



*Journal of Advances in
Science and Technology*

*Vol. VI, Issue No. XII,
February-2014, ISSN 2230-
9659*

**STUDY OF DIFFERENT CHEMICAL PROCESS
FLOTATION UNITS IN DE-INKING OF PAPER**

AN
INTERNATIONALLY
INDEXED PEER
REVIEWED &
REFEREED JOURNAL

Study of Different Chemical Process Flotation Units in De-Inking of Paper

Anubhav Gupta*

Research Scholar, DAV University, Jalandhar

Abstract – Flotation de-inking is a complex separation process of inks and other contaminants from Rbres. Due to economic reasons and strict environmental regulations, new materials used by paper manufacturers and new printing technologies, paper mills require environmentally benign de-inking technologies which can easily Rt into the current de-inking system without extra capital investment. In recent years, great progress has been made in Sotation de-inking technologies with respect to Sotation cell design, utilization of new surfactants and the understanding of de-inking chemistry. However, the rapid advances in printing, coating and other modiRcations of paper make de-inking more difRcult. More effort is needed to understand the Sotation behaviour of new types of waste papers. Flotation chemistry plays the most important role in determining the ink removal efRciency.

Keywords: Chemical, Process, Flotation, De-Inking, Paper, Materials, Environmental, Manufacturers, Printing, Technologies, etc.

INTRODUCTION

Paper is more than an industrial and commercial commodity. It is easily the cultural barometer of a nation, and effective growth and rising welfare of a nation cannot be achieved without a rise in the consumption of all kinds of cultural and industrial qualities of paper. Besides, paper being essential for liquidation of illiteracy, it is the most essential means of communicating thoughts of the peoples of the world and of developing better understanding between them. Process of modern democracy itself will be seriously hampered if paper is not available in sufficient quantities or without paper what would be there to safeguard human rights, the right to education, the right to culture, and the right of information. Paper has yet another important function, namely, as a packaging material par excellence. Packaging and wrapping are an index of standard of living. It is an established fact that for any increase in national income, there is more than proportionate increase in paper consumption (Abubakr et. al., 1995). Paper industry has had a chequered career in the past two decades with shortage of raw materials and power, rising cost, control over prices, and pattern of production and increasing cost of chemicals, thus affecting the profitability of operation. When paper industry is faced acute shortage of conventional fibrous raw materials, rising costs of imported pulp, and even the judiciary taking very serious view of environmental considerations the Importance of recycling of waste paper to the maximum extent cannot be undervalued (Adam et. al., 1997).

The future demand of raw materials can be met by proper recycling of waste paper. The waste paper is a cheap material having higher yield. Properly processed waste paper can be used for most of the paper grades including writing or printing and light shade grades.

REVIEW OF LITERATURE:

Additionally, the use of waste paper is a better utilization of the waste product and can provide source of income to the poor (Kaul, 1998). Recycled fiber has been an important source of paper making fiber in the last 100 years (Ajersch et. al., 1992). About 30% of global frber consumption is derived from waste paper (Ajersch and Pelton, 1996).

The use of the recovered paper in the manufacturing has increased during the last 10 years. In 1991, 37% recovered paper was used worldwide as a raw material in paper production (Xu. et. al., 1994). Recycled fiber has been used in the manufacture of various paper and board grades for many years. The use of recycled fiber worldwide is expected to reach 130 million tons by 2001. This means a rise from 33% recycled fiber used in 1988 to 41 % in 2001 (Andersen, 1997). The growing importance of de-inking grades will be one of the key trends in the future waste paper industries. Even Japan, whose efforts to recycle paper have been strenuous, has been unable to get its national recovery rate of waste paper above 52% (Bajpai et. al., 1993). As reported by Thomson (1999) recently. While Sweden has a

recovery rate of 6211/o in 1997 India has achieved only 16.5%. Recycling Will is the implicit fate of all paper produced In the future. Paper makers are focusing on recycling as an economic necessity (Barnbrick, 1985).

Pulp and paper manufacture is one of the most important industries in India categorized as a 'Core Sector Industry' (Barassi and Welsford, 1992). The first paper mill was setup in India more than 100 years ago. Presently, about 380 paper mills are in existence in India with an installed capacity of about 4 million tons per annum as registered with the Government of India and this includes 340 units producing paper and paper board in private sector (Bassemir, 1979). Raw materials wise classification of 380 paper mills reveals that 28 mills are forest-based and 11 t agro-based. The remaining 24 t mills use rags, waste paper etc. as raw material. These mills constitute about 30% of the total installed capacity. Out of the 380 mills 135 numbers of large, medium and small paper mills are lying closed.

Raw material availability at affordable cost is the prime concern and constraint for Indian Pulp and Paper Industry. It is predicted that per capita consumption of paper in India will rise from 3 Kgs to 6 Kgs before 2005 A. D. To meet the demand in the coming year's Indian industry will be forced to use more and more waste paper by recycling as well as by imports, as practiced today (Bhardwaj *et. al.*, 1997).

The paper mills that are not using waste paper presently will be forced to go in for this. Those who use small amounts will be required to increase the use of recycled fibers.

Any paper fiber used for a second time in the production of useful paper IS defined as secondary fiber. Paper made from secondary fiber pulp has special properties desirable In the converting process These include greater dimensional stability, less tendency to curl, better retention of size and fillers, increased opacity, more uniform formation, and better reproduction of imprint and colors for the production of tissue paper. It is reported that greater bulk and softness is realized when substantial amounts of secondary fibers are used. The disadvantages of secondary fibers include low strength (because the waste material has been previously processed in to paper and consequently has had considerable amount of refining treatments), low brightness, short fiber length, non-uniformity of color and low freeness.

Efficient removal of ink is necessary to recycle used paper in to high value products. The removal process involves detaching the ink from paper's cellulose fibers and then separating the dispersed ink particle from the pulp slurry. This process is known as "de-inking".

The first successful De-inking experiments were carried out and patented by Matthias Koop's in England in 1800. The first recorded de-inking of

printed waste paper was around 1900. Around 1960 a new process using flotation cells was borrowed from the mining industry and used to float the ink from the fiber. Conventional de-inking is necessary for large-scale secondary fiber utilization. It involves flotation and washing. These systems require mechanical and chemical treatments following re-pulping to separate the ink and contaminants from the pulp slurry.

The recycle potentiality of waste paper is mainly dependent on the type of ink, printing process used, and the paper to be recycled. Efficient recovery of secondary paper fiber also requires thorough and cost effective methods of de-inking.

A typical de-inking process:

The de-inking process involves ten basic steps. They are:

1. Pulping,
2. Pre-washing heat and chemical loop,
3. Screening,
4. Thorough flow cleaning or reverse cleaning,
5. Forward cleaning,
6. Washing,
7. Flotation,
8. Dispersion,
9. Bleaching, and
10. Water re-circulation and make up.

CONCLUSION:

This is mainly because neutral de-inking has great potential to lower chemical usage and cost, to reduce water treatment cost, to improve product quality and paper machine run ability. Mills will beneRt from switching from alkaline to neutral Sotation de-inking. Since no caustic or silicate is added in the pulper, Rbres are not yellowed or darkened. As a result, bleaching chemicals such as peroxide may not be required. Enzymatic de-inking represents a new approach to modern paper-recycling mills. Extensive research has been conducted to use enzymes to improve de-inking efRciency. The enzymes used included primarily cellulases, hemicellulases, amylase, lipase or resinase. Commercial application of enzymes to the Sotation de-inking of waste papers showed enhanced ink removal efRciency. Neutral pH de-inking further beneRts the use of enzymes since it can improve ink detachment from the Rbres and repulsing efRciency. Since most enzymes work at acidic pH and lower temperature, enzyme

manufacturers have to develop thermophiles and alkaline-stable enzymes to lower usage and enhance their effectiveness.

In India this figure is much low. Technical challenges involved in greater and better utilization of waste paper is improving the quality of these floors to the same level as that of virgin floors. The difficulties for countries like India will be that they will be forced to deal with an ever-decreasing quality of waste paper in the future. Therefore, in view of future raw material shortage and environmental legislation to maintain ecological balance, there is an immediate need to develop a de-inking technology which could ensure uninterrupted supply of de-inked waste paper pulp suitable for making all type of light coloured paper grades including writing and printing papers. I believe that this study is one step forward in that direction. The major companies involved in paper making, in both public and private sector may turn some of their profits to research in this field.

REFERENCES:

- Abubakr, S.M., Scott, G.M., and Klungness, J.H (1995). Fiber fractionation as a method of improving hand sheet properties after repeated recycling. Tappi J. 78(5): pp. 123-126.
- Adam, H. D., Vincent., Khong.C.; and Rizzon.E (1997). FAS (thio urea . oxide) bleaching of recycled pulp. Appita. 50(5): pp. 393 - 399.
- Ajersch, M., and Pelton, R (1996). Mechanisms of pulp loss in flotation de-inking. J. Pulp Paper Sci. 22(9): pp. 338-345.
- Ajersch, M., Pelton, R., Loewen, S., and Chan, A (1992). Measurement of dispersed air in news print pulp suspensions. Tappi J. 75(2): pp. 125-129.
- Andersen.S. L (1997). The outer limits of paper recovery and recycling. Tappi J. 80(4): pp. 59-62.
- Bajpai, P., Bhardwaj, K.N., Maheshwari.S.; and Bajpai,K.P (1993). Use of xylanase in bleaching of eucalyptus kraft pulp. Appita.46(4): pp. 274- 276.
- Barassi, and Welsford, J (1992). Latest development in de-inking technology. Appita. 45 (5): pp. 308- 312.
- Barnbrick, D. R. (1985). The effect of DTPA on reducing peroxide decomposition. Tappi J. 68(6): pp. 96-100.
- Bassemir, R.W (1979). The chemical nature of modern printing inks and de-inking. Tappi J. 62(7): pp. 25-26.
- Bhardwaj, N.K., Bajpai, P., and Bajpai, P.K (1997). Enhancement of strength and drainage of secondary fibers. Appita.50(3): pp. 230-232.
- Xu.r, Mc Lellan,F., Adiwinata,J., May,M., and Evans, T (1994). Functional and performance characteristics of soluble silicates in de-inking. Part I: Alkaline de-inking of newsprint /magazine. J. Pulp Paper Sci. 20(1): pp. 3-8.

Corresponding Author

Anubhav Gupta*

Research Scholar, DAV University, Jalandhar

E-Mail – vipinswaroop50@gmail.com