram bought from the supermarket and allowed to ferment for one to two weeks. The mash was placed in an improvised pressure cooker still.

The temperature was monitored at 70°C to assure that alcohol content of the mash would be attained and not just water which boils and evaporates at 100°C. The liquid yield was repeatedly distilled in the improvised still. The

following yield in each distillation trial is presented in Table 1. Table 1. Liquid Yield After Two Distillation Trial I Original Mash I Distillation Trial Liquid Yield(millimeters) I Apple 1300 1 1501 1201 Banana | 300 | 165 | 140 | II 12 300 millimeters of apple peelings liquid mash yielded approximately 120 millimeters of alcohol.

On the other hand, 300 millimeters original yield of banana peelings puree produced about 140 millimeters of alcohol. Chart 1 . Biathlon Yield from Apple Peelings Mash Chart 2. Biathlon Yield from Banana Peelings Mash Comparatively, the banana mash produced more biathlon as compared with the apple puree. This may be possible due to the fact that banana is known to contain a higher sugar content as to that of apple. A poster released by the United States Food ND Drug Administration (See appendix) reveals that 1 large apple (242 g/8 oz) has 25 grams of sugars?? roughly 10. 3% of its gram weight. Meanwhile, 1 medium (126 g/ 4. 5 oz) of banana has 19 grams of sugar. This is almost 15. 07% sugar content. Table 2 below shows the comparative nutritional value of banana and apple. This clearly shows the sugar content of a cup of banana exceeds that of a cup of apple by almost 179%. Table 2. Comparison of Nutritional Value of Apple and Banana It should be noted that the apple and banana peelings produced a significant amount of alcohol. Table 3 shows the calculated ratio of the hypothetical sugar intent of the tabulated percent of alcohol yielded.

Table 3. Ratio of Sugar Content to Actual Biathlon Yield I Sugar Content I Alcohol Yield I Ratio(Sugar : Alcohol) I Apple | 10. 33% 40. 0% | 1 : 3. 87 | Banana | 15. 07% | 46. 7% 1 : 3. 09 | Eater collection, Don samples are test to be flammable. VI. Conclusion and Recommendations EAI Tort cosmos TTY <https://assignbuster.com/ethanol-distillation-assignment/>

Ana Don samples proved The experiment showed that apple and banana can be a source of biathlon. The 40% and 46. 7% biathlon yield from apple peelings mash and banana peelings mash respectively represents a significant amount of alcohol.

It goes to show that both apple and banana can be an alternative source of fuel. However, it is recommended by the researchers that further trial should be done in the future to validate the biathlon from the liquid yield. The researchers had a bit of a problem in getting the exact temperature of the liquid inside the still. The tip of the kitchen thermometer merely touched the fluid inside, the average temperature of the whole liquid could not have been known for certain. It is recommended, therefore, that revisions in the procedure be done or the experiment be redone in a more controlled environment.

Further investigation can be best done with a laboratory setup with the proper laboratory tools and equipment. Moreover, more extensive analysis of the liquid yield such pH and alcohol proofing can be done to provide a more empirical evidence that the liquid collected is biathlon. In addition, the researchers recommend in using other possible plant source as a test subject for presence of biathlon. The research limits itself to the use of apple and banana peelings to represent the common household waste products at home. Future studies may try to use other biodegradable products.