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WHITE COAL MADE BY USING AGRO WASTE

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Abstract— The issue of the ever increasing demand for waste management has created a need for the development of suitable materials with the appropriate use of wastes. Everyday in India 1 lakh metric tonnes waste is generated which is generally disposed off openly on landfill site which creates unaesthetic view and some of the waste is carried to the treatment units which leads to increase in the amount of sewage which then puts excess pressure on the treatment units which ultimately increase the cost of treatment and dry disposal. In order to tackle this problem we have some solutions and techniques which will not only dispose of the waste effectively but also generates fuel. To create a cleaner and healthier environment there is need to turn these useless biodegradable materials to priceless and useful material and as by-product bio-briquette can be made which will not only use the waste material but has certain advantage such as replacing coal for burning.

Keywords—Durian peel waste, Calorific value, Bio-briquettes, Comparison with conventional coal.

I. INTRODUCTION

‘ India, a country that nature has endowed with a great beauty. on the other hand, in the same India disaster looms large. Whether it is a small or big city, there are huge mountains of waste. There is the garbage and trash that comes from food industries, which we throw away carelessly. For example, Groundnut shells from oil industries and bagasse from sugar industries. As well as large amount of waste is generated from forests and agricultural activities. For example, rice husk, plant litter, sawdust, almond shells, cotton stalk, cow dung etc. Earlier it was very nice, there were plants and trees all around. Everyone was happy. People used to have cattle. All the farmers were very happy. The dumping of waste by municipally has destroyed what was once a beautiful place. What we called solid waste management has now become nothing but dirty business. As India is a developing country the demand for waste management and fuel for industrial purpose are increasing. To fulfil these demands we have introduce bio-briquettes. Bio-briquettes are made up from above agricultural waste and forestry waste etc.

II. METHODOLOGY

A. RAW MATERIALS

1) Saw dust: Sawdust is flammable and accumulation provides a ready source of fuel. Airborne sawdust can be ignite by sparks or even heat accumulation and result in explosion. And its calorific value is 3900 k cal/kg.

2) Plant Litter : Leaf litter, plant litter, tree litter, or duff, is dried plant material, such as leaves, bark, needles and twigs that have fallen on the ground. This detritus or dead organic material and its constituents nutrients are added to the top layer of soil, commonly known as the litter layer or O horizon (O for organic).

3) Bagasse of sugar cane: Bagasse is the fibrous matter that remains after sugarcane or sorghum stalks are crushed to extract their juice. The dry pulpy residue left after the extraction of juice from sugar cane. It is use as a biofuel and in the manufacture of pulp and building materials. Bagasse is often used as a primary fuel source for sugar mills. When burned in quantity, it produces sufficient heat energy to supply all the needs of a typical sugar mill, with energy to spare. And its calorific value is 4200 k cal / kg.

4) Groundnut Shells: Most peanuts sold in the market are without shells. These large quantities of peanut shells are left as agricultural waste, not being used properly. To efficiently convert useless peanut shells into valued products, the wise and economical choice is peanut shell pellet mill. Peanut shell pellet making machine is the specialized machine for making peanut shell pellets. And its calorific value is 3800 k cal / kg.

5) Almond Shells: Almond shells are the outer shells of almond. Mostly almond shells are inedible and are removed before eating the almond meat inside. The almond companies or industries generated large amount of almond shells waste which is big problem created by them. Because it contain cellulose and lignin which are difficult to decompose to the environment. Hence it need treatment to use it as a agricultural purpose.

6) Cotton Waste: Cotton waste material is best raw material for briquetting as cotton waste is having less moisture content and size of cotton waste is below 20 mm so it is best for briquetting. Cotton waste for briquetting gives high

calorific value and good thermal efficiency and leaves low ash content. Briquettes from cotton waste reduces production of carbon dioxide by partially replacing coal used in power plants with materials that are already controlled in the carbon cycle. And its calorific value is 3700 k cal / kg.

7) Jute Waste: Jute is also known as golden fibre. It is a long, soft, shiny vegetable fibre that can be spun into, course strong threads. It is produced from the plant genus corchorus. Jute fibres are composed primarily of the plant materials cellulose and lignin. Jute fibres are environment friendly.

8) Press Mud: The pressed mud is either thrown away or is used as a cheap fertilizer. The use of these cheap fertilizer gives a very low yield as compared to the modern fertilizers available. However, the major quantity of press mud goes just as a waste which also causes pollution of water in near by area. The briquettes made from press mud after drying have a good calorific value as much as 4800 k cal/kg approximately.

B. SUN DRYING

In warm climates, it is beneficial to link the storage with natural drying, as aforementioned, with the purpose of reducing the level of moisture content of biomass before the crushing. Natural drying is based on exposing the biomass to favourable environmental conditions to reduce the moisture contents in the biomass without supplying any heat externally. It is achieved by means of a controlled exposure of the biomass to solar radiation, wind and other natural processes such as the thermogenesis.

C. CRUSHING

Crushing is a set of processes that allows the reduction of particle sizes to the needs required by the final energy conversion technology. Crushers are machines designed to reduce the size of biomass by moving metallic tools (typically hammers and teeth). The crushers are mounted on the periphery of a rotating cylinder that works at a high speed in order to take advantage of the centrifugal force to enable a more effective impact of the hammer on the materials to shred.

D. COMPACTION

Compaction is the process of reduction of raw material volume at high pressure. The crushed material compacted by mixing suitable binder with the help of compressor and converted into compacted brick like material called as Bio briquette or white coal. Compaction produces and increase in temperature leading to a bakelized surface, which gives a glossy appearance and consistency to the briquettes. The raw crushed materials are pushes into cylindrical mold to achieve density between the range of 1000 to 1200 kg/m^3.

III. LITERATURE RIVIEW

A. OLORUNNISOLA,"PRODUCTION OF FUEL BRIQUETTES FROM WASTE PAPER AND COCONUT HUSK ADMIXTURES, AGRICULTURAL ENGINEERING INTERNATIONAL, VOL. 9, PP. 1-11, 2007.

In this paper he used the mixture of a municipal solid waste and an agricultural residue, i.e., shredded waste paper and hammer milled coconut husk particles. Briquettes were manufactured using a manually-operated closed end die piston press at an average pressure of 1.2 x 103 N/m2 using four coconut husk: waste paper mixing ratios 95; 15: 85; and 25: 75. Results showed that briquettes produced using only waste paper and 5:95 waste paper-coconut husk ratio exhibited the large linear expansion when dried. A reversal relationship was observed between compressed density and relaxation ratio of the briquettes. The average durability of all the briquettes was greater than 95%. He concluded that stable briquettes can be prepared from waste paper mixed with coconut husk particles.

B. WAHIDIN NURIANA, NURFA ANISAA, MARTANAA SYNTHESIS PRELIMINARY STUDIES DURIAN PEEL BIO BRIQUETTES AS AN ALTERNATIVE FUELS, INTERNATIONAL JOURNAL OF ENERGY PROCEDIA, PP. 295 – 302, 2014.

The purpose of the research is to develop and test the characteristics of durians peels briquette as fuel material. It was tested by applying proximate analysis and was conducted in Laboratories. Demand for energy, including fuel oil is an important global issue of both energy consumption related to human needs and the resources and the effects of the use of energy sources. He has done various efforts to maintain the balance of supply and sustainable world energy needs, by introducing durian peel bio briquette as an alternative fuel. Materials used in this study are the durian peel waste, fresh durian peel and peel green pedestal. Durian peel cylindrical briquettes with a diameter of 3.8 cm, 6.5 cm high and 100 mesh grain size. Densification process increase the fuel density. Durian peel waste may be used as a renewable alternative fuel bio-briquette the dry weight ratio of peel to peel an average wet mass of 1:3.

C. MANOJ KUMAR SHARMA, GOHIL PRIYANK, NIKITA SHARMA BIOMASS BRIQUETTE PRODUCTION: A PROPAGATION OF NON-CONVENTION TECHNOLOGY AND FUTURE OF POLLUTION FREE THERMAL ENERGY SOURCES, AMERICAN JOURNAL OF ENGINEERING RESEARCH (AJER), VOL. 4, PP. 44-50, 2015.

Biomass briquettes are made from agriculture waste and are a replacement for fossils fuels such as oil or coal, and can be used to heat boiler in manufacturing plants. Bio- briquettes are a renewable source of energy and do not release fossils

carbon to the atmosphere. The extrusion production technology of briquettes is the process of extrusion straw, sunflower husks, buckwheat etc. or finely shredded wood waste under high pressure. There is a tremendous scope to bring down the waste of convention energy sources to a considerable level through the development, propagation of non-convention briquettes technology i.e. briquettes machine for production of bio-briquettes to meet thermal energy requirement .

D. MUHAMMAD FAIZAL" UTILIZATION BIOMASS AND COAL MIXTURE TO PRODUCE ALTERNATIVE SOLID FUEL FOR REDUCING EMISSION OF GREEN HOUSE GAS, ADVANCED SCIENCE ENGINEERING INFORMATION TECHNOLOGY, VOL. 7, PP. 950-956, 2017.

A disadvantage of the use of fossil fuels is to damage the environment and also considered as a non-renewable and unsustainable. To overcome this problem, In this paper he presents the characteristics of bio-briquette resulted from a series process using a mixture of raw materials. As raw materials of bio briquette production, this research used biomass corn cobs and banana peels, and a fine coal waste. Before using as a component in the bio briquette, corn cobs, banana peels, and fine coal waste were carbonized. The carbonation process was carried out in temperature of 300-500oC for 15 minutes. After the carbonization, the calorific value of coal, corn cobs and banana peels were increased, but for the banana peel, the calorific value was decreased with the increasing of carbonization temperature range from 300oC - 500oC. The highest calorific value of bio briquette of 6,297 kcal/kg was obtained for the composition of carbonized coal, carbonized corn cobs and carbonized banana peels ratio was of 20:80:00.

E. IMEH E. ONUKAK , IBRAHIM A. MOHAMMED-DABO , ALEWO O. AMEH , STANLEY I.R. OKODUWA AND OPEOLUWA O. FASANYA PRODUCTION AND CHARACTERIZATION OF BIOMASS BRIQUETTES FROM TANNERY SOLID WASTE, RECYCLING, PP. 1-19, 2017.

The tannery industry is well known for the huge amount of toxic solid and liquid waste produced from various processes of tannery industry. Bio-briquettes generate energy from waste. In this study he develop and characterization of biomass briquettes from tannery solid wastes. Tannery solid waste which comprise hair, flesh, chrome shavings and buffing dust, were collected from a tannery in Kano, Nigeria, to formulate and characterize briquettes. Scanning electron microscopy and proximate analysis were carried out on the samples. The briquettes, comprising varying ratios of TSWs, were shaped and characterized. Thermal efficiency, durability and compressive strength were determined for the briquette. The briquettes had calorific values between 18.63 and 24.10 MJ/kg. Durability of the briquettes ranged from 98.12% to 99.77%. The energy values were in between 17.462– 24.101 MJ/kg, which was comparable to other fuel sources such as sub-bituminous coal (20.000– 24.730 MJ/kg). This study shows that TSWs can be used for fuel briquette production, which is a source of sustainable energy generation. It is eco-friendly, has less cost and affordable compared to fossil fuel.

IV. CONCLUSIONS

The study shows that briquettes are better alternative to the coal. It is economic and environmental friendly. Briquettes have good handling property because of its compacted shape, which makes them transportable over long distances without disintegration.

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