

**WELCOME**



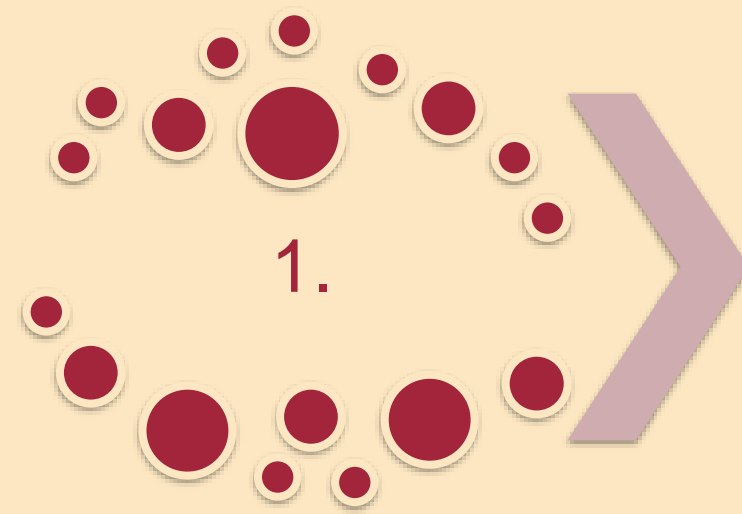
# PAKKA SKILLS

An initiative of Yash Pakka Ltd

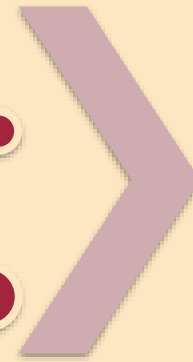
**TOPIC**

**Benchmarking of Pulping,  
Bleaching and Recovery  
Operations (Wood & Agro Based  
Mills)**

# PAPER HIGHLIGHTS

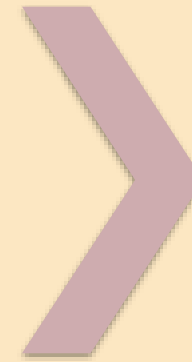


**Introduction  
to paper**



**2.**

**Pulping  
vision  
technology**



**3.**

- **Bleaching  
techniques  
also status  
of chemical  
recovery**



**Discussion  
on pulping,  
bleaching  
and recovery  
latest vision**

# Introduction to Paper

- **Paper plays a key role in our daily life and papers have been used for many years from now.**
- **Papers are made with the pulp of the woods, non-woody raw materials like straws, bamboo, kenaf, hemp and also with some recycled fibres paper.**
- **In the process of paper manufacturing ,the processes after pulping, bleaching of the brown pulp is necessary to produce good white paper and to run the pulp mill smoothly chemical recovery is also needed.**

## **Statistics of paper industry**

- The Indian paper industry accounts for about 4 % of world production of paper and it is expected to grow from the present production i.e. 19 MT to 23.5 MT (million tons) by 2025.**
- On other hand, in 2019 the total production capacity of bleached hardwood Kraft pulp amounted to around 79.26 million air-dried metric tons.**
- In recent years, paper production from wood-based raw material has reduced from 84 % in the 1970's to 25 % and 17 % of total pulp production is from agro-based pulp and paper mills.**

## Brief Introduction to Pulping

- For pulping there are number of challenges to be faced or facing by the paper mills to run their organisation. Pulping processes reduce wood or any other fibrous raw material to a fibrous mass. Chemical pulping essentially dissolves the non-cellulosic components in wood, mainly lignin, and thereby liberates the fibres.
- In this process, the virgin materials are mixed with a chemical solution, called white liquor, in a digester, where they are pressurized and heated to dissolve the lignin from the wood.

## Bleaching Process in Mills

- Once the pulping process becomes less selective (in the removal of lignin as compared to cellulose and hemicellulose), the process is stopped; further processing of pulp proceeds via extended delignification and bleaching processes.
- Although the bleaching process is intended to bleach the 'brown' unbleached pulp into bright white pulp, the initial stages in a multistage bleaching process are more aptly called delignification since they essentially contribute to additional and preferential lignin dissolution



# Chemical Recovery in Paper mills

- **After being dissolved, the virgin material is separated into individual fibres and the chemical mixture, now called black liquor, is concentrated in an evaporator. Then, it is burned in a recovery boiler, where the energy is recovered, often cogenerating both steam and electricity, which is then used as process energy.**
- **In this department the liquor is recovered for further cooking in pulping section.**

# **COMPARISON OF TECHNOLOGIES USED IN INDIAN PAPER INDUSTRY VIS A VIS THOSE USED IN DEVELOPED COUNTRIES:**

- **For Pulping**
- **For Bleaching**
- **For Recovery**

**of both Wood & Agro Based Mills**

# Pulping Operations

<b>Pulping</b>	<b>Advanced Countries</b>	<b>India</b>
<b>Chemical</b>	<ul style="list-style-type: none"><li>• <b>Continuous Digesters or RDH pulping</b></li><li>• <b>Oxygen Delignification</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Mainly batch scale pulping</b></li><li>• <b>Only practiced by some mills</b></li></ul>
<b>Newsprint</b>	<ul style="list-style-type: none"><li>• <b>Ground wood pulping, TMP process, CTMP Process</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Generally CRMP</b></li></ul>

# Bleaching Operations

	<b>Advanced Countries</b>	<b>India</b>
<b>Bleaching</b>	<ul style="list-style-type: none"><li>• <b>TCF &amp; ECF bleaching in most of the mills</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Chlorine is still being used in many mills</b></li></ul>
	<ul style="list-style-type: none"><li>• <b>Extended nip press</b></li><li>• <b>Closed draw</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Plain/Suction Press mostly used</b></li><li>• <b>Open Draw</b></li></ul>

# Chemical Recovery Operations

	<b>Advanced Countries</b>	<b>India</b>
<b>Chemical Recovery</b>	<ul style="list-style-type: none"><li>• <b>Falling film type evaporators</b></li><li>• <b>Equipped with lime burning kilns</b></li><li>• <b>Direct contact evaporators still used</b></li></ul>	<ul style="list-style-type: none"><li>• <b>No direct contact evaporators</b></li><li>• <b>Generally LTV,STV in some mills</b></li><li>• <b>Only some mills have lime kilns.</b></li></ul>

# **AREA REQUIRING TECHNOLOGY UPGRADATION**

## **AFTER STUDIES:**

- **Cost competitiveness**
- **Improved quality standards**
- **Environmental compliance and**
- **Enhanced productivity**

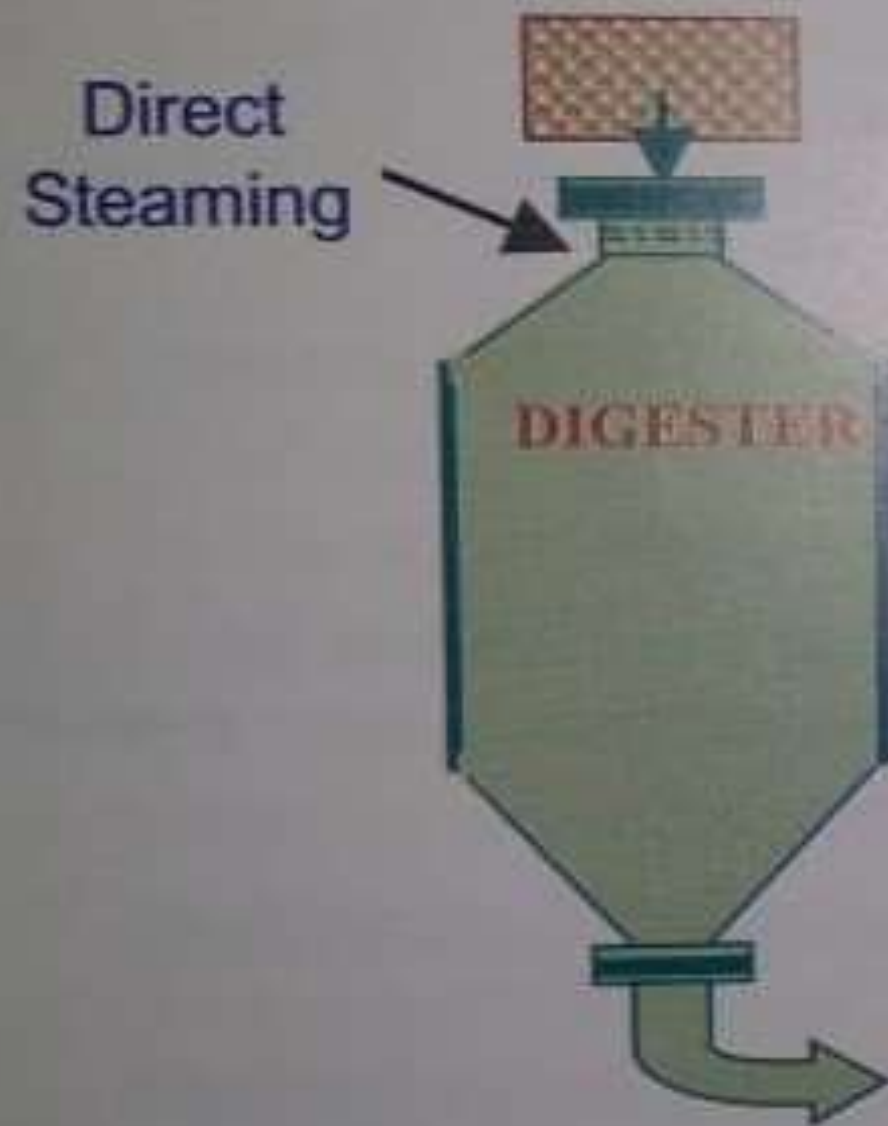
## **Solution of Pulping**

**The systems the alkali concentration in the digester is manipulated so as to reduce the damage to the cellulose and hemicelluloses during pulping.**

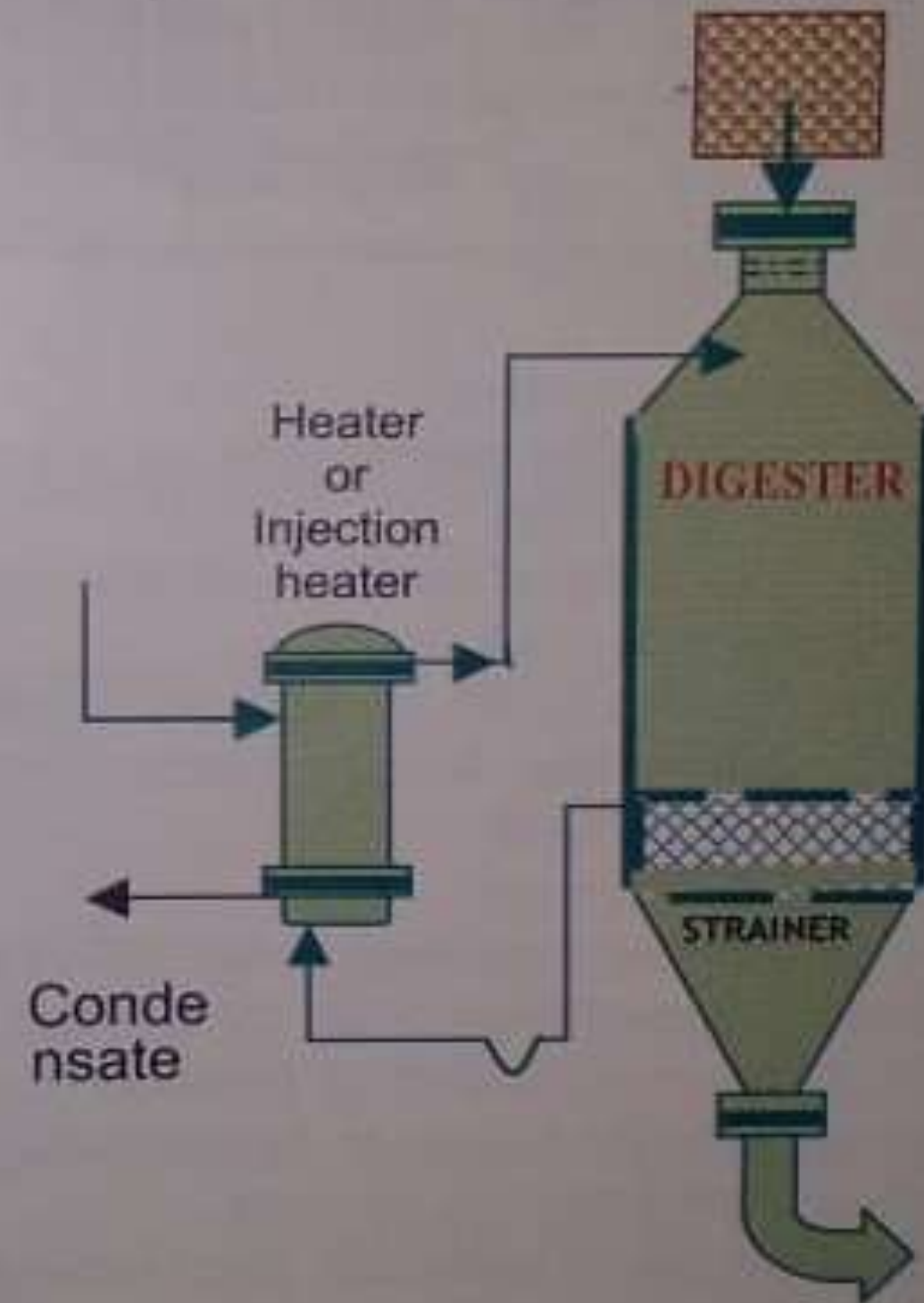
- Modified Continuous Cooking (MCC) for continue digesters.**
- Rapid Displacement Heating (RDH) for batch digesters.**

**To keep the concentration of alkali lower and to minimize the concentration of dissolved lignin at the end of the cook**

Existing Direct steaming System



Modified Indirect steaming System



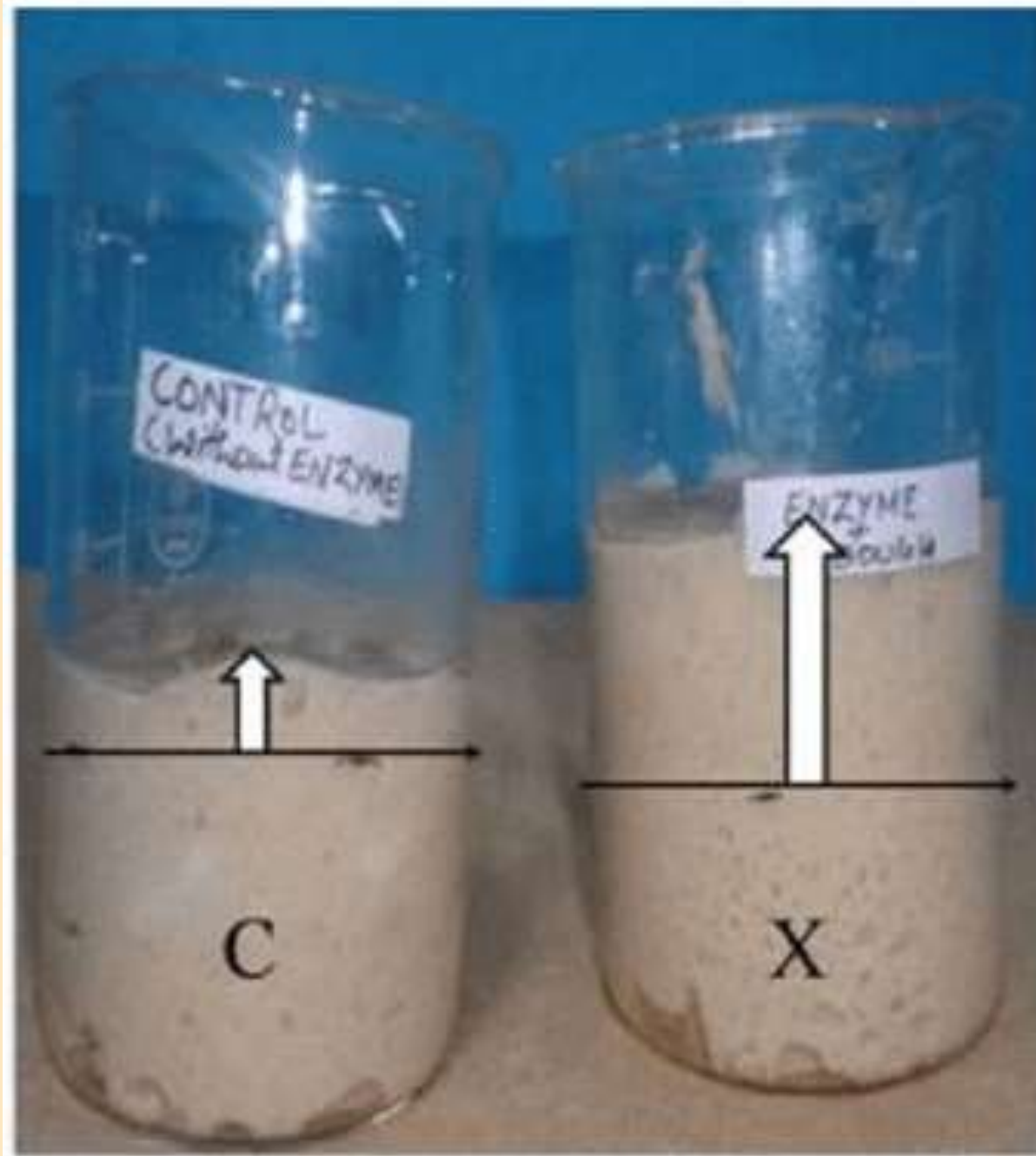


# **Solution of Efficient Pulp Bleaching**

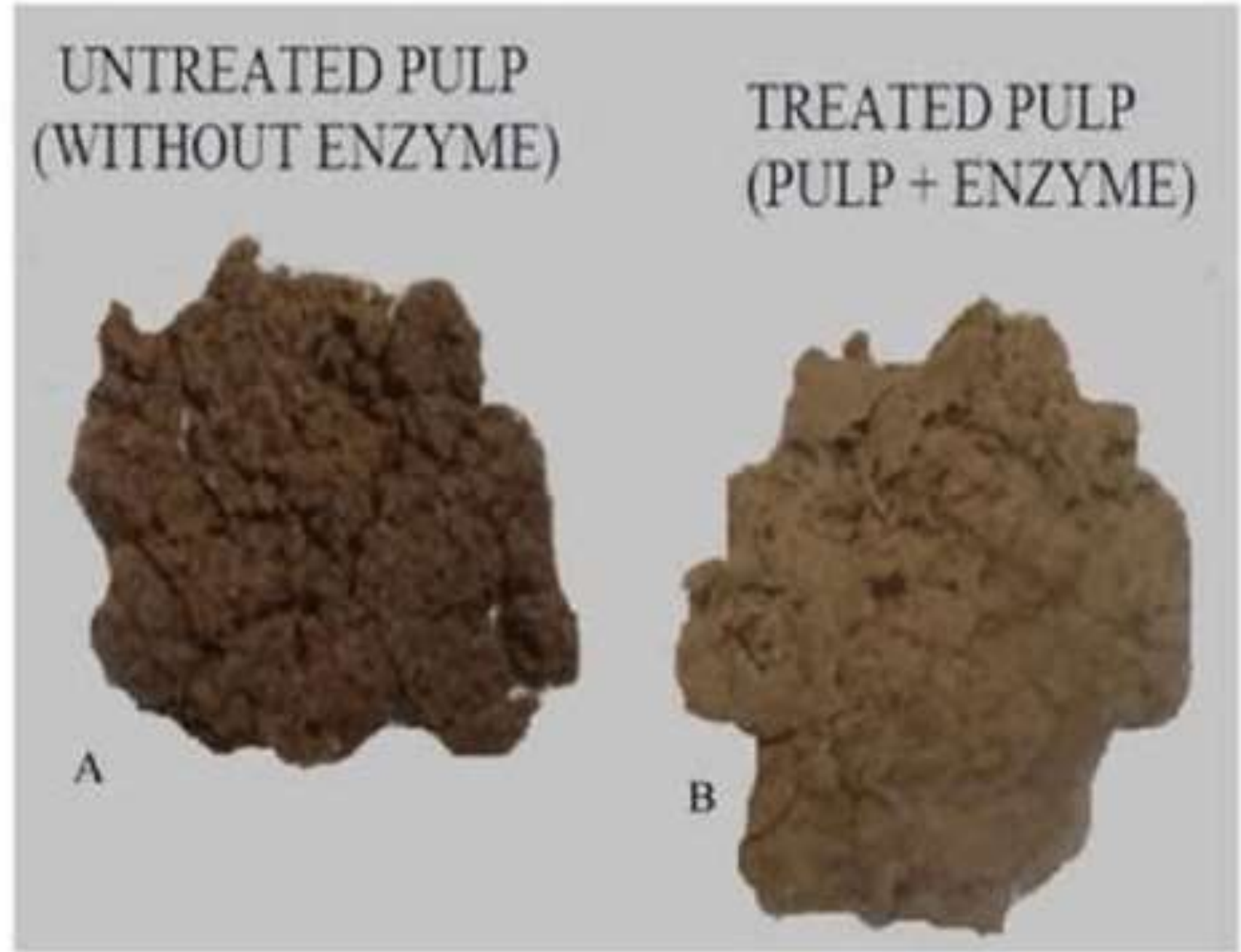
## **XYLANASE TREATMENT:**

**The application of xylanases to fibres between chemical pulping and the bleaching sequence is being rapidly implemented in mills worldwide.**

**It is placed after the pulping and oxygen delignification steps and prior to chlorine, chlorine dioxide, and hydrogen peroxide steps; mills have implemented xylanase before or after ozone bleaching stages**



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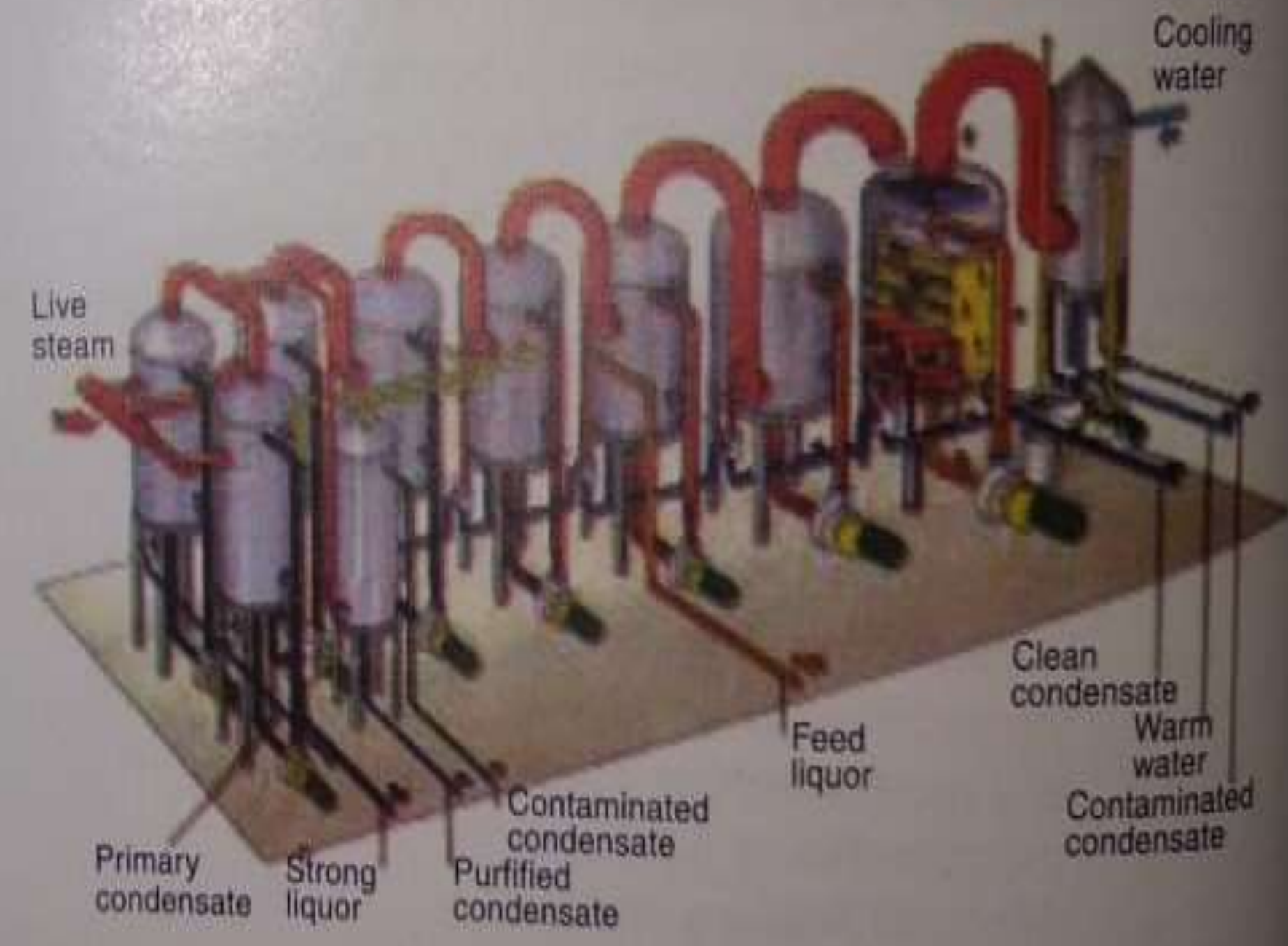
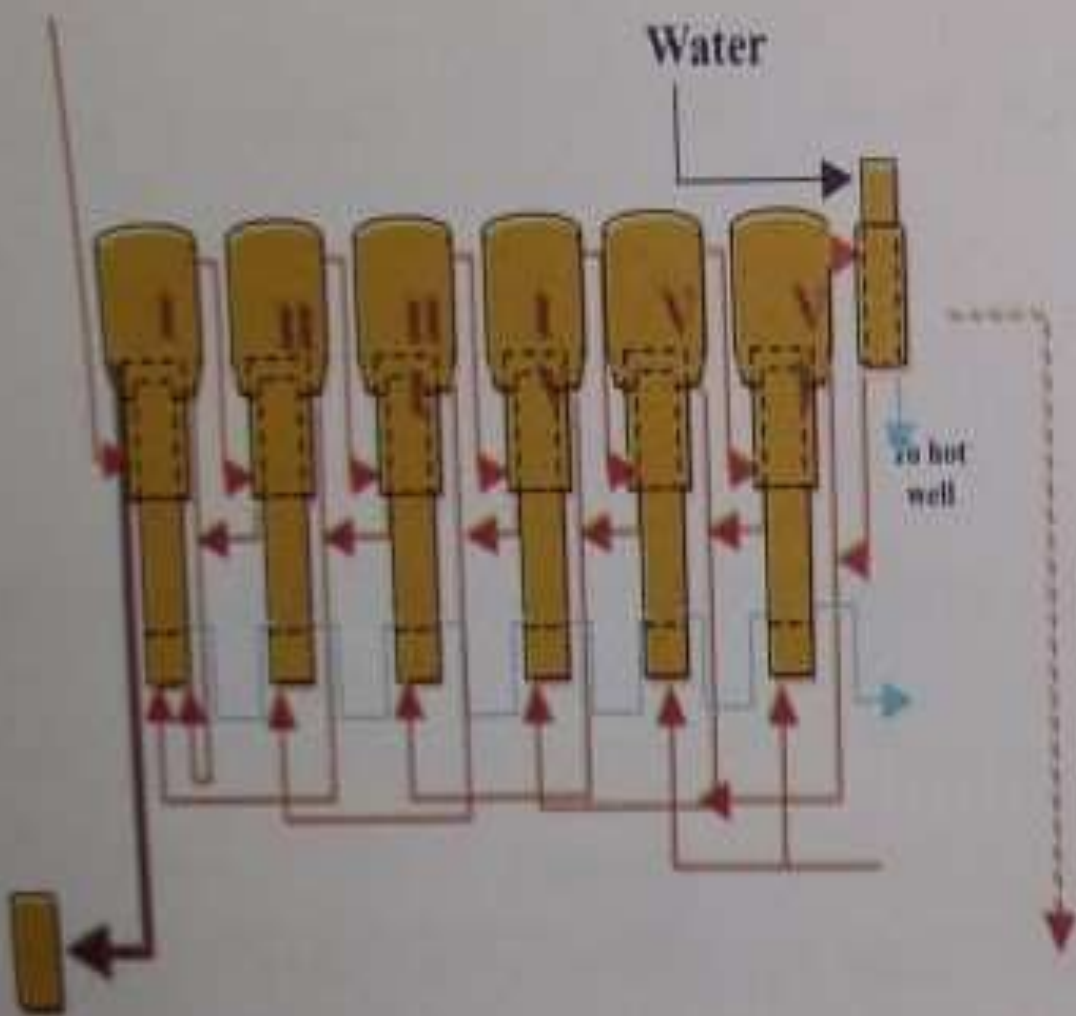


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## **Suggestions for chemical recovery**

**With high-yield wood pulps or when agricultural residues are used, press washers or other special devices may be needed to effectively remove the liquor from the pulp.**

**Combustion of soda liquors can take on different forms than that used for Kraft. Since sulphide is not needed, there is no need to maintain a local reducing environment in the combustion step.**



- **Black Liquor filtration system**
- **Installation of FF Evaporators as a finisher effect for existing mills and complete 7 effects MEE system for new units.**
- **Thermal treatment of black liquor**
- **Installation of DCS system**
- **Conversion of recovery boilers to power boilers**
- **Non condensable gases collection and burning.**

# Conclusion

**With this study we have concluded that pulping operations in such above Kraft mills now being changed to sustainable pulping following that technique environment sustains and also future mankind resources protected. After that bleaching techniques are now being changed to xylanase bleaching, will cause a real change to the current paper industry scenario and also the cost will be effective from this type of technique.**

**Also chemical recovery operations should be pollution free and ecofriendly in every wood and agro based industries.**

**Any  
Questions  
Please**



**THANK you**

**PACKAGING WITH A SOUL**

means we celebrate our oneness