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SNIPPETS
FOR THE PAPER INDUSTRY

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RECOVERED FIBER – NOT WASTE PAPER

In general the pulp and paper industry is facing three important challenges. The first one is the increased demand on wood for energy production and the impact that this has on the availability and prices of this raw material on a global scale. The second challenge is the escalating increase in energy prices affecting profit margins, as the pulp and paper industry is an energy-demanding industry. The third challenge is the increased pressure from environmental groups and lobbies for utilization of environmentally friendly chemicals but also for stricter regulation and monitoring of the industry.

Due to inadequate availability of indigenous waste paper, Indian mills rely heavily on imported waste paper to meet the raw material demand. The import bill, in fact, has increased significantly over the years.

RECYCLING OF PAPER

Recycling and specifically recycling paper has gained considerable importance over the past decade. The use of recycled paper is continuously growing in the global paper industry including emerging geographic regions such as China and India. The increased use of recycled paper has resulted in an increased requirement for deinking chemical agents.

DEINKING TECHNIQUES: The most common deinking techniques are Wash deinking and Floatation deinking.

When compared with the wash method the flotation method can provide a better deinking effect by recovering 20% more fibers. The flotation deinking has been adopted as a standard practice for removing ink from wastepaper in paper recycling operations.

The flotation method has been improved resulting in a more efficient removal of inks, dirt, and other contaminants from the recycling pulp. The advances in flotation deinking were required due to an increase in the use of a more 'contaminated' paper feedstock for recycling. The continuous improvement of deinking surfactants and especially non-ionic and cationic surfactants has been pivotal in improving the flotation deinking method.

Deinking comprises two steps - Firstly the detachment of ink from the surface of the disintegrated fibers which is performed during pulping. And secondly the removal of the detached ink particles from the pulp slurry by wash or flotation technique.

The major recycling processes are as under:

Pulping: Disperse recovered paper into separated fibers. The main objective of pulping process is to de-fiberize. Pulping process is done by either stationary pulper (batch process) or drum pulper (continuous process).

Cleaning: Major objective is to separate large heavy contaminants from fibers to protect downstream equipment from damage and pluggage. Cleaning process is done with High density cleaners and deflakers.

Screening: Screening separates contaminants based mainly on size, but also on shape and deformability. Screening is done by Disc screen or pressurized screens. It is better to keep cascaded in pressure screens to save more fiber. This process can be with medium consistency and low consistency for better performance.

Centri-cleaning: Main objective to remove high/low density contaminants through centri-cleaners. Centrifugal cleaners used to remove metals, ink, sand, bark, dirt, etc. Centrifugal cleaner uses fluid pressure to create rotational fluid motion in a tapered cylinder. Rotational movement causes denser particles to move to the outside faster than lighter particles. Good fibers carried inward and upward to the accepted stock inlet. Dirt held in the downward current and removed from the bottom.

Deinking: Deinking used to produce White or Tissue. In floatation process, Air is injected in to the suspension and forms small bubbles. The hydrophobic ink particles attached to the air bubbles. The air bubbles ascend to the surface. They are removed as deinking froth. The two important processes in Deinking are floatation and washing.

Dispersion and Kneading: The process of dispersion of residual contaminants, detachment and fragmentation of corss-linked ink and toner particles is called Dispersion process.

Bleaching: Bleaching used to produce White or Tissue. The process of brightening of fiber is called bleaching, it is important in removing of color striping of dyes.

Effect of Deinking on Chemical pulps:

- Mechanical damage
- Loss of fines
- Hardening and stiffening (hornification)
- Weakening of bonding
- less fiber conformability
- less absorptive
- loss of hemicelluloses
- Decreased cleanliness

Chemically pulped fibers that never been dried and have the ability to swell with water which makes the fibers flexible. It can be mechanically treated (refining) to increase the flexibility. The flexible never dried fibers are able to conform in the paper sheet which increases the fiber bonded area making strong paper. When dried, the fibers become rigid, termed hornification.

Previously dried fibers, upon exposure to water, do not swell and do not become flexible. These rigid fibers break upon refining: causing fines. When paper is made, the rigid fibers do not conform in the paper sheet and the resulting low fiber bonded area produces a weak sheet.

Effect of Deinking on Chemical pulps:

Wood containing pulps from mechanical pulping processes have lignin (a three-dimensional cross-linked polymer) which makes fiber walls stiff

INDUSTRY NEWS

Mae Fah Luang University's School of Science and Queen Many University of London's School of Engineering and Materials Science have developed a shellac-based coating that may improve the gas barrier properties of a recyclable paper.

W& F New generation **ULTRABOND** forming fabric launched by **W & F** for improved quality and efficiency on Packaging board..

W&F takes necessary fumigation and safety measures in packing of fabric and screens before movement, this ensures safety at consumption end.

and deters water swelling. The stiff, somewhat round cross section fibers make paper with low fiber bonded area and weak fiber bonds. Therefore, the strength of never dried mechanical pulps is generally lower than of never dried chemical pulps. Recycling may improve properties of mechanical pulps by flattening and flexiblizing the fibers.

Effect of Recycled fibers on paper making process:

- Lower freeness - decrease machine speeds or add drainage aid
- Lower paper strength: more sheet breaks
- Low efficiency of chemical additives (fines and anionic trash)
- Increased deposits
- Decreased cleanliness

Deinking Chemicals:

The deinking chemical agents are based on formulations of:

- Sodium hydroxide
- Sodium hydrosulfite
- Hydrogen peroxide
- Chelating agents
- Surfactants.

Enzymatic Deinking Could Compete in the Future with Chemical Agents

During the past thirty years the attempt to replacing chemicals with enzymes in deinking recycled paper including cellulose, xylanase, laccase and lipase, has been pursued. Celluloses and hemicelluloses have been demonstrated to dislodge inks by peeling off fibers or fines on paper surfaces. Lipases have shown some direct action on ink particles either degrading oil carriers or breaking down pigments. Lignin-degrading enzymes, such as laccase, also hold some potential for deinking, as they may selectively remove surface lignin, and hence, facilitate ink removal. Cellulolytic enzymes have shown the most promising results for deinking of mixed office paper waste.

The use of enzymes could be an attractive alternative to chemicals in deinking. The application of enzymes in deinking has been studied on laboratory and pilot plant scale. This work has resulted in numerous patents. However, so far enzymatic deinking is rarely applied in commercial use although some promising applications include recycling plants for mixed office waste.

What the Future Holds

The global trend in the paper industry is to reduce the consumption of fibers and increase the recycle rate of secondary fibers. China already has become a key geographic region in the utilization of recycled paper displaying an increase in consumption from 41.0% in 2000 to over 50.0% in 2006. The challenges in the supply of virgin pulp feedstock and the growth in the use of recycled paper by the Chinese paper industry, warrant a high growth of the deinking chemicals market through to 2016.

Some Recycled fiber facts:

Compared to virgin paper, Recycled paper

- Reduces demand on forests
- Uses less total energy
- Uses less beach
- Produces fewer toxic releases
- Saves water
- Reduces wastes that otherwise must be land-filled or incinerated
- Has a fiber efficiency rate of more than 70% compared to 23-45% for virgin papers

Conclusion

In conclusion, the market for deinking chemicals is expected to exhibit further growth. The utilization of recycled paper is critical for the reduction of wood consumption and maintenance of forest resources. It is also overall more economical than wood pulping. Therefore, recycled paper is expected to dominate the paper fibre feedstock in the coming years. The industry recognizes the strong dynamics that this market holds and the added value that it can offer to the consumers and end-users. Deinking agents are an integral part of the impetus in the pulp and paper market.

QUOTABLE QUOTE	**"*PERFECTION* is not attainable, But If we chase perfection, we can catch *EXCELLENCE* " - VINCE LOMBARDI**

SCRABBLE email answers by 25th April' 23	Form a word : **FIT CASE ONE RUNS** First correct answer will win a gift from Wires & Fabriks (S.A.) Ltd. (Maximum two prizes for one person in a year)
WINNER MAR. 2023	**Mr. Ashith Andanur, Instrument Department, Unit: Harihar Polyfibers, M/s Grasim Industries, Kumarapatnam,** **Answer : MONOSACCHARIDES**

?QUIZ email answers by 25th April' 23	**QUIZ:** Which is the part where lignin is highly concentrated? (a) Outskirts of lamella (b) Middle lamella (c) Mitochondria (d) Pith
WINNER MAR. 2023	**Quiz:** The primary screen rejects could be as high as 50%, the primary screen rejects are often sent to a secondary screen to recover usable _____. . (a) Ink (b) Lignin (c) Pulp (d) Fiber **Mr. Bidhan Borua, GM, Base Paper Mills Ltd. Bangladesh** **Answer : (d) Fiber**
Prizes	**Best / first correct answer** received will win one-year subscription to **IPPTA Journal** (Maximum one prize for one person in a year).

☺ Teaser	*Mr. X*: Doctor, Help me, I am addicted to TWITTER *Doctor: Sorry… I don't' **FOLLOW** you…..*

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