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Paper Pulp from Ground Nut Shell

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ABSTRACT

In recent years, several nations throughout the world have Looked for alternate plant materials the produce Fiber Due to growing scarcity of Wood from the forest. Groundnut shell are one of them that might practically be used as an alternative resource. Using Kraft method, we created pulp in this project from used ground nut shells. Given that ground nut shells are high in cellulose, one of the best ways to investigate the usage of groundnut shells is by chemical pulping, which produce paper. The cellulose should ideally be used to create fibers that can be Used to create functional paper goods. Chemical pulping was the method of choice in this study to liberate the fibers because it works Well to dissolve lignin that is incorporated in the cellulose.

Keywords: Ground nut shells, chemical pulling, pulp, lignin

1.INTRODUCTION

1.1 IMPORTANCE OF PAPER

Paper Is a substance with Various. from that point forward, writing letters, maintaining Records of important information like books, and providing Entertainment for others all occur on paper. Obtaining high quality pulp at a competitive price while protecting the environment requires lowering the amount of energy, water and chemical used during to this pulping process. the use of wood for pulp manufacture has led to more deforestation and environmental deterioration globally. paper and other wood products make up 10% of all deforestation, while deforestation is also responsible for 12% of greenhouse gas emissions globally Investigating different pulp making methods is essential to reducing deforestation.

1.2 WHAT IS GROUND NUT

The peanut also called as groundnut. it is leguminous family‘s arachishypogeae plant. It is legume crop produce primarily for its palatable seeds in the tropics and subtropics, it is commonly cultivated.Because of high oil content, an oil crop. Peanut pods often from beneath on crop plants rather than above ground. This quality is the one that the Linnaeus, a botanist, used to identify the particular ‘’under the earth’’ is the meaning of the name hypogeal. Like many as with other legumes, the root nodules of peanuts contain symbiotic nitrogen -fixing bacteria. Having the ability to fix nitrogen translates as less nitrogen-containing fertilizer is needed for peanuts, and they are useful for crop rotations because they increase soil fertility. In terms of flavors and nutritional because they increase soil fertility. In terms of flavor and nutritional makeup, peanuts are comparable to tree like almonds and walnuts, as well in culinary. In western cuisines nuts are frequently prepared in similar manner. The according to the botany, a “nut” is fruit whose ovary wall is thick.

1.3 CHELLANGES IN PULP PRODUCTION

Main raw material used for paper pulp is wood .wood derived from forest that’s the reason of deforestation. That’s why alternative raw material required for paper pulping. Ground nut shell smellier content like wood . Therefore, groundnut

shell used as a raw material for paper production. Obtaining high quality pulp at a competitive price while protecting the environment requires lowering the amount of energy, water and chemical used during to this pulping process. The use of wood for pulp manufacture has led to more deforestation and environmental deterioration globally. Paper and other wood products make up 10% of all deforestation, while deforestation is also responsible for 12% of greenhouse gas emissions globally Investigating different pulp making methods is essential to reducing deforestation

1.4 OBJECTIVE OF WORK

The study of Paper pulp from ground nut shells project's main goal is to production of pulp with efficiency of energy, water and chemical materials. Find alternative source of wood for paper production. Decrease deforestation with used of alternative source of wood for paper production. Waste management of groundnut shells with beneficial product

2.LITRATURE REVIEW

2.1 chemical composition of Groundnut shell

Ground nut shell is high content of cellulose fibers. Cellulose main component to produce pulp .groundnut shell similar ability like wood therefore groundnut shell used as an alternative source of wood material for paper production.

Table 1

Organic matter	92
Ash content	3.8
Crude protein	5.4
Crude fat	0.1
Lignin	36.1
Cellulose	48.8
Hemicellulose	5.6

2.2 Cellulose

The majority of the cellulose in wood is found as fibers. After the pulping process, the cellulose is obtained as pulp. The fibers of cellulose are continuously chain of single monomer.

2.3 Lignin

Many plants have a complex organic polymer deposited inside their cell walls that gives them a hard and woody structure. Lignin is a Group of intricate organic polymers that have a crucial structure role in a tissue that support the majority of plants. Due to their rigidity and resistant to rot, lignin plays a crucial role in development of cell walls, especially in wood and bark .

Chemical formula of lignin – $C_{81}H_{92}O_{28}$

3.MATERIALS AND METHODOLOGY

3.1 Materials

Raw material Groundnut shell, sodium hydroxide, hydrogen peroxide, sodium carbonate, Sodium sulphate ,distilled water

3.2 Preparation of Raw material

First take good quality of groundnut from market. Collect shells of ground nut. After that washed with distilled water for 5 min to remove extra dust and other waste material. Dry the groundnut shells in sunlight for 2 hrs. grind groundnut shells in grinder to reduce size of shells which helps in cooking process to increase reaction area. After that groundnut shells place in oven for 1 h at 80° for further drying. Or a kraft pulping process chemical must be taken right proportion. For a cooking liquor consist of following chemicals Na2SO4,NaOH and Na2co3 Take These three chemicals must combine to give total of 12.5% by weight solution. In this 12.5% of solution, according to Kraft's pulping we took 58.6% of NaOH, 27.1% of Na2SO4, and 14.3% of Na2CO3.

NaOH =0.556× 125 = 73.25 grams

Na2CO3 = 0.143× 125 =33.875 grams

Na2SO4=0.271×125 =17.875 grams

Take this chemical in different beaker and make liquor with help of distilled water.

3.4 Cooking Process

Take 20-gram dried groundnut shells in a 1000 ml beaker .400 ml of cooking liquor add in beaker maintain the ratio of cooking liquor to groundnut shells 1:4. Heat was added to the contents of the beaker to reach required cooking temperature (80-90° c) at the required cooking time (4hr 30 min). Continue starring with glass rod. Cooking liquor is a weak base so need more time to cooking method. Slow cooking at low temperature is a best for process. After that brown stock and black liquor are firmed.

3.5 Filter and washing the Pulp

After brown stock and black liquor are firmed. Pulp and small amount of lignin, in minuscule proportion are present in brown stock. Brown colour of stock is depending on a lignin content in a stock. The black colour contains dissolve lignin and cooking chemicals. That cooking chemicals will recovered. one time washing is not enough so we need to wash brown stock again and again. Filter until the clear colour of water obtain in filtrate. Finally, the product obtained with less lignin content.

3.6 Bleaching process

Hydrogen peroxide used as a bleaching agent to remove the brown colour from the pulp. Take 25 ml of hydrogen peroxide in beaker dissolved in 50 ml distilled water after the pulp add in beaker stir well for 5 min. after that dry the pulp for 1 hr. at 80° in air oven.

4.PROJECT WORK IN LAB

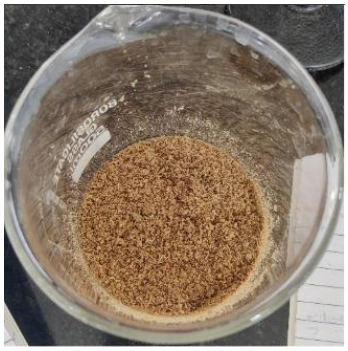

Figure 1

Figure 2

indicate the preparation of groundnut shells .first collect groundnut shell washed and grind with grinder to size reduce after dried in oven for 1 hr. This ground nut shell used as a main raw material for paper pulp.

Figure 3

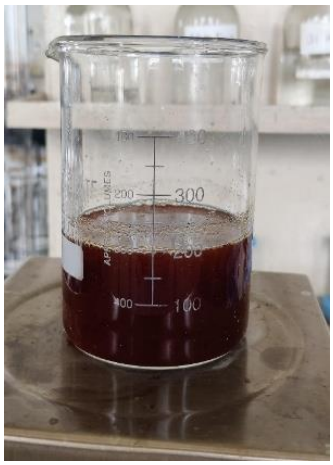

Figure 4

preparation of cooking chemicals .in this process sodium hydroxide, Sodium carbonate and sodium sulphate chemical used as a cooking liquor. Take proper amount of chemicals in separate beaker and made solution with use of distilled water .

cooking process, ground nut shell and cooking liquor add in beaker and heat apply to Beaker. continuously stirring whily cooking process. maintain temperature between 80-90° temperature. Give proper required time for cooking for best result.

after sufficient time provide black liquor and brwonstock are obtained. Black liquor contain Cooking chemicals and Dissolved lignin .brownstok contains paper pulp and less amount of lignin.

Figure 5

filtration process after brwonstock and black liquor firmed. Filter the pulp with filter paper. Washed the pulp with distilled water again and again . One time wash is not enough. Collect the filtration and send to laboratory for recovery of coking chemicals for reuse.

Figure 6

Figure 7

brown pulp ,Pulp contain a less amount of lignin and dark brown colour .it need to bleaching.

in this practical hydrogen peroxide use as a bleaching agent. After bleaching brown colour of groundnut shell was reduce. Our final product obtain which used for a manufacturing for paper.

4.1 Result and conclusion

4.2 Pulp yield

The influence of changing the first three parameters during chemical pulping was evaluated using pulp yield . Weighting the dry mass of pulp generated by chemical pulping ,we used equation to determine the pulp yield

$$\text{Pulp yield} = \frac{dry\ mass\ of pulp}{Oven\ drymass\ of\ groundnut\ shell\ sample\ at\ the\ begning} \times 100$$

$$= \frac{8}{20} \times 100$$

$$= 40\ \%$$

Result

A million tons of groundnut shells are commonly regarded as agro-industrial waste that are released into the environment each year. This lignin-rich shell slowly degradation in the natural environment.

However, there are multiple uses for groundnut shell biomass. These are waste can be transformed into useful bio product to obtain zero waste production. It is good waste prevention.

Groundnut shell lignin concentration can be effectively reduced by chemical pulping at low temperature as longer cooking time, resulting in fiber with a high tensile strength and elongation.

Temperature had the greatest effect according to the surface plots. Effect on delignification that is statistically significant yield of pulp. The ideal chemical pulping circumstances were discovered for maximum pulp production and lowest kappa number were 270 minutes and 80° - 90° C, respectively.

The physical characteristics of the paper sheets under investigation demonstrated that they can be uses commercially to produce packaging material for the industries that produce cement, floor and animal feed. The usage of groundnut shell pulp blends with other non-wood materials will help to further improve the use of groundnut shell in pulp production. Wood, recyclable paper and raw materials should all be looked into.

Conclusion

Ground nut shell lignin concentration can be effectively reduced by chemical pulping At low temperatures and longer cooking times, resulting in fibres

With High tensile strength and elongation. proper cooking times is required for this process. For high quality pulp low temperature and proper cooking times provide.

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