

Short Communication

FEASIBILITY OF NEUTRAL SULPHITE ANTHRAQUINONE PULPING OF JUTE

Only a fair price of jute for the growers can ensure its sustained supply for the industries or for export. Multifarious uses and vigorous export promotion drives, in their turn, can keep the demand of jute to the desired level. Thus, a project was undertaken for making paper-pulp from jute using a process to give a higher yield compared to the conventional kraft process, yet retaining the kraft like properties. The success of such a project is likely to open the possibility of a perpetual high demand of jute in the industrial sector.

Addition of anthraquinone (AQ) in neutral sulphite (NS) pulping of wood have been proved to be very encouraging (Virkola *et al* 1981). Hence, it is interesting to study the effect of AQ in NS pulping of jute with an aim to make fully chemically defiberized pulp.

Jute cutting from white-B grade of jute (*Corchorus capsularis*) was used in this investigation. It was heavily contaminated with unretted scales. The scales were allowed to remain in the fibre stock due to the difficulty of removing them

industrially with the present-day-technology. The raw material was hand-cut into 2-3 cm in length. One cook was also made without cutting the "jute cutting". Several NS-AQ cooks with different doses of alkali and two doses of AQ (0.1 and 0.2%) were made. A series of kraft cooks were also made to compare the results. The physical strength properties of the pulp were evaluated by conditioning the handsheets made from the pulp at 23°C and 50% R. H.

The following conclusions are drawn in NS-AQ pulping of jute compared with kraft control :

- (1) Unbleached pulp yield is higher by 6.3% points on od jute with NS+0.1% AQ at a kappa number of 20. Bleached yield gain is 7.8% points on od jute, when bleached with a chlorination - extraction-calcium hypochlorite bleaching sequence. The bleached yield is 58.0% in NS-AQ process and 50.2% in kraft process.

- (2) There is no problem in disintegration and screening of NS-AQ pulp as is faced with the kraft pulp. Even the uncut 'jute cutting' (length 10-60 cm) offers no problem. This may make the need to cut the whole length jute redundant in pulping by NS-AQ process. However, further study is needed in this regard. The pulp is fully chemically defiberized giving no screening rejects. To avoid disintegration and screening problems with the kraft pulp, cooking is to be continued to a lower kappa number, may be as low as 14. Then, of course, there will be severe loss of yield and strength of the pulp.
- (3) Alkali requirement in NS-AQ pulping is less if delignification is aimed at a kappa number above 22, but still giving fully chemically defiberized pulp with no screening rejects.
- (4) NS-AQ pulp is easier to wash. Thus, less wash water is needed and consequently less energy is required for evaporation of the spent liquor in the recovery cycle. The spent liquor from spills and leakages is less hazardous because it is almost neutral.
- (5) There is no foul odour in the spent liquor.
- (6) NS-AQ pulp is beaten quicker than kraft pulp. It also drains faster.
- (7) Brightness of unbleached NS-AQ pulp is very high, around 50% Elrepho.
- (8) NS-AQ pulp is bleached easily. A three-stage CEH bleaching of unbleached pulp of kappa number 22 leads to a brightness of 80% Elrepho and 94.0% (on od unbleached pulp) treatment yield. Kraft pulp with the same kappa number gives a brightness of 77% and a treatment yield of 90 7%.
- (9) The physical strength properties of the unbleached pulp are almost similar to those of the kraft control with the same kappa number. The strength properties of the bleached NS-AQ pulp are better than those of the kraft pulp.
- (10) The physical strength properties of NS-AQ unbleached pulp are superior to those of the kraft pulps from some commonly used coniferous woods (Table-1). Consequently, NS-AQ jute pulp will serve as an alternative to kraft coniferous wood pulp.

Table 1. Comparison of NS-AQ jute pulp (from uncut 'jute cutting') with coniferous kraft pulp unbleached yield and pulp quality at 300 CSF (Yee unpublished)

| Species | Kappa number | Total yield % | Year index mNm ² /g | Burst index kPa m ² /g | Tensile index Nm/g | Apparent density kg/m ³ |
|-------------------------|--------------|---------------|--------------------------------|-----------------------------------|--------------------|------------------------------------|
| Jute | 23.1 | 62.7 | 19.9 | 10.6 | 108 | 618 |
| Douglas fir | 32.1 | 42.1 | 17.0 | 6.85 | 94.5 | 650 |
| Southern pine | 37.1 | 45.5 | 14.3 | 5.90 | 94.0 | 680 |
| <i>Pinus sylvestris</i> | 39.3 | 47.0 | 12.7 | 7.65 | 110 | 690 |
| <i>Pinus taeda</i> | 30.6 | 44.0 | 11.5 | 7.15 | 105 | 690 |
| <i>Pinus patula</i> | 35.0 | 44.1 | 12.6 | 7.15 | 108 | 680 |

The main drawbacks of the NS-AQ process are :

—Pulping time at the same temperature is longer. However, proper selection of alkali charge and temperature is likely to reduce the cooking time. To this end, research on the effect of all the cooking variables, kinetics of delignification, etc., is warranted.

—The heat value of the waste liquor is low because of higher pulp yield.

This investigation shows that NS-AQ process is very encouraging in pulping of jute.

REFERENCES

- Virkola, N. E., Kettunen, J. and Pusa, R. 1981. Neutral sulfite AQ pulping as an alternative to kraft pulping. *Tappi* 64(5) : 103-107
- Yee, T. T. Unpublished. The response of jute fibre to different pulping processes. Pulp and Paper Research Department, Central Research Organisation, Rangoon, Burma

A. F. M. Akhtaruzzaman
Divisional Officer
Pulp and Paper Division
Forest Research Institute
Chittagong
BANGLADESH