Cold Caustic Pulping of Casurina Equisitifolia

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SUMMARY

This paper deals with the results of the study on cold caustic pulping of casurina equisitifolia, a typical fast growing hard wood The effect of blending of this high yield pulp with chemical bamboo and mixed hard wood (60 : 40) pulp in different proportions was also studied.

The growing scarcity of fibrous raw material for pulp and paper industry forced the industry to explore the possibilities of utilizing newer and lesser known wood species. Casurina equisitifolia, commonly known as casurina, is one among them. This hard wood is being grown in the coastal areas for building construction purposes and domestic fuel. But it was found that this is one of the promising raw material for paper making[1,2,3]. Because of its lighter colour and the good strength properties (except tear) of conventionel chemical pulp, an attempt was made to findout its suitability for high yield pulping as it will help partiy to solve the problem of scarcity of fibrous raw material.

EXPERIMENTAL :

The casurina wood of about 5 years age with bark was chipped in plant chipper. After removing the slivers and lengthy bark pieces, the chips were fractionated in the cold caustic plant fractionator at a clearance of 21 thou. The fractionated chips were used in pulping. The cooking chemical varied from 6 to 10% as NaOH on O.D chips basis. Two sets were done for each chemical dosage i.e. at room temperature and 80°C. After soaking period, the respective chips were passed through laboratory 12" disc refiner at a plate clearance of 25 thou. The refined pulp was washed thoroughly and computed the yield etc. The strength properties were evaluated at 40° SR after beating in laboratory valley beater. Bamboo and mixed hard wood (60 : 40) blend unbleached pulp was beaten to 40° SR and then mixed with the beaten casurina cold caustic pulp in different proportions and evaluated for strength properties. The results are presented in Tables 1–3.

RESULTS AND DISCUSSION :

A perusal of the results indicates that the increase of chemical and soaking temperature improves the strength properties, but however, there is a drop in yield, kappa number and hand sheet brightness.

The drop in yield and kappa number could be due to the dissolution of lignin at elevated temperature and increase of chemical.

The drop in brightness could be due to the modification of left over lignin in the pulp. The blending studies reveal that the increase of cold caustic pulp decreases the overall strength properties.

CONCLUSION :

Cold caustic pulp of casurina with 10% chemical and 80°C could be blended to an extent of 10–20 percent without much affecting the strength properties in wrapping grades of paper. However, the selection of of optimum cooking conditions viz., percentage of chemical and temperature depends upon the individual requirement of mills.

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TABLE—1

PULPING CONDITIONS AND RESULTS

Sl. No.	Particulars		6% chemical		8% chemical		10% chemical	
			I	II	I	II	I	II
1.	Chemical as NaOH	%	6.0	6.0	8.0	8.0	10.0	10.0
2.	Temperature	°C	32.0	80.0	32.0	80.0	32.0	80.0
3.	Bath ratio		1:4	1:4	1:4	1:4	1:4	1:4
4.	Time	Hrs.	6.0	2.0	6.0	2.0	6.0	2.0
5.	Residual alkali	Gpl	5.76	6.16	7.46	8.32	11.68	12.64
6.	Alkali consumption	%	61.6	58.9	63.95	58.40	53.28	49.44
7.	Yield %		92.50	88.62	90.26	86.86	87.78	82.08
8.	Kappa No.		111.90	105.30	100.8	97.40	91.77	82.77
9.	Brightness of hand sheet	(% Elrepho)	38.2	34.8	37.5	33.8	35.0	31.6
10.	Strength properties at 40 °SR							
	a) Bulk	cc/gm	3.05	2.99	3.02	2.52	2.81	2.41
	b) Burst factor		6.20	8.30	7.40	10.7	8.50	12.20
	c) Breaking length	mtrs	930	1440	1620	2120	2020	2490
	d) Tear factor		7	14	13	17	13	21
	e) Double Folds (Kohler Mollen)	nos.	1	1	1	1	1	1

TABLE—2

(RESULTS OF BLENDING OF COLD CAUSTIC PULP WITH PLANT PULP (SOAKING AT ROOM TEMP)

Sl. No.	Particulars	Plant pulp	6% Chemical				8% Chemical				10% Chemical			
			I	II	III	IV	I	II	III	IV	I	II	III	IV
1.	Hand sheet Brightness % Elrepho	17.8	38.2	19.5	21.5	22.3	37.5	19.8	21.0	22.0	35.0	19.5	20.8	22.2
2.	Bulk cc/gm	1.75	3.05	1.92	2.18	2.5	3.02	1.90	1.99	2.14	2.31	1.89	2.10	2.05
3.	Strength preperties at 40 °SR													
a.	Burst factor	33.8	6.2	28.6	24.9	21.1	7.4	29.2	26.8	24.6	8.5	29.5	28.5	25.0
b.	Breaking length Mtrs	5500	930	4580	4490	4080	1620	5060	4830	4680	2020	5210	4870	4220
c.	Tear factor	66	7	60	54	50	13	63	55	51	13	63	55	51
d.	Double folds (Kohler Mollen) Nos.	59	1	32	20	9	1	36	22	15	1	39	25	18

NOTE Set I 100% Cold Caustic Pulp
Set II 10% C.C. +90% Plant Pulp
Set III 20% C.C. +80% Plant Pulp
Set IV 30% C C. +70% Plant Pulp

TABLE—3

RESULTS OF BLENDING OF CAUSTIC PULP WITH PLANT PULP

(IMPREGNATION AT 80°C)

Sl. No.	Particulars	Plant pulp	6% Chemical				8% Chemical				10% Chemical			
			I	II	III	IV	I	II	III	IV	I	II	III	IV
1.	Hand sheet % Elrepho Brightness	18.8	34.8	20.5	21.1	22.2	33.8	20.0	20.8	22.5	31.6	19.2	21.0	22.2
2.	Bulk cc/gm	1.70	2.99	2.05	2.20	2.31	2.52	1.93	2.07	2.20	2.41	1.82	2.00	2.04
3.	Strength preperties at 40°SR													
a.	Burst factor	31.30	8.32	26.2	24.9	21.2	10.7	29.0	25.8	23 9	12.2	29.4	25.4	24.3
b.	Breaking length Mtrs	4920	1440	4290	3500	3020	2120	4260	3940	3670	2490	4330	3820	3550
c.	Tear factor	68	14	60	53	52	17	60	55	54	21	66	62	58
d.	Double folds nos (Koh'er Mollen)	39	1	14	12	9	1	25	22	14	1	27	24	18

Note : Set I 100% Cold Caustic Pulp.
Set II 10% C.C. pulp + 90% Plant Pulp.
Set III 20% C.C. pulp + 80% Plant Pulp.
Set IV 30% C.C. pulp + 70% Plant Pulp.

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