"Pitch Control for Improved Quality and Productivity"

Chandarana D.P. Lakhotia R.L.

ABSTRACT

Pitch has been a recurring problem for pulp and paper manufacture since long. Liberated in the Pulping and Paper making as a sticky resinous material, pitch seriously hampers the manufacture of the quality products.

Resinous matter is a key quality parameter for Dissolving grade pulp too where high resin content causes clogging of jets and adversely affects the yarn color.

Use of surfactants as Digester- Additive has been successfully tried in the Dissolving grade pulp street of Century Pulp and Paper to achieve a reduction of over 35% in Resin Contents (Alcohol-Benzene Extractives) of pulp.

The Paper discusses the Pilot and Plant Studies carried out with three different products towards deresination of Dissolving grade pulp and the improvement made in product quality.

INTRODUCTION:

Deposition of pitch is one of the frequently occuring problems in paper manufacture. This pitch is liberated from the fibers during refining and tends to accumulate as a colloidal suspension of negatively charged particles. These particles cause problems by filling in the wire of the Paper Machine, thereby producing holes in the finished Paper, or get collected on the Felts or Machine part as sticky material.[1]

In case of Dissolving Grade Pulp, high resinous matters are a cause of serious processing problems for Rayon Produce in terms of frequent clogging of jets, brittle fibre and discoloration. The harmfulness of Resin depends on several factors like wood type, wood storage and time and resin viscosity etc. For products like Yarn and Cellulosic films, a low Resin content in pulp is absolutely necessary.

In view of the difficulties faced in procurement and storage of Eucalyptus wood, Proper seasoning is often not practical, leading to higher Resin content (Alcohol : Benzene Extractives) finding its way in the final product.

Usage of Digester additives in prehydrolysis, sulphate cooking and extraction stages of processing yielded good results towards lowering Resins with additional benefits of reduced Kappa No.

These Digester additives are nonyl-phenol condensates modified and blended with special chemicals which fecilitate penetration in wood and emulsify Resin/Pitch for its easy removal.

The Resin-Content (Alcohol : Benzene Extractives) in the Dissolving Grade Pulp at the Mills used to be as high as 0.45% against the requirement of 0.3 ± 0.02% by

Century Pulp and Paper
Ghanshyamdham
Lalkua - 262 402
Distt. Nainital (Uttranchal)

the Yarn Manufactures i,e Resin content higher than 0.3% poses processing difficulties and deterioration in Yarn quality. The studies were primarily aimed to reduce this.

DISCUSSIONS

Unseasoned wood gives heavy Pitch problems. During seasoning of wood in air, the resin content decreases. Oxidation of unsaturated fatty and resin acids, hydrolysis of esters and degradation through microorganisms are believed to be the most important changes.

In Eucalyptus, which is used for the manufacture of Dissolving Grade Pulp at the mills, the resin is mainly located in the Parenchyma cells and is mainly composed of fats and steryl esters of fatty acid. The unsaponifiable portion is generally difficult to remove in pulping and bleaching.[2] At the cooking stage of wood, a part of resin is suspended and washed out together with Black liquor hence washing of pulp becomes very important.

The widely used method among the Rayon Industry to represent the Resin content in wood pulp is generally Alcohol : Benzene Extract. This is believed to be comparable to the sum of hexan, ethyl ether and Acetone - Extract.

During storage of wood, the hydrolysis of fats and steryl esters takes place. However, such storage may not be practical in the present context of raw material availability. Use of surfactants as digester additives could be a solution. These are generally wetting agents which facilitates penetration during cooking. The wood resin molecules diffuse out of the unbroken Parenchyma cells and are squeezed out. Due to high pH and ionic strength in the digester, the wood extractives most likely form a lamellar liquid crystalline phase which forms separate droplets at the pulping temperature. This facilitates deresination.[3]

TABLE-1

Pulping Conditions : Dissolving Grade Pulp

		Prehydrolysis Stage	Sulphate Stage
Bath Ratio		1 : 2.5	–
Steaming Time	Minutes	105	75
Cooking Time	Minutes	105	75
Temperature	°C	175	165
Active Alkali	%	–	16.5

EXPERIMENTAL :

Century Pulp and Paper produces 100 TPD Rayon Grade Pulp from Eucalyptus, incorporating Prehydrolysed - Kraft Process. The Eucalyptus wood chips collected from the chipper house were subjected to two- stage cooking in the pilot plant of the mills, using Prehydrolysis and Sulphate stages. The conditions maintained during processing are as per Table-1.

A digester additives i,e nonyl - henolic based compound was used in Prehydrolysis and/or sulphate stages at a dosage varying from 0.1% to 0.2%. Unbleached pulp was evaluated for Kappa No. and Alcohol : Benzene extractives. It is revealed that a maximum of 56.15% reduction in Extractives could be achieved with 0.4% dosage in sulphate stage the summary of the finding are given in Table-2.

TABLE-2

Deresination with Digester Additives

Particulars/Sets		I	II	III	IV	V
Dosage in Prehydrolysis	%	0	0.1	0	0.2	0
Dosage in Sulphate	%	0	0.1	0.2	0.2	0.4
Screened Unbleached Yield	%	33.61	32.47	32.21	33.23	33.59
P. No.		14.6	13.3	13.4	13.2	13.0
Resin	%	0.479	0.305	0.350	0.261	0.210
Reduction	%	–	36.32	26.93	45.51	56.15

TABLE- 3 CENTURY PULP AND PAPER RAYON GRADE PULP PLANT TRIAL RESULTS OF SURFACTANTS FOR DERESINATION

CHEMICAL DOSING RATE kg/t PULP	BLANK (Without Chemical) Resin & Fats % (Before Trial)	PRODUCT -A 23/01/2001 to 04/02/2001			PRODUCT-B 05/02/2001 to 11/02/2001			PRODUCT - C 12/02/2001 to 17/02/2001		
		Dosing Points	R&F, % Avg. Value	Reduction, %	Dosing Points	R&F, % Avg. Value	Reduction %	Dosing Points	R&F, % Avg. Value	Reduction %
. 0.7	0.43 .	. .	. .	. .	. Sulphate=0.7	. 0.324	. 24.65	. PH=0.7	. 0.325	. 24.42
0.9	.	Sulphate=0.4 VF - 1 = 0.4 VF - 2 = 0.1	0.358	16.74	.	.	.	.	.	.
1.0	.	PH = 0.3 Sulphate = 0.6 Washing = 0.1	0.301	30.00	.	.	.	PH = 0.7 Sulphate = 0.3	0.242	43.72
1.1	.	PH - 0.6 Washing = 0.1 VF - 1 = 0.4	0.353	17.90	PH = 0.4 Sulphate = 0.7	0.244	43.25	.	.	.
1.2	.	Sulphate = 0.5 Washing = 0.1 VF - 1 = 0.4 VF - 2 = 0.2	0.310	27.90	.	.	.	.	.	.
1.3	.	Sulphate = 0.6 Washing = 0.2 VF - 1 = 0.4 VF - 2 = 0.1	0.328	23.72	.	.	.	.	.	.
1.4	.	.	.	.	PH = 0.7 Sulphate = 0.7	0.193	55.12	Set1) PH = 0.9 Sulphate = 0.5 Set2) PH = 0.4 Sulphate = 1.0	0.215 0.304	50.00 29.30
2.0		.	.	.	PH = 1.0 Sulphate = 1.0	0.164	61.86	.	.	.

VF 1 : Chlorination, VF 2 : Extraction Stage, PH : Prehydrolysis Stage R & F % : Resin & Fats %,

PLANT SCALE STUDY:

Based on the encouraging trends indicated during Pilot scale studies, three different products were tried for duration of one week each. During the trials, Multi-point dosing was also tried to assess the best options. Product- A was tried at Chlorination/ Extraction stages also to judge the effectiveness. The results obtained are tabulated in Table-3. Accordingly, regular usage of Product B has been planned. The dosing was maintained @ 0.7 kgs to 2.0 kgs per ton of pulp in the Digester. For a reduction in Resin content by about 25%, dosage of 0.7 kgs per ton was found optimum.

CONCLUSION

Deresination can be facilitated by suitable Digester additives in the pulping process. It is possible to achieve a reduction of around 25% in extractives by a dosage of 0.7 kgs of surfactant per ton of Pulp.

The process can be great significance not only in reducing the Resin content in Dissolving Grade Pulp, but also during Kraft cooking for manufacture of paper grade pulp to avoid problems associated with Pitch deposits in the pulping/paper making equipments. Reduction in Kappa no./Alkali charge to Digester are additional gains.

ACKNOWLEDGEMENT:

The Authors express their sincere gratitude to the management of Century Pulp & Paper for their kind permission to present the paper at IPPTA seminar. Thanks are also due to laboratory staff and Mr. N.P. Ruwari Sr. Chemist in particular for his exellent, untiring efforts in the analytical work during the studies. Help offered by Mr. D.K. Mishra for preparation of the paper is thankfully acknowledged.

REFERENCES

1. Pulp and Paper Chemistry and Chemical Technology : James Casey Vol. III.
2. Demirbas A., Wood SCI Tech. 25 (1991).
3. Stenius P.et als "Micelle Formation and Phase Equilibria of Surface Active components of wood in Surfactants in solutions" B. Lindman Plenum Publ. Vol. I
4. Product Literature : Berol Nobel (1991).