

Semi-continuous Biotreatment Plant for Pulp and Paper from Crop Residues

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Most pulping processes require large quantities of chemicals and high energy. The drastic cooking conditions adopted by the paper industry results in generation of a variety of wastes in gaseous and solid states causing environmental pollution. Biological processes offer an ideal and appropriate solution to obviate the above problems. The microorganisms degrade hemicelluloses and loosen the lignin-cellulose bond, thereby reduce the requirement of chemicals and energy in preparing pulp and paper.

A novel process of biological softening of cellulosic materials by anaerobic treatment has been developed and patented at CIRCOT. The process has several advantages in terms of yield, better quality pulp, process economy, environment friendliness, etc., and above all, it is the most practicable technology.

The Process

Ten tonnes of alkali pretreated raw material (cotton stalks, rice straw or wheat straw) is charged every day and the same quantity of biosoftened material is taken out from the outlet and cooked in digester. The particulars of process parameters are given below:

Process Parameters	Cotton Stalks	Straws
Alkali concentration	5%	2%
Cooking time	1 hour	1 hour
Temperature	160°C	160°C

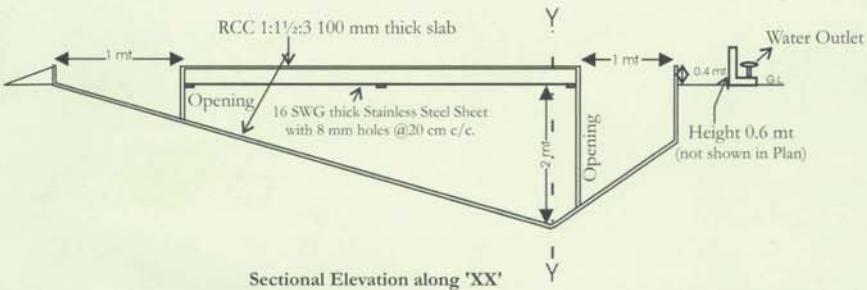
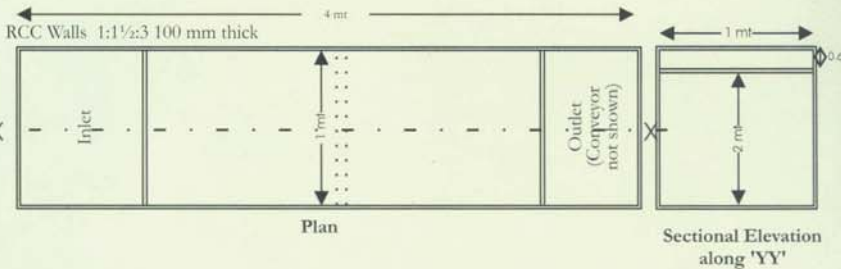
Digester volume - 230 M³

Retention time - 5 days

Capital cost - Rs. 10 lakhs

Running Cost

<i>Man power</i>	
4 persons per day (1 semi skilled @ Rs. 150/day and 3 unskilled @ Rs.100/day)	Rs.450/day
<i>Chemicals</i>	
200 kg of NaOH daily @ Rs. 15/kg	Rs.3000/day



Schematic Diagram of the Semicontinuous Plant for Anaerobic Treatment of Cellulosic Substrates

Total Cost of Production of Paper

Product & Raw Material	Chemical Process (Rs.)	Biological Process (Rs.)
Cost of writing grade paper from cotton stalks/tonne	12,300	7,360
Cost of writing grade paper from wheat straw/tonne	10,409	8,586
Cost of writing grade paper from rice straw/tonne	4,108	2,700

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