

Newsprint Grade Cold-Soda Pulp From Kenaf Sticks

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Laboratory scale investigations were carried out on the production of cold soda pulps (66-78% yield) from kenaf sticks. These pulps when admixed with 40 percent bleached soda pulps from kenaf bast fibre were considered to be suitable for newsprint manufacture.

In view of the limited resources of conventional raw materials, agricultural residues have gained much attention in recent years. Extensive studies carried out in India and abroad have indicated that among the agricultural residues, kenaf has a great potential for papermaking. It is a promising raw material having rapid growth and extraordinary fibre value for papermaking.

At present, kenaf is not being used commercially for papermaking, however, it seems to be the fibre of future. Investigations have indicated that the two components of kenaf (the woody stick and the bast fibre) should be separated for preparing the type of pulp for which each might be suitable. The possibility of using kenaf sticks for the production of mechanical pulp and kenaf bast fibre for the production of chemical pulp has made kenaf an ideal raw material for newsprint manufacture. If bark constituting about 25 percent of the whole kenaf could be economically removed and rendered available; its chemical pulp in admixture with the high yield pulp of the stick could form a furnish for newsprint manufacture on a small scale.

Earlier investigations (1) were carried out in this branch on the production of newsprint-grade pulps from whole kenaf. In the present investigation the results of the production of newsprint grade pulps from a furnish containing cold-soda pulps from kenaf bast fibre are included.

EXPERIMENTAL

Raw Material

Kenaf obtained from Andhra Pradesh Paper Mills Ltd, was chipped to 2-3 cm length in the pilot

plant chipper. The two components of kenaf i. e. bast fibre and the sticks were separated manually and pulped separately.

Chemical (Soda) pulping of kenaf bast fibre

Kenaf bast fibre (200g. o. d. basis) was pulped by soda process in a vertical stationary stainless steel autoclave. The conditions of pulping and pulping results are recorded in Table-I. The pulp was bleached in three stages using CFH sequence in order to improve its brightness. The bleaching conditions are recorded in Table-II. The bleached pulp was beaten in Lampen mill to a freeness of about 250ml (CSF). The pulp was evaluated for its strength properties using standard methods. The results are recorded in Table III.

Cold Soda Pulping of Kenaf Sticks

Cold soda pulps were prepared by seeking the cut (2-3 cm length) kenaf stick (200 g o.d. basis having 40 percent moisture) in caustic soda solution (10-20 GPL) at room temperature for 4 hours keeping the bath ratio 1:6. After the treatment the pulp was washed with fresh water and refined in Sprout-Wal-dron disc refiner keeping the clearance of 0.381mm, 0.254mm. and 0.127 mm. successively. The pulps were washed, and their yield was determined. The pulps were beaten in PFI mill (2000 rev) to about 250ml freeness using standard conditions.

Blending of Pulps

Cold soda pulps were blended with bleached soda pulps bast fibre in the ratio 60:40 respectively. The strength properties of various blends were determined as usual. The results are recorded in Table-III.

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TABLE-I
CONDITIONS AND RESULTS OF SODA PULPING
OF KENAF BAST FIBRES

1 Cooking Parameters.	
a) Caustic soda, % (as Na ₂ O)	16
b) Maximum temperatures, °C	170
c) Total time, Hours	3(including 1 hour to raise to max temp)
d) Bath ratio	1:6
2. Unbleached pulp yield, %	48.0
3. Kappa no.	34.0
4. Strength Properties of unbleached pulp	
a) Apparent density, g/cm ³	0.71
b) Tensile Index, (N. mg)	53.15
c) Stretch, %	2.2
d) Tear index, (mNm ² /g)	12.07
e) Burst index, (Kpam ² /g)	4.77

TABLE-II
BLEACHING CONDITIONS, YIELD AND STRENGTH
PROPERTIES OF BLEACHED BAST FIBRE PULP

Sl.No.	Particulars	Chlorination	Alkali extraction	Hypochlorite extraction
1.	Chlorine applied,%	2.5	—	0.5
2.	Caustic soda, (% as NaOH)	—	2	—
3.	Temperature, °C	35	Room	35
4.	Time (min)	30	60	180
5.	Consistency, %	3	5	5
6.	Bleached yield, %	39.2		
7. Strength properties of bleached pulp				
a)	Apparent density, g/cm ³	0.55		
b)	Tensile index,(N.mg)	15.44		
c)	Stretch, %	2.0		
d)	Tear index (mNm ² /g)	5.50		
e)	Burst index,(Kpam ² /g)	—		
f)	Brightness, % (ISO)	54.0		
g)	Opacity, %	87.3		

TABLE-III
PULP YIELD AND PROPERTIES OF BLENDS*

Sl.No.	Caustic soda gpl	Pulp yield %	Freeness of beaten pulp	Mixed pulp freeness ml.	Drainage time (Sec)	Apparent density g/cm ³	Tensile index (N.mg)	Stretch%	Tear index MNm ² /g	Burst index k pam ² /g	Bright ness % (Iso)	Opacity %
1.	10	77.3	265	270	5.4	0.60	12.08	1.28	3.29	0.22	51.0	97.6
2.	12	73.3	275	250	5.2	0.60	12.81	1.18	3.69	0.28	50.4	96.9
3.	15	70.0	280	265	5.0	0.58	12.84	1.37	3.08	0.27	49.8	96.7
4.	20	65.8	260	255	5.0	0.54	9.07	1.12	2.77	0.17	50.6	96.8

(*60% cold soda pulps of sticks and 40% bleached soda pulp of bast fibre)

Results & Discussions

The pulping results (Table-I) indicate that kenaf bast fibre could be pulped to produce unbleached soda pulp (48 percent yield having K_{no} 34) by using 16 percent caustic soda(as Na₂O).

Bleaching of bast fibre pulp by CEH sequence reduced its yield as well as strength properties significantly (Table-II.) The pulp had a brightness of 54% (ISO) at 39.2% yield.

The results of cold soda pulping of kenaf sticks

(Table III) indicate that pulps in good yield (66-78%) could be prepared by varying the concentration of caustic soda solution from 10-20 gpl.

The properties of blends (60 percent cold soda pulps of kenaf sticks and 40 percent bleached soda pulps of kenaf bast fibre) indicate that the strength properties brightness and opacity of all the blends are suitable for newsprint manufacture. However, blend prepared under Sl. No. 4 has somewhat lower strength properties although brightness and opacity of this blend are comparable with the other blends.

CONCLUSIONS

The following conclusions were drawn from the present investigations:—

1. Newsprint grade pulps could be produced in laboratory blending cold-soda pulps of kenaf stick with chemical (soda) pulp of kenaf bast fibre.
2. Soda pulp from kenaf bast fibre showed poor bleaching response when bleached by CBH sequence, pulp yield and strength properties were reduced significantly.
3. By varying the bleaching conditions & using alternative bleaching chemicals it may be possi-

ble to bleach the bast fibre pulp to suitable brightness without appreciable loss in yield and strength properties. However, further studies are required in this aspect.

4. The economics of debarking and collection of kenaf should be taken into account while using kenaf commercially.

REFERENCES:

1. Sharma Y. K., Dhawan Rita, Karira, B. G. High-yield pulps from kenaf, Indian Forester (in press)