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**EUROPEAN PATENT APPLICATION**

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54 **Manufacture of pulp.**

57 Processes for producing pulp from lignocellulosic material in which the delignification agent comprises an alkali metal hydroxide together with a small amount of a sulphite in the range between 0.1 and 15% expressed as  $\text{Na}_2\text{SO}_3$  by mass on an oven dry basis of said lignocellulose. The addition of the small amount of sulphite gives a marked improvement in both the quality of the paper produced from the pulp and the rate of delignification. The rate of delignification is improved further by the use of a redox agent such as anthraquinone, anthrahydroquinone, homologues and derivatives thereof. Optionally, the process may be carried out in two stages, including a first stage in which lignocellulose is digested in a liquor containing between 0.1 and 15% of a sulphite, and another further stage in which said lignocellulose is digested in a liquor containing an alkali metal hydroxide.

The pulping liquors may also contain other alkaline compounds such as sodium carbonate which act as buffers.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 1 651 665 (L. BRADLEY et al.)  * Page 2, line 4 - page 4, line 32 *	1,2, 7-10, 15- 19	D 21 C 3/02 D 21 C 3/26
X	US - A - 2 528 351 (E. FARBER)  * Claims 1,2; examples I-VII *	1,2,7 -10, 15- 17,19	
P,X	ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol. 57, no. 9, page 1258, abstract no. 11374 Appleton, Wisconsin, US; H. OHI et al.: "Modified soda/quinone cooking.(1). Soda/Quinone cooking with sodium sulfite" & J. JAPAN WOOD RES.SOC. (MOKUZAI GAKKAISHI) 32, no. 9: 697-704  * Abstract *	1,3, 4,6- 10, 12, 14- 18	TECHNICAL FIELDS SEARCHED (Int. Cl.4)  D 21 C
The present search report has been drawn up for all claims. XX			
Place of search THE HAGUE		Date of completion of the search 05-01-1988	Examiner NESTBY
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

## X LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-8,10: A pulping liquor comprising an alkali metal hydroxide and a sulphite and optionally a redox agent; a process using this liquor  
Claims 9,12,14-19: A process using the pulping liquor of claims 1-8
2. Claims 9,11-19: A process using two treatment liquors

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims,

namely claims: 1-8,10 and 9,12,14-19 using the pulping liquor of claims 1-8



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
P,X	TAPPI JOURNAL, vol. 69, no. 12, December 1986, pages 89,90 Norcross, GA, US; P. HE et al.: "Influence of sulfite on the effectiveness of anthraquinone in soda pulping" * Whole article *	1-4,6-10,12,14-19	
X	ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol. 56, no. 5, November 1985, pages 586,587 abstract no. 5231 Appleton, Wisconsin, US; T.J. McDONOUGH et al.: "Sulfite-anthraquinone pulping of southern pine for bleachable grades" & CPPA ANN.MFG.(MONTREAL)REPRINTS 71A:161-170(Jan.29-30 1985) * Abstract *	1,3,4,6-10,12,14-19	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
X	ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol. 52, no.1, July 1981, page 129, abstract no. 1082 Appleton, Wisconsin, US; & JP - A - 80 163 291 (OJI PAPER) 19-12-1980 * Abstract *	1,3,4,6-10,12,14-16,19	
X	ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol. 52, no. 9, March 1982, page 110, abstract no. 10562 Appleton, Wisconsin, US; & JP - A - 81 118 988 (OJI PAPER) 18-09-1981 * Abstract *	1,3,4,7-10,	



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	-- ABSTRACT BULLETIN OF THE INSTITUTE OF PAPER CHEMISTRY, vol. 50, no.10, April 1980, pages 1010,1011, abstract 9393 Appleton, Wisconsin, US; J. KETTUNEN et al.: "Effect of anthraquinone on neutral sulfite and alkaline sulfite cooking of pine" & PAPERI PUN 61, no. 11:685-690, 693-694,699-700(Nov. 1979) * Abstract *	12,14- 16,19	
A	-- TAPPI JOURNAL, vol. 66, no. 12, December 1983, pages 81,82 Norcross, GA, US; J.M. MACLEOD et al.: "Delignification rates of alkaline-AQ processes" * Whole article *	1,3,4, 6-10, 12,14- 19	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	-- TAPPI JOURNAL, vol. 69, no. 8, August 1986, pages 102-105, Norcross, GA, US; I.B. SANBORN et al.: "An evaluation of the sulfite-AQ pulping process" * Page 102, page 103, left-hand column, two first paragraphs; tables I and II *	1,3,4, 6-10, 12,14- 19	
A	-- US - A - 4 213 821 (N.N. VANDERHOEK et al.)		
A	-- US - A - 4 363 700 (I. WADA et al.)  -----		