

PDF-Export

Topic:

Recycling of complex lingo-cellulosic materials

Paper-ID 91376
Paper title Acid pretreatment of Corn stover from Guanajuato, Mexico.
Presentation format Poster
Date of submission 28.02.2017 23:28 Uhr
Authors
- divanery rodriguez (*diva@xanum.uam.mx*) (Presenter)
- Ana María Paloma Hortelano Carrera (*b103_hortelano_ca_ana@hotmail.com*)
- Carlos Antonio León García (*kalu-antonio@hotmail.com*)
- Enrique Saavedra (*ensaavedra@itesi.edu.mx*)

Content

Corn stover consists of leaf, husk, cobs and stalks that remains after maize harvest. Such stover makes up half of the yield of a corn crop and as it was considered as waste it was burned, causing air pollution, soil erosion and lowering soil quality [1]. Recently an alternative to its valorization as biomass source has been evaluated for biofuels production in sustainable biorefineries platforms. Corn stover is rich in cellulose and lignocellulose (37.4% and 18%, respectively), so a pretreatment is necessary to release the reducing sugars that will be further processed into biofuels such as bioethanol and biobutanol [2]. Therefore the objective of this project was to find the combination of temperature and sulfuric acid concentration of the pre-treatment of corn stover (CS) that releases the highest concentration of reducing sugars.

The first step was the drying of the raw material during 24 hours at 68°C, followed by the grinding of the solid until getting a particle size of 0.64 mm. The pretreatment of the corn straw was performed at different process conditions, aiming to perform a grid screening and selecting the best operating points. The variables employed were temperature (100°C, 110°C and 120°C) and sulfuric acid concentration (0, 2, 4, 6, 8, 10 %wt/wt). Three repetitions per each grid point. The reaction time was 5 minutes. Control was performed at 25°C [2]. After the pretreatment, solid and liquid fractions were separated, solid residue was ground to powder and infrared spectroscopy was performed. Liquid fraction was neutralized, and the concentration of released sugars was determined through reduced sugars (RS) using the method proposed by Miller that uses 3,5-dinitrosalicylic acid (DNS) as a reactant. Statistical differences were evaluated through one way ANOVA.

The highest yield of reducing sugars was found at the temperature of 120°C and acid concentration of 10 % wt/wt (0.11 g RS / g CS). The pretreatment using sulfuric acid 8% at 120°C also resulted in a higher concentration of RS than the highest obtained at 100 and 110 °C (0.09 g RS/ g CS). The observed trend at high temperature (100, 110 and 120 °C) was that at higher concentration of sulfuric acid, higher concentration of RS was released from the corn stover. In control tubes pretreated at 25 °C such effect of acid concentration was not observed. Comparison of the solid residue was analyzed by Fourier transformation infrared spectroscopy.

References

1. Sheehan, J., A. Aden, K. Paustian, K. Killian, J. Brenner, M. Walsh, R. Nelson, Energy and environmental aspects of using corn stover for fuel ethanol. *Journal of Industrial Ecology*, 2003. 7(3□4): 117-146.
2. Morales-Rodriguez, R., E.S. Perez-Cisneros, J.A. de los Reyes, D. Rodriguez-Gomez, Evaluation of biorefinery configurations through a dynamic model-based platform: Integrated operation for bioethanol and xylitol co-production from lignocellulose, 2016. *Renewable Energy*, 89: 135-143.

Paper-ID 64211
Paper title Biocontainers made from lignocellulosic recycled materials: Evaluation of physical-mechanical properties.
Presentation format Poster
Date of submission 31.01.2017 01:08 Uhr
Authors - Yanina Aguerre (*yanina_aguerre@yahoo.com.ar*) (Presenter)
- Graciela Gavazzo (*ggavazzo@gmail.com*)

Content

The aim of this work is to evaluate the physical-mechanical properties of biocontainers, designed from the combination of lignocellulosic recycled materials, in order to select an ideal container, of strong walls and low absorption capacity, suitable for plant cultivation. The purpose is to reuse a fraction of urban solids, forestry and agroindustrial waste: newspaper (ONP), office paper (OWP), corrugated cardboard (OCC), pine sawdust, eucalyptus sawdust and sugar cane bagasse as raw material to design biocontainers, as an alternative composition to those used nowadays, applying pulp molding technology. Biocontainers are known as those containers made without pollutant materials derived from petroleum, which decompose rapidly when they are buried in soil or when they are composted [1]. Biocontainers are usually classified as plantables or compostables [1]. Among the main properties that must have an ideal biocontainer, are the resistance properties, then all containers must be strong enough to support the substrate and the seedlings during the germination and growth, support irrigation conditions and nursery handling. Pulp molding technology is an attractive resource for the use of lignocellulosic raw materials, it admits different grades of pulp and it allows us to design products of semi-rigid structure, three-dimensional, of varied forms and for various uses [2]. Biocontainers were designed with optimized mixtures, which were obtained in a previous work [3]. Containers with secondary fibers alone and mixed with pine sawdust, eucalyptus sawdust and bagasse fibers were made: 100% ONP; 100% OWP; 100% OCC; 50:50% ONP:OWP; 50:50% ONP:OCC; 50:50% OWP:OCC; 30:30:40% ONP:OWP:Pine; 30:30:40% ONP:OWP:Eucalyptus; 30:30:40% ONP:OWP:Bagasse. The physical-mechanical properties of the containers were measured: thickness, specific bulk, apparent density, compressive strength and water absorption capacity, according to internal techniques. The results show that: ONP pulps decrease strength and increase absorption capacity; OWP pulps increase strength and decrease absorption capacity; OCC pulps exhibit an intermediate behavior; pine and eucalyptus sawdust decrease strength and absorption capacity; bagasse fibers decrease strength and increases absorption capacity. It is concluded that the ideal biocontainer is that made with OWP pulp in a 100%. This design results in a container of strength walls and low water absorption capacity, which will prevent the container from absorbing moisture and drying the substrate.

[1] Evans, M., Taylor, M. and Kuehny, J. 2010. "Physical Properties of Biocontainers for Greenhouse Crops Production" *HortTechnology* 20 (3): 549-55.

[2] Gavazzo, G. B. (2003). Valorisation de la pâte moulée. PhD thesis. Université du Québec à Trois-Rivières, Canada.

[3] Aguerre, Y. and Gavazzo, G. 2016. "Lignocellulosic Recycled Materials to Design Molded Products: Optimization of Physical and Mechanical Properties", *J. Mater. Sci. Eng. A* 6 (4): 222–231.

Paper-ID 65021
Paper title BIOGAS PRODUCTION THROUGH CORN WASTES USING PIG MANURE AND RUMEN LIQUID AS INOCULUMS
Presentation format Oral presentation
Date of submission 31.01.2017 03:43 Uhr
Authors - Elely Castro Cogollo (*elelycastro@gmail.com*) (Presenter)
- Karina Ojeda (*kojedad@unicartagena.edu.co*)
- Yuly Ramirez (*yulisramirez@hotmail.com*)

Content

ABSTRACT

Castro, E., Ojeda, K., Ramírez, Y. University of Cartagena; Cartagena, Colombia;

Colombia is a country with a huge agricultural potential, and it counts with a big amount of acres destined to crops, in which it generates enormous quantities of organic material no edible, therefore there are environmental problems of air, water and land. For this reason there have been so many research about the energetic use of residual biomass in Colombia, based on their compositions, with the final purpose of mitigate environmental problems.

This work evaluated the yield of biogas production through lignocellulosic wastes of corn, taken from Bolivar department, hence it determined the effect of particle size and inoculums/substrate ratio on biogas production, in order to analyze the influence of these parameters over the quantity of methane production, which was quantified by liquid displacement measurements with NaOH. Moreover, for the best operation condition with regard to size particle and inoculum/substrate ratio was applied a pretreatment with urea. From the results, the ratio 80:20 w/w of the inoculums presented the highest methane yield. It was proved that the best inoculums/substrate ratio was 1:1 with a 0,5 mm substrate particle size, which was reflected in the highest quantity of displaced methane.

The results showed that when particle size decreases, the biogas production increases, due to a higher transfer area between the inoculum and substrate, which allows a faster digestion process. It was proved that the urea pretreatment enhance the biogas production.

Keywords: Biogas, biomass, Inoculum to substrate Ratio, Size Particle.

Paper-ID 65041
Paper title BIOGAS PRODUCTION THROUGH CORN WASTES USING PIG MANURE AND RUMEN LIQUID AS INOCULUMS
Presentation format Oral presentation
Date of submission 31.01.2017 03:43 Uhr
Authors - Elely Castro Cogollo (*elelycastro@gmail.com*) (Presenter)
- Karina Ojeda (*kojedad@unicartagena.edu.co*)
- Yuly Ramirez (*yulisramirez@hotmail.com*)

Content

ABSTRACT

Castro, E., Ojeda, K., Ramírez, Y. University of Cartagena; Cartagena, Colombia;

Colombia is a country with a huge agricultural potential, and it counts with a big amount of acres destined to crops, in which it generates enormous quantities of organic material no edible, therefore there are environmental problems of air, water and land. For this reason there have been so many research about the energetic use of residual biomass in Colombia, based on their compositions, with the final purpose of mitigate environmental problems.

This work evaluated the yield of biogas production through lignocellulosic wastes of corn, taken from Bolivar department, hence it determined the effect of particle size and inoculums/substrate ratio on biogas production, in order to analyze the influence of these parameters over the quantity of methane production, which was quantified by liquid displacement measurements with NaOH. Moreover, for the best operation condition with regard to size particle and inoculum/substrate ratio was applied a pretreatment with urea. From the results, the ratio 80:20 w/w of the inoculums presented the highest methane yield. It was proved that the best inoculums/substrate ratio was 1:1 with a 0,5 mm substrate particle size, which was reflected in the highest quantity of displaced methane.

The results showed that when particle size decreases, the biogas production increases, due to a higher transfer area between the inoculum and substrate, which allows a faster digestion process. It was proved that the urea pretreatment enhance the biogas production.

Keywords: Biogas, biomass, Inoculum to substrate Ratio, Size Particle.

Paper-ID 73141
Paper title Effects of Fractionation and Mechanical Treatments of Korean OCC on Paper Properties
Presentation format Oral presentation
Date of submission 24.02.2017 06:51 Uhr
Authors - HAK LAE LEE (*lhakl@snu.ac.kr*) (Presenter)
- Hye Jung Youn (*page94@snu.ac.kr*)

Content

Linerboards and corrugating mediums are being produced using recycled old corrugated containers (OCC) as major raw materials. However, it causes many quality and process problems including strength reduction, deterioration of machine runnability, etc. To find the most appropriate recycling process for the highly recycled papers like Korean OCC, several approaches of fractionation and mechanical treatment of the fractionated stocks were examined and compared. The stock obtained after refining of the whole stock containing both long and short fiber fractions gave better strength but lower in freeness. Refining of the long fiber fraction and remixing it with unrefined short fiber fraction also improved strength, but the improvement was less than the case of refining whole stock. Mechanical treatment of fines fraction did not show any changes in strength. Results indicated that not only long fiber fraction but also short fiber fraction should be mechanically treated to improve strength properties of highly recycled fibers. Removal of the contaminants in the long fiber fraction was crucial for strength improvement.

Paper-ID 96326
Paper title Strengthening with CMA of paper structure from recycled lignocellulosic fiber
Presentation format Poster
Date of submission 15.04.2017 19:45 Uhr
Authors
- Jose Turrado (*jturrado@dmcyp.cucei.udg.mx*) (Presenter)
- Alma Rosa Saucedo Corona (*asaucedo@dmcyp.cucei.udg.mx*)
- Francisco Javier Fuentes Talavera (*ffuentes@dmcyp.cucei.udg.mx*)
- Carla Aviña Castañeda (*carlys_avi@hotmail.com*)
- Nestor Fermín Robles Marín (*nestfer_robmar@hotmail.com*)
- Rubén Sanjuán Dueñas (*rsanjuan@dmcyp.cucei.udg.mx*)

Content

Abstract

Key words: Aged fiber, carboxymethyl starch, recycled lignocellulosic fiber, refined fiber, tensile strength.

The world demand of paper is estimated that by the year 2020 in the order of 500 million tons paper, in congruence with ecology and economics approximately 50% of this world paper production will enclosed recycled fiber. The operation with recycled fiber in paper structure implies the integration of aged, hornified and degraded fiber. However, the suitability for use of the final product must comply with new and high specifications. Thus the great challenge is to strengthen the degraded cellulosic fibers, for which different efforts have been made, specially in the incorporation of modified chemical products. The present work evaluates the impact and integration process of Carboxymethyl Starch (CMA) on natural fibers.

The CMA is applied in the range of 0.2 to 0.5%, reaction time 10-30 min, consistency of 3-5%, constant temperature of 35 °C, the electric charge in fibrous suspension is controlled and as refiner equipment was uses the Jockro Mill at 150 rpm and 20 min, these parameters are correlated with a 3^k design with 5 points

The CMA is adhered on fibers, which allows the mechanical interlacing of fibers forming chemical bonds. The obtained results are energy saving in refining, increase in Tensile Strength and conservation of the porosity

Paper-ID 72906
Paper title THE METHODS INVOLVED IN DEINKING WASTE NEWSPAPERS AND RECYCLING THEM
Presentation format Poster
Date of submission 23.02.2017 21:34 Uhr
Authors - Amardeep Singh (*f2014267@dubai.bits-pilani.ac.in*) (Presenter)
- BILEENA BALACHANDARAN (*f2014145@dubai.bits-pilani.ac.in*)
- SRINIVASAKANNAN KRISHNA (*f2014445@dubai.bits-pilani.ac.in*)

Content

Abstract

The advent of incineration methods have paved a whole new way for industries and pilot plants to remove wastes and to prevent serious environmental after-effects. However, statistics have shown that the amount of energy generated from burning newspaper wastes is not feasible enough when studied from a mass to energy ratio. The alternative is to reblend the fibres in the newspapers and to separate the pigment agents. The resultant fibres can be used to create polymers using specialised chemicals. The following project covers methods and ideas in finding the best newspapers from the United Arab Emirates that have the most appropriate properties using only household chemicals. The project aims to provide an ample alternative to the gargantuan amounts of wastes which are discarded each year on an exponential level. Several tests were conducted to assess properties such as the Kappa number test, flotation, detergent action mixing and continuous stirring. The polymers had been subjected to heating and hardening and then assessed to see what are the best properties they exhibit. The experiment was conducted on different paper sources from the U.A.E. such as Gulf News and Khaleej Times. Tests were also aimed at extracting colours from the fibres.