Handmade Paper Formation from Onion Peels

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Abstract: Every year above 15 million trees are cut down for various purposes. In which around 8 million trees are only cut down for paper production. This number is increasing every year which is causing climate calamities, disappearance of wildlife, emission of greenhouse gases, soil erosion, etc. We can't stop the use of paper, but we can find an alternative for making of it. Every year tons of onion waste are produced worldwide in which outer onion skin contributes up to 70% of this waste. This waste can cause environmental problems when not properly treated. In this paper, an attempt has made for production of paper using onion peels. For the pulping of onion skin soda process has been used. Paper produced was light and white and can be used for decorative purposes.

Keywords: Eco- friendly, Handmade, Onion skin, Soda process.

1. INTRODUCTION

Since ancient times, paper has been the substantial medium for communication as a writing tool. Even though the world is getting digitalize, computerize and electronically networking, the demand for paper will never get slack and it will keep proliferating over time due to its versatility [1]. Every year 8 billion trees are cut down for paper production only. In which, 55% of the trees are used for the manufacturing of wrapping and packaging paper, 26% are used for the printing and writing paper, 8% are used for sanitary, 7% for newspaper and the remaining is used for other purposes. According to the research, 24 trees are cut down every minute worldwide.

Cutting number of trees on this rate leads to the deforestation which is the main global issue. Although forests may regrow after being cleared and then abandoned, this is not always the case, especially if the remaining forests are highly fragmented. The consequences of deforestation are felt throughout the environment and the natural cycles which regulates the life on the Earth, as well as in human cliques and the animals that depends on forests for habitat. It mainly results in the climate change, disappearance of wildlife, emission of greenhouse gases, etc.

To eradicate such consequences, it's a need of time to rummage an alternative for the wood. In this paper, we have endeavour to make handmade paper from onion skin. Onion is a rich source of cellulose fibres. It contains 41.1% cellulose, 38.9% lignin, 16.2% hemicellulose and remaining 3.8% extractives. After the tomato, onion is the second most important vegetable in the world. Every year tons of onion waste are generated which can cause environmental problems if not disposed [2].

Using onion skin for paper making can save the trees being cut and also the environmental problems which arises due to this will be eliminated. By undergoing a survey, it can be seen that the use of handmade paper lessens the deforestation which in turn eludes the environmental degradation, so this gives rise for the manufacturing of handmade papers [7]. The handmade papers can be made into variety of creative and innovative style. It can be used for printing as well as writing. The strength of handmade paper is satisfactory, and they are having a number of positive points.

2. MATERIALS AND REAGENT

The chemicals used in this research were alkaline in nature. The chemical includes sodium hydroxide and sodium hypochlorite. Sodium hydroxide is used for the extraction of lignin from cellulose.

Soda process was employed for the pulping of onion skin. Sodium hypochlorite was used for the bleaching of pulp whereas Rin fabric whitener was used as bleach which contains sodium hypochlorite.

Cooking liquor was made by adding 23% of NaOH in 400 ml of water, then stirred the mixture and filled the beaker to form 1 litre of solution for soda process.

Apparatus and Instruments

Deckle and mould technique was used for the paper formation from onion skin pulp. It is basically a traditional method of handmade paper making in which two pieces of paper making tool essentially a screen and frame are used to form a paper of even thickness.

Fig 1: Deckle and mould

Along with that, heating mantle for heating purpose, borosilicate glass beaker, stirrer for stirring the cooking mixture, weighing balance, beater for beating of bleached pulp and fabric clothes were used. We avoided metal vessel due to the corrosive nature of sodium hydroxide. Sponge was also used for draining out excess water from the paper.

Collection of samples

We collected onion skin waste from the vegetable market and washed them with water. After washing samples were dried in hot air oven at 60℃ for 1 hour to remove the moisture. As the onion is commonly used vegetable, its waste i.e., onion skin was readily available in the market.

Fig 2: Onion peels

Procedure followed

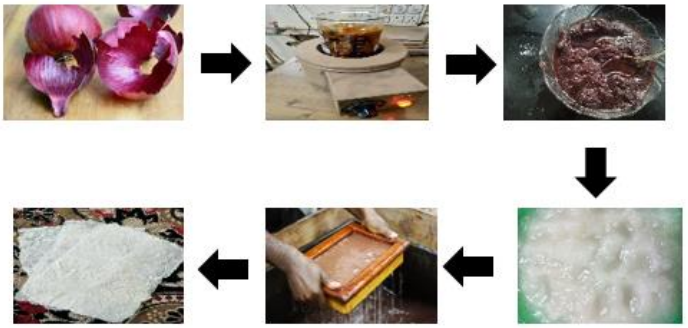

Fig 3: Process Flow Diagram

Firstly, 100gms of sample was weighed. Cooking liquor was made by adding 95gms of NaOH in 400ml of water and then the beaker was filled with water to make 1L of solution. Onion skins were cooked in cooking liquor at 95℃ for 1 hour. After that, cooked pulp was washed 4-5 times with water to removed lignin content completely and to get the pH of the water nearly 7. Washed pulp was bleached by using Rin fabric whitener for 30 minutes following beating of the pulp in beater. Finally, by using deckle and mould paper was formed and it was kept on fabric cloth. After keeping it overnight for drying paper was ready.

3. RESULTS

Paper was tested in the industry and the results are as follows:

Sr. No.	Tests Performed	Test results
1.	GSM	64
2.	Burst Factor (kg/cm2)	11
3.	pH	7.1
4.	Thickness (mm)	0.32
5.	Moisture content (%)	6.1%
6.	Cobb value (gm/m2)	149

Fig 5: Final paper

4. CONCLUSION

Onion skin has shown promising results as a sustainable alternative for paper production, with favorable test outcomes. It can be utilized for decorative purposes due to its appealing aesthetics. Additionally, its low Cobb value makes it suitable for packaging applications. Furthermore, it exhibits impressive burst factor, indicating high strength. The moisture content of onion skin paper aligns with standard values, making it a viable option for various uses.

5. REFERENCES

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