

1. Three Days workshop on Waste paper recycling held on 18th -20th May 2022.

The sixth Semester students of Chemistry department, Shillong College had attended a three days' workshop programme on the 18th -20th May 2022 at Shillong Science, Mawlai Umshing in collaboration with SCSTE Shillong. The report of the three-day workshop is as follows:

Introduction

Paper recycling pertains to the processes of reprocessing waste paper for reuse. Waste papers are either obtained from paper mill, paper scraps, discarded paper materials, and waste paper material discarded after consumer use.

Examples of the commonly known papers recycled are old books, old newspapers and magazines that we have finished reading, or those diaries five years back that are no longer relevant, they are suitable scraps.

Other forms like corrugated, wrapping, and packaging papers among other types of paper are usually check for recycling suitability before the process. The papers are collected from waste locations then sent to paper recycling facilities.

The step by step process of paper recycling is discussed as follows

Raw Materials required for Paper recycling:

- Waste paper
- Jute/Fibre
- Water
- Heat/Power

The waste paper should be free from plastic.

The Jute/fibre (jute bag) is use in order to hold the paper together.

Machines Required for Paper recycling:

1. Beater Machine
2. Uni-Vat Machine
3. Screw Pressing Machine
4. Calendering Machine.

Working principle of each Machines:

1.Beater Machine

The Beater machine is pentagonal in shape, consisting of a motor to run the machine, a turbine which helps to beat the paper pulp into tiny particles.

It does not have a flat surface, but slope towards the edge.

It requires a heat of about 3HP (horse power).

2. Uni-Vat Machine

A Uni-Vat Machine is rectangular in shape, and consisting of a moulding tray, two hand pulleys to pull the tray, one-foot brake to push the tray upwards for releasing the remaining water.

The Uni-Vat Machine is use to mould the paper into sheets.



Fig: Uni-Vat Machine

3. Screw Pressing Machine

A Screw Pressing Machine is a type of machine press in which the ram is driven up and down by a screw. The screw shaft can be driven by a handle or a wheel. It works by using a coarse screw to convert the rotation of the handle or drive-wheel into small downward movement of greater force.

It is use for de-watering of the handmade sheets that is formed in the Uni-Vat. A uniform pressure is exerted on the pulp sheets, placed between the platens, mounted on the sturdy base.



Fig: Screw Pressing Machine

4. Calendering Machine

The Calenders employ two or more steel rolls that close under pressure to smooth, compress, and some cases partially bond a non-woven, plastic, paper, or another substrate.

The Calenders machine imparts a smooth touch to the papers by improving the opacity.



Fig: Calendering Machine

How Paper is recycled: A step by step process

1. Collection:

This is the first process in the paper recycling process. This significant step involves the collection of recyclable papers. It entails gathering paper waste from various outlets like your home, offices, and schools and colleges.

Recyclers and paper merchants collect the paper materials from collection points such as trash bins, paper stores, paper scrap yards, and commercial outlets that generate paper waste.



Fig: Collection of Waste Paper

2. **Sorting:**

After collection, the papers are sorted and separated. This process helps to identify the papers that would be recycled and those you need to discard. At this stage you also remove all the external material from the paper collection.

Once accepted at the recycling facility, the papers are further sorted based on the quantity and paper value by assessing the materials that were used to make the paper.

3. **Shredding and pulping:**



Once sorting is finished, the next step involves shredding followed by pulping. Shredding is done to breakdown the paper materials into small bits. After the materials is finely shredded to bits, it is mixed with water to break down the paper fibre materials.

Fig (a) Shredding of jute

(b) Mixing the waste paper with water

(c) Pulp

4. **Beating Process:**

The beating process involve the following steps;

- a) Filled the beater with water.
- b) Beat the fibre first and wait until the water rise.
- c) After 30-45 minutes the fibre will turn into sponge like particles.
- d) The soak paper is transfer into the beater.
- e) Allow for mixing by multiples rotation.
- f) Followed by addition of alum (to prevent the flow/to hold the paper clay together)
- g) Boiled starch (3%) is poured into beater (to prevent stiffness of the Paper).
- h) Resin is added thereafter (act as water resistance).
- i) Addition of colours as per your preference.

5.Moulding:

Materials required for moulding are-

- Moulding Tray
- Table
- Cotton cloth

After beating the pulp is transfer into the Uni-Vat for moulding into sheets.



The steps are as follows-

- a) The Uni-Vat is filled with water
- b) Inserting of the moulding tray.
- c) One cup of the pulp is poured into the tray.
- d) Spread the pulp with your hands to avoid accumulation.
- e) Release the tray and then it is carried for making into sheets.

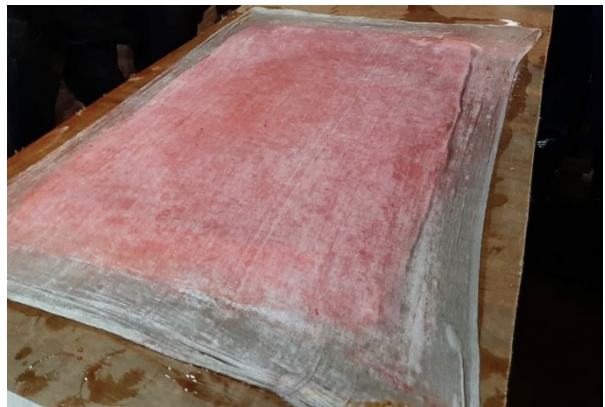


Fig:

Moulding tray for making into sheets



Fig: A Table to place paper sheets and a cotton cloth to separate the sheets

Fig: Paper sheets

6.Drying:

Drying involves two steps-

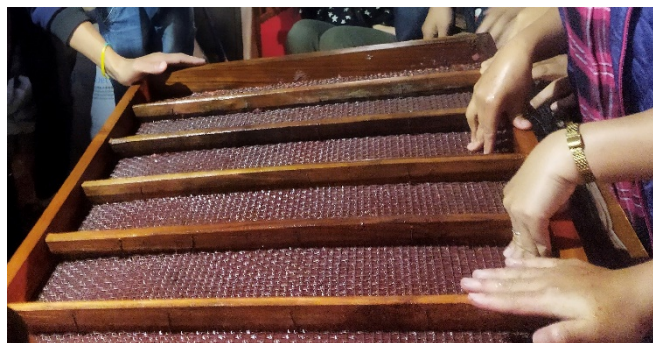


➤ By
Screw

Pressing Machine

➤ Drying in the presence of air.

After paper is taken screw pressing process involves the handmade formed in the uniform exerted on the placed between the platens, mounted on the sturdy base.



moulding, the for drying in a machine. This de-watering of sheets that is Uni-Vat. A pressure is pulp sheets,

After screw pressing, the paper is taken for drying in the presence of air. Drying in air is a slow process depending on the weather condition. It usually requires 2-3 days or even weeks to completely dry.



Fig: After Screw Pressing



Fig: Drying in Screw Pressing



Fig: Drying in the presence of air



Fig: Dried Paper

7. Calendering:

This is the final process of paper recycling, after drying the paper is taken for Calendering process. This process involves smoothening of the paper, one sheet at a time. The time taken for Calendering process depends upon the thickness of the paper.

The purpose of Calendering is to get a smooth and fine paper for used in multi-purpose such as file cover, greeting cards, paper bags etc.



Fig: Calendering Machine



Fig:Paper under Calendering process



Fig: File Cover (Final Product)

Conclusion:

After working on this project, we conclude that paper recycling is very important in our daily life because it helps to save energy about 70%, it is also environmentally friendly. When you decide to recycle paper, you avoid dumping papers which pollutes the air with the production of various toxic gas. Waste paper recycling also helps reduce greenhouse emissions.

On the other hand, recycling takes less energy which in turn, ensures there are less methane and carbon dioxide in the atmosphere.

Recycling also preserves trees and lessens deforestation; it provides jobs opportunities and improves the economy.



Fig: Teachers & Students of BSc 6th Semester (Day 1)

List of all students' participants as well as the teachers accompanying in these three days workshop on Waste paper recycling are given below-

Teachers

1. Mr. Kenneth Umdor (Head of Department Chemistry)
2. Dr. Cheerful Masharing
3. Dr. Badaker Laloo
4. Dr. Barisha Wahlang
5. Dr. Lathewdeipor Shadap
6. Dr. Smarling Suting

Students Participants	Roll Nos
1.Sngewbhalang Mary Rymbai	S1900543
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6.Bathymmailang Marbaniang	S1900546
7.Haphibanri Sohtun	S1900553
8.Angel Lamin	S1900549
9.Iardaris Marbaniang	S1900533
10.Cordially Rose Nongrem	S1900544

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15.Iaidbor Jana	S1900534
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A Glimpse from the Three Days Workshop





