

Environmental obligations of paper industry

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Use of Paper and Paper Products is highly linked with cultural and Economic Developments of a Country. We receive messages on Paper in Books, Magazines, Computer listing and invoices etc. We use Paper to pack, transport and display products ranging from bread, tea, soap, butter, salt, pulses and drinks to furniture, fertilizers and cement etc. We prefer to buy food products packed in paper packings and prefer using napkins, towels and tissues made from wood fibres.

In 1987, the world population used over 215 million tons paper and paper board products and all estimates show that paper consumption is going to increase in the foreseeable future.

With the increasing trend in consumption of paper our concern and awareness over the environmental situation is also growing rapidly. This concern not any longer limited socially or geographically but shared by virtually all people on the earth. The recent survey indicated a significant and wide environmental concern in most of the countries in the world.

ENVIRONMENTAL POLLUTION PROBLEMS :

Environmental pollution is one of the major problems which mankind is facing today due to rapid Industrialisation, Urbanisation and rise in living standards in general. Natural water resources, atmosphere and land have been seriously effected due to over exploitation of natural resources and increasing generation of waste. Paper consumes huge amount of natural raw materials, such as forest products, agricultural residues, coal, lime, dyes, chemicals and water etc. During the various manufacturing operations, huge, volume of liquid, gaseous and solid wastes are discharged in environment causing serious problems.

Paper Industry is among 20 highly polluting Industries in our country. There are 288 Paper and Pulp units with an annual installed capacity of 2.9 million

tons. Large integrated Paper Mills utilise Bamboo, Wood and Waste paper as raw materials and are based on Kraft pulping process. There is only one Mill which is using Sulphite pulping process. Small and Medium size paper Mills utilise rice and wheat straw, grasses, Jute sticks, hassians and waste paper etc., as raw materials and use soda pulping process. The small and medium paper Mills do not have any chemical recovery system. Newsprint Mills utilise 20-25% chemical pulp, and 75-80% mechanical pulp, manufactured by Thermo Mechanical pulping process and use Hardwood, Bamboo, Eta Reed and Bagasse as raw materials. Bleaching sequence followed by different Mills is CEHH or CEH or HYPOCHLORITE Bleaching.

Environmental pollution for Pulp and Paper Industry had been a matter of great concern. During making of Pulp and Paper, large volume of solid, liquid and gaseous wastes are discharged into the environment at various stages starting from the raw materials procurement to finish product despatch.

A continued successful development of the Paper Industry requires better product performance and better characteristics than competing products or systems. In the evaluation of performance, environmental criteria have already been introduced and it seems likely that will play an increasingly important part in the future. It is necessary that all social and Industrial activities have to be compatible with environmental requirements. Paper Industry has a basic advantage as it uses renewable raw materials and its products can be recycled. The production process for Pulp and Paper Industry can, however, have a serious impact on environment, if proper measures are not taken. To stay competitive, the Paper Industry, therefore, must adopt environmental management in the broad sense,

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In many applications, paper products compete with many other materials or systems available in the market. Therefore, we see constant developments towards improved product quality and a more efficient production process. It should be borne in mind that prerequisite and environmental consequences vary for different products, production units and geographical areas. Many companies have already embarked on more or less complete environmental programmes, depending upon their size and specific requirements.

MAJOR ENVIRONMENTAL ISSUES :

Quite recently; distinguished environmental scientists have made a list of what they regarded as the most pressing environmental issues. They also considered developments which will be there upto the year 2000 in their studies. From the paper industry stand point the study highlights several key issues. It envisages sustained yield of the raw material, and in the long run to organise for more regrowth of Wood, Bamboo as raw materials than it is consumed by Paper Industry. Another important issue which has been high lighted is that of tropical rain-forest. In these areas, Industry must help to protect the rain forests by organising its wood supply from plantations. For the establishment of plantations, rain forest areas must be avoided.

Air pollution in the form of Sulphur-dioxide, Nitrogenoxides and Hydrocarbons can exert detrimental affects on forest and thereby threaten and make more costly raw material base of the Industry. Due to the great importance of this issue, for the raw material supplies, Industry must be prepared to comply with increasingly stringent requirement.

Chlorinated organic material is formed when chemical pulp is bleached with Chlorine, hypochlorite or chlorine dioxide. This material is then discharged with the bleached plant effluent. The discharge of Chlorinated material from a conventional bleaching plant for sulphate pulp, is atleast 8-10 kg. per ton, as TOCL. By introducing oxygen bleaching and efficient biological treatment of the effluent, discharges down to 3-4 Kg TOCL per ton can be achieved. Development today is towards combining a modified cook with the Oxygen bleaching and modified final bleaching to reach a very low discharge value.

Risk chemicals include organic and inorganic compounds had elements which are toxic in nature and in certain cases degrade slowly in the environment. For the pulp and paper Industry, the discharge of Chlorinated material from the bleaching of chemical pulp, belongs to this category as well as sludge from drinking operations. Additives used by the Industry also belong to this category.

For most of these issues, knowledge and technology is available to plan and initiate programmes to gain a high environmental acceptance and compatibility. Knowledge and Technology has reached a high level, but it is still under development.

Some of the problems, which are faced during raw material procurement, during manufacture and during consumption, are as under :

During raw material procurement, Mills usually have to do operations which include (a) cutting (b) barking (c) removal of leaves and (d) cutting branches of the trees which generate solid wastes, responsible for upsetting ecological balances. The above are faced during cutting and procurement of Bamboo and Wood. Solid wastes from lime stone query and coal production, lime production from rotary kiln etc. emit dust which is a big health hazard, which results in Asthama, lung infection and nasal infection.

During manufacture, inside the plant, significant quantities of waste in the form of solid, liquid and gaseous as well are generated causing serious pollution of water, air and eco-system. Other factors, causing environmental detoriation inside the factory premises, are thermal stresses due to an excessive heat and humidity and noise as well.

Paper Industry is a major consumer of process water. About 200-250 m³ of waste water per ton of paper is discharged having high BOD, COD, PH, Solid contents, colour and foam. In our country, the discharged water from paper mills is having 50 kg of BOD per ton of paper equivalent to that of 1000 people per day.

The details of contaminates, generated from different categories of paper mill in India are as under :

- (1) Large size integrated mills based on Bamboo and Hardwood : Suspended solids 100-150, BOD 40-60 & COD 150-200.
- (2) Newsprint Mills :— Suspended solids 80-100, BOD 50-60, COD 130-140.
- (3) Small Paper Mills, based on agricultural residues:— Suspended solids 100-250, BOD 100-270, COD 400-1000.
- (4) Small Paper Mills, based on waste paper :— Suspended solids 50-90, BOD 20-40, COD 50-100.

Pollution due to small paper mills based on agricultural residue is more serious as recovery of chemicals for these Mills is still a big problem, and most of the Mills are not having a recovery system. Normally a 30 TPD small paper mill, based on agricultural residue, will have a BOD load equivalent to 100 TPD large integrated mill, as the integrated mills are having chemical recovery system.

Increased use of paper, paper board and newsprint has resulted in increased waste paper generation from various sources. Recovery of waste paper and waste paper products is hardly 20-25% in our country as compared to 40-50% in advanced countries. This necessitates urgent need to have better and efficient utilisation of waste paper, which will help in solving many inherent problems arising from waste paper contamination.

Various environmental protection measures include water pollution control, air pollution control, solid waste treatment and noise pollution control.

WATER POLLUTION

Paper Industry probably consumes a large volume of water per unit of consumer goods produced. The entire process of Paper making, right from the washing of fibrous materials to the drying of sheet of paper, depends upon water in some form or other and since the end product is practically free from water (5/7% max. moisture is there in finished paper) all the water consumed in pulp and paper making process, reappears as waste water. In our country, about 200-350m³ of fresh water is consumed per ton of paper produced, resulting in about 200-250m³ effluent per ton of paper.

The modern trend in paper and pulp Industries is towards "Zero Effluent Discharge" Compared to this, effluent discharge in our country in paper industry is abnormally high. This not only pollutes the water resources to a high degree but also affects the economics of the paper mills and poses a problem for the treatment of the large quantities of effluents.

As most of our water resources are either in the form of rivers or streams, they get polluted by such discharge making it unfit for human consumption.

In the developed countries of the world, such as USA, the water pollution rate from Pulp and Paper Mills is of the order of 7 Million Gallons per day, where as the same in India is approximately 200 Million Gallons per day, when our total paper production in the year 1988 is only 1.8 Million Tons as against 60 Million Tons of paper production in USA.

A good water management is vital for economy of a mill. Cost of effluent treatment itself is about Rs. 80/- per ton or Rs. 1/- per kg of BOD removed in a 100 TPD Mill. Reduction in water consumption by about 10-20m³ per ton of Paper will result in saving of about Rs. 2.5— 4.5 lakh per annum. By recycling maximum amount of back water, introduction of control measures and technological changes, it is possible to minimise water consumption to a very low level. This of course requires personal training and properly planned development programme, and arousing the awareness of pollution problems amongst all the working personal in the mill. Some of the in-plant control measures for controlling pollution are (a) Max. recycling of back water at various stages. (b) Recycling of condensate by strict monitoring (c) Plugging all the possible leakages point from the pump glands and valves, pipeline etc. (d) Monitoring and Metering the water consumption at different stages. (e) Use of back water in waste Paper and pulp system and (f) Good housekeeping.

Some of the technological changes which should be incorporated to cut down pollution are :

- Oxygen bleaching/chlorine dioxide bleaching.
- Use of Anthraquinone and lower sulphur high-yield pulping process.
- Modification of bleaching sequence to eliminate caustic extraction stage. and

(d) Total recycle concept.

The effluent should be treated in primary system for removal of suspended solids and in secondary system for removal of dissolved solids and adsorption for removal of colouring material. The most common practice is to have aerated lagoons and follow activated sludge treatment system for removal of dissolved solids. During recent years, anaerobic treatment has received considerable interest due to low power consumption, lower nutrient demand and low generation of sludge, in developing countries. Land application of Industrial effluent is very common and is very promising for ecological and economic reasons. The land application system involves irrigation, infiltration, percolation and over land flow. Sandy soils give highest percolation, loamy soils are suitable for irrigation and clay loams for over land flow. The rate of application vary with soil, conditions, type of crops, climatic conditions and effluent quality.

In our country, many of the integrated Pulp and Paper Mills are having primary and secondary treatment systems. Some of the Mills are in the process of implementating these systems wherever they don't exist. However, the situation in small and medium size Mills, based on agriculture residues, is very alarming due to lack of recovery systems, and many mills are not having full fledged treatment system.

AIR POLLUTION

Air pollution control measures include inplant control measures, process modifications and external control measures as well. Some such control measures are :

- (a) Minimisation of dust generation in Chipper house by spraying water on Bamboo/Wood and Chips.
- (b) Controlled discharge of digestors.
- (c) Proper care in chlorine handling.
- (d) Maintaining low sulphidity in cooking liquor &
- (e) Proper ventilation and providing exhaust fans at

various dust generating points, such as lime and talcum handling plants.

Air pollution control measures are yet to be given due to consideration in our country. However, Aeration, ventury scrubbing, Electrostatic precipitation and condensation etc. are being practiced by many mills.

FUTURE ENVIRONMENTAL NEEDS :

The environmental pollution control measures are very expensive and many Mills find it very difficult to use them due to poor financial condition. However, with adoption of MINAS and rising public concern over environmental pollution, the mills have to go in for short term and long term pollution control programmes. Pollution control measures are a social responsibility. In plant control measures and good house-keeping, proper ventilation, effective safety measures and proper training of concerned persons, will go a long way in eliminating environmental hazards. Good water management, effective waste recycling and properly modified process improve the atmospheric conditions as a whole and will improve the economy of the operations.

To make a complete environmental evaluation of a product, it is necessary to consider the entire product life cycle from raw material extraction to final disposal stage or recycle of the product. The ideal product can efficiently be recycled at a low cost but if it cannot, it should have safe disposal characteristics or be able to add fuel value in refuse burning. An attempt to identify the future environmental needs of the Pulp and Paper Industry should start with product life cycle. Technology is rapidly developed and implemented to bring down the emission from the production and converting units to a very low and safe level. In Industry we have to be prepared to accept stringent environmental requirements as the public awareness is increasing day by day.

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