IMPROVING EUCALYPTUS PULP REFINING THROUGH THE CONTROL OF PULP CONSISTENCY AND STOCK pH

by

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EUCALYPTUS FIBERS

- they are short
- they are numerous
- they are special for tissue papers
- they are great for printing and writing papers
- they are loved by papermakers
- they are marvelous

Pulp Refining

- vital step in preparing pulps for papermaking
- optimization of refining conditions
- orientation to end product specifications
- comparisons at given bulk
- comparisons at given tensile strength
- comparisons at given freeness
- comparisons at given net applied energy

Refiner

- 20 inches
- double disk
- DD Beloit
- duo flow feed
- disks : 3 x 3 mm 5 degrees angle
- 0.6 Ws/m refining intensity

Consistency and pH optimization

Consistency levels:

- 3 %
- 4 %
- 5 %

pH levels:

- 5
- 7
- 9

Tissue Papers Required Properties

Bulk

Absorption

Tactility

Smoothness

Softness

Fluffiness

Strength

P & W PAPERS REQUIRED PROPERTIES

Formation

Opacity

Bulk

Strength

Porosity

Smoothness

Printability

Dimensional stability

Fiber Characteristics

- Fiber length
- Fines
- Coarseness
- Number of fibers / gram

Given bulk comparisons

Bulk levels:

2.1 cm^3 / g

2.0 cm^3 / g

1.9 cm^3 / g

1.8 cm^3 / g

Given Tensile Strength Comparisons

Tensile strength levels:

30 N.m/g

40 N.m/g

50 N.m/g

Relevant findings at given handsheet bulk

Property	*Objective*	*Best treatment*
Brightness	Higher	cons. 4% / pH 9
Schopper Riegler	Lower	cons. 5% / pH 5
Net energy	Lower	cons. 5% / pH 9
Tensile	Higher	cons. 3 % / pH 9
Stretch	Higher	cons. 3 % / pH 5

Relevant findings at given handsheet bulk

Property	*Objective*	*Best treatment*
Burst	Higher	Cons. 3 % / pH 5
Tear	Higher	Cons. 3 % / pH 5
Opacity	Higher	Cons. 3 % / pH 5
Porosity	Higher	Cons. 4 % / pH 5
Water absorption	Higher	Cons. 3 % / pH 7

Relevant findings at given tensile strength

Property	*Objective*	*Best treatment*
Brightness	Higher	Cons. 4 % / pH 9
Schopper Riegler	Lower	Cons. 4 % / pH 9
Net energy	Lower	Cons. 5 % / pH 9
Bulk	Higher	Cons. 3 % / pH 5
Stretch	Higher	Cons. 5 % / pH 5

Relevant findings at given tensile strength

Property	*Objective*	*Best treatment*
Burst	Higher	Cons. 5 % / pH 9
Tear	Higher	Cons. 5 % / pH 9
Opacity	Higher	Cons. 3 % / pH 5
Porosity	Higher	Cons. 5 % / pH 5
Water absorption	Higher	Cons. 3 % / pH 5

Conclusions

- Important to select stock consistency and pH
- Fiber length almost unaffected
- Coarseness is reduced
- Number of fibers / g is increased
- At neutral pH , most of properties are in the average
- Sheet fiber bonding can be improved by refining at higher pH's and consistencies

Conclusions

- For properties not related to fiber bonding it is better to refine the pulp at lower pH's (5 - 7) and lower consistencies (3 - 4 %)
- Net energy is saved when pulps are refined at pH 9 and consistency 5 %
- P & W papers are dependent on fiber bonding
- Tissue papers do not like excess bonding
- According to the end product , the refining conditions should be differently adjusted

Conclusions

- Conclusions are very different when you make the comparisons at given bulk or given tensile strength
- It is important to previously define your requirements
- Papermaker has to be aware about these differences to better take advantage of the fiber potential