

Soda Semi Chemical Pulping of *Terminalia Coriacea*, *Terminalia Bellirica* and Mixed Hardwoods of Andhra Pradesh for Newsprint Furnish

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Introduction

In order to meet the acute shortage of the newsprint in the country Nepa Mills is increasing its production from 5400 tonnes to 75000 tonnes. For this purpose the mill has installed soda semi-chemical pulping plant. Around Nepa Nagar *Terminalia* species as well as mixed hardwoods are available in exploitable quantities besides *salai* wood. To help the industry as well as to utilize the hitherto unutilized material this investigation was undertaken. Studies have been conducted on the effect of concentration of alkali and temperature of reaction on the quality of the soda semi-chemical pulps produced from these materials.

Raw Materials

The following species of the wood supplied by M/s. Bhadrachalam Paper and Boards Mills, Hyderabad were used for this investigation after debarking, chipping and screening.

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Results of the investigation on the soda semi-chemical pulping of Terminalia coriacea, Terminalia bellirica and mixed hardwoods of Andhra Pradesh for newsprint furnish are described. It is observed that with the increase in concentration of chemicals, the yield and power consumption decreases while the strength properties improve. With the increase in temperature the power consumption decreases and strength properties improve. There is no appreciable difference in power consumption, in yield of pulps from Terminalia coriacea, Terminalia bellirica and mixture of hardwoods. The strength properties are higher in case of Terminalia coriacea than the others. With bleaching not only the brightness of the furnish improves but the strength properties also improve. By blending bleached beaten soda semi-chemical pulps with Nepa ground wood and bleached beaten chemical bamboo pulp (Nepa Mills) satisfactory properties are obtained.

1. *Terminalia Coriacea*
2. *Terminalia bellirica*
3. *Bosewellia serrata*
4. *Anogeissus latifolia*
5. *Pterocarpus marsupium*
6. *Lannea Coromandelica*
7. *Chloroxylon swietenia*
8. *Caruga pinnata*
9. *Mitragyna parvifolia*
10. *Madhuca logisdiavar lalifolia*

Soda semi chemical pulping of *Terminalia Coriacea*

Four hundred grammes of oven dry chips were passed through 12" Sproutwaldron refiner keeping a clearance of 254 microns to fractionate the chips for each experiment. The fractionated chips were soaked in caustic soda solution keeping the bath ratio 1 : 4. The concentration of caustic soda was kept at 50 gm/litre, 100 gm/lit. and 150 gm/lit. The time of soaking with caustic soda was 3 hrs at room temperature (23°C) while at 50°C and 98°C it

was 1 hr. After soaking time the liquor was drained. The soaked chips were then again refined keeping the clearance as 50,10,0 and 0 microns successively. The pulp thus obtained was washed thoroughly. The power consumption and the yield of the pulp was determined. The pulp was then beaten to a freeness of 250 ml (CSF) in lampen mill. The beaten pulp was blended with bleached beaten chemical bamboo pulp (Nepa Mills), in the ratio of 60 : 40 respectively. Standard sheets were prepared from this blend and physical properties of the sheets were determined after conditioning at 65% R.H. and 27°C. The pulping conditions, power consumption and physical properties are recorded in table I.

The strength properties of the bleached beaten chemical bamboo pulp (Nepa Mills) for blending are recorded below :

1. Freeness of the pulp=250 ml (CSF)
2. Breaking length=4680 metres
3. Burst factor=30.6
4. Tear factor=110
5. Brightness=39

The results recorded in table I indicate that with the increase in concentration of the chemicals, the yield and the power consumption decreases while the strength properties improve. There is no change in the brightness and opacity of the pulp sheets. With the increase in temperature, the

power consumption decreases, strength properties improve and there is no change in brightness and opacity.

Soda semi-chemical pulping of *Terminalia bellirica*

Four hundred grammes of oven dry chips were fractionated in 12" Sprout Waldron refiner keeping a clearance of 250 micron. The fractionated chips were treated with 150 gm/lit concentration of sodium hydroxide at 23°C, 50°C and 98°C keeping the bath ratio as 1 : 4 and time of soaking 3 hr at 23°C and 1 hr at other temperature. The treated chips were further refined after draining out the liquor keeping a clearance of 50,10,0 and 0 micron successively. The yield and the power

Table I

Pulping conditions, yield, power consumption of soda semi chemical pulps from *Terminalia Coriacea* and Physical properties of blended sheet.

Sr. No.	Concentration of sodium hydroxide grams/litre	Temp. °C	pulp Yield*	Power Consumption KWH/T	Breaking length metres	Burst factor	Tear factor	Brightness Elrepho MgO=100%	Opacity %
1.	50	23	84.1	917	1420	6.2	23.4	31.5	100
2.	100	23	83.2	875	1560	7.8	26.5	33.9	100
3.	150	23	80.9	833	1800	8.0	29.3	30.8	100
4.	50	50	80.2	880	1610	6.7	33.3	29.0	100
5.	100	50	78.2	833	1850	8.0	36.4	34.6	100
6.	150	50	77.2	722	2000	8.3	36.7	33.2	100
7.	50	98	78.9	750	2070	8.3	36.0	32.9	100
8.	100	98	77.4	722	2270	9.0	43.7	30.0	100
9.	150	98	76.3	694	2690	14.0	59.3	34.2	100

*Expressed as % on O.D. weight of the chips.

consumption was determined. The washed pulp was beaten in Lampen mill to a freeness of 250 ml (CSF) and blended with bleached beaten chemical bamboo pulp

(Nepa Mills) in the ratio of 60 : 40 respectively. Standard sheets were prepared and conditioned at 65% and 27°C. The physical properties of the sheets were determined. The pulping conditions, pulp yield, power consumption and physical properties of the resultant blended sheets are recorded in table II.

woods was prepared :

1. <i>Terminalia Coriacea</i>	30%
2. <i>Terminalia bellirica</i>	30%
3. <i>Boswellia serrata</i>	5%
4. <i>Anogeissus latifolia</i>	5%
5. <i>Pterocarpus marasupium</i>	5%
6. <i>Lannea Coromandelica</i>	5%
7. <i>Chloroxylon swietenia</i>	5%
8. <i>Garuga pinnata</i>	5%
9. <i>Mitragyna parvifolia</i>	5%
10. <i>Maduca longifoliavar latifolia</i>	5%

It is seen from table III that with the increase in temperature the yield and power consumption decreases while strength properties improve. There is no change in brightness and opacity. On comparing the results recorded in Table I, II & III, it is observed that there is no appreciable difference in yields of pulps from *Terminalia coriacea*, *Terminalia bellirica*, and the mixture of hardwoods and the power consumption is also practically of the same magnitude. The

Table II

Pulping conditions, yield, power consumption of soda semi-chemical pulps from *Terminalia bellirica* and physical properties of blended sheets.

Concentration of sodium hydroxide gm/litre	Temp. °C	Pulp Yield*	Power consumption KWH/T	Breaking length metres	Burst factor	Tear factor	Brightness Elrepho MgO=100	Opacity %
150	23	82.5	860	1660	7.8	31.2	33.5	100
150	50	80.1	778	1810	8.0	40.0	32.7	100
150	98	78.9	722	2120	10.0	46.6	33.6	100

*Expressed as % an O.D. weight of the Chips

It is seen from table II that with the increase in temperature the yield and power consumption decreases while the strength properties improve. There is no change in brightness and opacity.

Soda semi chemicals pulping of Mixture of hardwoods :

The following mixture of hard-

Four hundred grammes of the oven dry mixture of the chips mixed in the proportions given above were processed under the similar conditions as given under soda semi chemical pulping of *Terminalia bellirica*. The pulping condition, pulp yield, power consumption and physical properties of the resultant blended sheets are recorded in table III.

strength properties are higher in case of *Terminalia coriacea* than *Terminalia bellirica* or the mixture. The brightness is lowest in the case of the mixture.

Bleaching of soda semi-chemical pulps from *Terminalia coriacea* *Terminalia bellirica* and mixture of hardwoods.

Pulps prepared under conditions

TABLE III

Pulping conditions, yield power consumption of soda semi-chemical pulps from mixture of hardwoods and physical properties of blended sheets.

Concentration of sodium hydroxide gm/litre	Temp. °C	Pulp Yield*	Power consumption KWH/T	Breaking length metres	Burst factor	Tear factor	Brightness Elrepho MgO=100	Opacity %
150	23	82.3	875	1510	6.7	25.0	24.4	100
150	50	80.3	833	1950	7.7	33.8	25.4	100
150	98	78.0	750	2470	11.6	41.6	27.7	100

*Expressed as % on O. D. weight of the chips.

table I (9) Table II (3) and Table III (3) were bleached with calcium hypochlorite under the following conditions:

Calcium hypochlorite* 10%
Consistency 10%
Temperature 40°C

*% expressed as available chlorine on O.D. wt. of the pulp.

The yield of the bleached pulp was determined, the pulp was beaten in Lampen mill to a freeness of 250 ml (CSI) and

then blended with bleached beaten chemical bamboo pulp (Nepa mills) in the ratio of 60:40 respectively. Standard sheets were prepared from the blends and then conditioned at 65% R. H. and 27°C. The physical properties of the blended sheets are recorded in Table IV. It is seen that with bleaching of the soda semi-chemical pulps not only there is an improvement in brightness but there is improvement in the strength properties. The proper-

ties from *Terminalia coriacea* are better than from either *Terminalia bellirica* or the mixture.

Blending of bleached beater soda semi-chemical pulps with Nepa ground wood pulp and bleached beaten chemical bamboo pulp (Nepa Mills).

The bleached beaten soda semi-chemical pulp, Nepa ground wood pulp from salai wood and bleached beaten chemical bamboo pulp (Nepa mills) was mixed in

TABLE IV

Bleached pulp yield and physical properties of blended sheets

	Yield*	Breaking length metres	Burst factor	Tear factor	Brightness Elrepho MgO=100	Opacity %
<i>Terminalia Coriacea</i>	70.1	3010	15.6	66.6	38.9	100
<i>Terminalia bellirica</i>	71.4	2610	13.7	55.1	36.9	100
Mixture of hardwoods	70.4	2600	15.0	50.0	37.0	100

* % expressed on O.D. weight of the pulp.

the proportion of 1:1:1. Standard sheets were prepared and conditioned at 65% R.H. and 27°C. The physical properties are recorded in Table V. On comparing the results recorded in

Table IV and V, it is seen that by preparing the blends containing the ground wood pulps the properties of the sheets are lowered though brightness is not

affected except in the case of mixture.

It is seen from Table V that blends give satisfactory strength properties for newsprint.

TABLE V

Physical properties of sheets prepared from the blend of bleached beater soda semi-chemical pulps, Nepa ground wood pulp and bleached beaten bamboo chemical pulp (Nepa Mills) in the ratio of 1:1:1

	Breaking length metres	Burst factor	Tear factor	Brightness Elrepho Mg=100	Opacity %
Terminalia Coriacea	1820	8.6	37.9	38.0	100
Terminalia bellirica	1760	8.3	33.9	34.0	100
Mixture of hardwoods	1750	9.6	35.5	29.8	100
Nepa furnish*	990	4.6	32.8	27.4	100

* 60% Ground wood pulp (salai) and 40% bleached beaten chemical bamboo pulp (Nepa).

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