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Kraft Paper for Packing—Use of Gaur Gum for Benefication

Introduction

In a developing country like India, the prospective of packaging industries seems to be very bright in the years to come. Actually paper is the root of civilisation and in affecting the life in diversified manners. As reported by Talwar the planning commission envisaged the demand of wrapping paper and board to increase to 6,50 000 tonnes in 1976 and about 10,00,000 tonnes by 1980.

It is common knowledge that the kraft paper which is used in the manufacture of packaging is usually not of required strength properties. This is primarily because in India the kraft paper is not manufactured from 100% softwoods. Because of the chemical composition, morphology and fibre length the softwoods are preeminently suitable for the production of strong pulps re-

Non-availability of kraft paper of suitable strength properties for the packaging industry is a common complaint. In the present study an attempt has been made to improve the strength properties of kraft paper by incorporating softwoods (30%) as long fibred material to mixed hardwoods (70%). For further benefication of strength a gaur gum preparation to the extent of 0.7% on air dry pulp has been used as a wet end additive. The strength properties have considerably increased.

quired for kraft paper. Softwoods are in very limited supply, hence bamboo was used for the production of all types of paper in the country including kraft. However, due to limited availability of bamboo even for writing and printing paper, the Indian paper industry is usually manufacturing kraft and other papers from mixed hardwoods and bamboo.

In the present study a mixture of soft woods 30% Himalayan grown twisted pine (*pinus longifolia*) and mixed hard-woods 70% has been used so that some good qualities of the softwoods may be incorporated in the resultant paper in the form of improved strength properties. To improve the quality further, a wet end additive made out of gaur gum, as supplied by a manufacturer, has been used to the extent of 0.7% on the air dry pulp.

A survey of the literature shows that for ordinary grade of paper making pulp 0.1% locust bean gum on the weight of the fibre is

considered sufficient². Further, of the various deflocculating agents that are used as wet end additives, for improving strength of the paper, the deacetylated gum karaya is considered most effective³, but only in the absence of alluminium ions. This, however was not possible in our study. The use of locust bean gum for a comparative study was also not possible due to its non availability. However, it may be mentioned in passing that the locust bean gum contains mainly galactose and manose, whereas in gaur gum galactose, manose, glucose and arabinose are present⁴.

Experimental

Debarked mixed hardwoods in the proportion 70% and 30% pine (twisted) by weight are chipped to an average chip size of 25mm and 5-6mm thickness. The chips were cooked by the sulphate process in stationary vertical digesters under following conditions.

(1) Chips liquor ratio

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- (2) Active alkali on bone dry basis 16-17%
 (3) Sulphidity 20-22%
 (4) Yield 45%
 (5) Cooking cycle:—

- (a) Loading of chips and liquor charging— 1½ hr.
 (b) Raising pressure to 7kg/cm² and temp. 170°C-2Hrs
 (c) Cooking at constant pressure - 1 hr.
 (d) Blowing - ½ hr.

Pulp obtained after screening and washing etc. gave 18-19°SR freeness. And it was then passed through a battery of hydrafiners and jordans for a selective mechanical treatment imparting desired characteristics by maintaining a freeness between 30-40°SR depending upon the quality and purpose for which paper is required, using 18-20 H. P. per

ton of paper in refining

In preliminary experiments various amounts of gaur gum preparations were used as wet end additive. It was found that with the use of 0.7% of the gaur gum preparation on the air dry pulp, the strength properties to the required level could be obtained. Therefore, in all experiments, this concentration of gum was maintained Kraft papers of four different G. S.M. namely, 60, 80, 100 and 120 using 0.7% gum additive in all cases were prepared keeping beating time and other operational conditions as uniform as possible for each basis weight of paper.

In the following table the strength properties of the kraft papers have been given. A perusal of the figures in the table will show that

the Burst factor has increased in all cases (25-27% in 60, 80, 100 G.S. M. and 20% in 120 GSM) with addition of the gum preparation. This is because, one of the functions of the gum is to act as a deflocculating agent and thereby help in the formation and ultimate bonding of fibre, as the drainage becomes comparatively slow. For the same reason (namely for good formation) the breaking length both in machine and cross directions have increased (25-27 % and 23 to 25% respectively) in all the four G.S.M. of kraft paper under study. The improvement is almost uniform. The stretch has also improved both in machine and in the cross

Table—Comparative Strength Properties Of Kraft Paper.

G.S.M.	60		80		100		120		ISI Standards of kraft paper Grade I Grade	
	Without additive	with additive	Without additive	with additive	Without additive	with additive	Without additive	with additive		
Burst Factor	22	28	24	30	22	28	20	26	30	20
Breaking length (meter) M.D.	4800	6 00	4800	6000	4300	5500	4300	5500	7000	4500
C.D.	3400	4200	3400	4200	3300	4000	3300	4000	4000	2500
Stretch M.D.	1.5	1.8	1.6	1.9	1.6	1.8	1.6	1.8		
(%) C.D.	2.2	2.45	2.4	2.6	2.2	2.4	2.2	2.5		
Folding endurance (Double folds)										
M.D.	40	140	90	150	80	200	90	250	100	40
C.D.	16	60	24	75	25	90	40	100		
Tear Factor										
M.D.	80	70	86	78	88	75	93	79		
C.D.	101	80	99	105	100	90	100	92	120	75
Porosity (Sec./100cc)	3.05	6.0	6.0	9.5	8.5	15.0	10.0	18.0		

- NOTE: 1) Furnish common to all-pine 30% and mix hardwoods 70%
 2) Gaur gum preparation on air dry pulp used-0.7%

direction. So far folding endurances (double folds) are concerned, the improvement in strength on the addition of gum is very conspicuous in machine direction. Although some improvement in folding endurance, has also been obtained in cross direction. Measurements of tear factor have behaved in an erratic way and cannot be easily explained. This is because tear factor is a function of the fibre length and, as far as information goes, is independent of wet-end additives. The addition of gum has a beneficial effect on the resultant paper for the porosity test and in some cases the time required is almost double.

Further work is in progress.

Conclusion :

The addition of gum has increased the strength properties of paper and the use of such paper is sure to increase the strength of packaging material. One of the serious handicaps from which the Indian packaging

industry is now suffering is for want of kraft paper of suitable strength. The work demonstrates that for both 60 and 80 G.S.M. papers the breaking length in machine direction is 6000 metres as against 7000 metres required for grade I and 4500 metres required for grade II kraft paper according to ISI specifications⁵. In the cross direction breaking length should be 4000 for grade I and 2500 for grade II (as per ISI specification).

It will, thus, be seen that the paper produced by incorporating of 0.7% wet-end additive in the form of gaur gum preparation on the weight of air dry pulp has vastly improved the quality of paper and compares favourably with I. S. I. standards.

It is, therefore, to be expected that the paper will suit the requirement of packaging industries. The improvement is due to (a) the use of some long fibered coniferous wood (30%) in the furnish, as well as, (b) due to addition of gaur gum

preparation to the extent 0.7% in the form of an additive. In view of above, the manufacturing cost of paper is expected to be materially affected.

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References :

1. Talwar, A., IPPTA, 11, 4, 313 (Oct.-Dec., 1974).
2. Swansen, J.W., Tappi, 33, 9, 451 (Sept., 1950).
3. Swansen, J.W., Tappi, 34, 5, 25 (May, 1956).
4. Duggal, Hardev S. and Swansen, J. W., IPPTA, 11, 1, 29 (Jan.-March, 1974).
5. Anon., IS : 1397-1967, Third Reprint, Oct. 1973, UDC 676.45, ISI.