(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 436 133 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90123231.4**

(51) Int. Cl.5: **D21C 3/02**, D21H 11/06

(22) Date of filing: **04.12.90**

(30) Priority: **06.12.89 JP 315469/89**

(43) Date of publication of application:
10.07.91 Bulletin 91/28

(84) Designated Contracting States:
DE NL

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(54) Neutral paper and paper tube using the same.

(57) A neutral paper comprises 20 to 100 % of partially chemically processed pulp produced in a 65 to 95 % yield using a cooking agent consisting essentially of NaOH, Na_2CO_3, $NaHCO_3$, Na_2SO_3, $NaHSO_3$ or a combination thereof and has a pH of 6 to 9. A paper tube made of the above paper joined by emulsion adhesive or water-soluble adhesive of pH 6 to 9 is also provided.

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NEUTRAL PAPER AND PAPER TUBE USING THE SAME

BACKGROUND OF THE INVENTION

This invention relates to a neutral paper suitable for packaging materials for photosensitive materials and a paper tube using the same.

Papers used as the materials for photosensitive materials such as a protecting sheet or a paper tube were made from chemical pulp (Japanese Patent KOKOKU No. 58-43730).

The above conventional papers were made from chemical pulp and therefore, the yield of the pulp from wood was low. As a result, it was expensive.

On the other hand, papers made from high yield pulp are used in a wide range for various packaging materials such as a paperboard because of low price and high rigidity. The high yield pulp includes mechanical pulp produced by mechanical process alone such as groundwood pulp, refiner groundwood pulp and thermomechanical pulp and partially chemically processed pulp with partial chemical process such as chemigroundwood pulp and chemithermomechanical pulp.

The mechanical pulp was not basically preferred for packaging materials for photosensitive mateials because of containing lignin and resin extracts of wood in addition to cellulose. The partially chemically processed pulp was also appreciated not to be preferred for a packaging material for a photosensitive material because of containing a lot of lignin. Therefore, the partially chemically processed pulp has not been used for packaging materials for photosensitive materials at all, and has not been attempted to be used for a packaging material for photosensitive materials. Moreover, when the inventors tentatively used a conventional paper made from partially chemically processed pulp for a packaging material for photosensitive materials, it could not be actually utilized because of affecting adversely a photosensitive material such as fogging.

SUMMARY OF THE INVENTION

An object of the invention is to provide a neutral paper which is cheep and does not affect adversely photosensitive materials.

Another object of the invention is to provide a paper tube using the above neutral paper.

The inventors observed the high yield ability of the partially chemically processed pulp in order to achieve the above objects, and provides an inexpensive paper suitable for packaging materials for a photosensitive materials by making the partially chemically processed pulp not affecting adversely on photosensitive materials.

The inventors investigated as to the adverse affect on photosensitive materials by using a paper made of partially chemically processed pulp, and found a paper made of partially chemically processed pulp not affecting adversely photosensitive materials. That is, although Na_2S, Na_2SO_3, Na_2CO_3, NaOH, $NaHCO_3$, $NaHSO_3$ or the like is used in simplex or a combination thereof as the cooking agent, then they found that Na_2S affects adversely photosensitive materials.

Moreover, when Na_2SO_3 and Na_2CO_3 are used in combination as the cooking agent in the monosulfite process, a color photographic paper is affected to a increase the sensitivity. This phenomenon is caused by the acidity of the accomplished paper. The inventors investigated the range of the acidity affecting to increase the sensitivity on a color photographic paper, and found that when pH is not less than 6, the increase of the sensivity is small to be within the tolerance limit, particularly, when pH is not less than 7, the increase of the sensitivity does not occur at all.

When NaOH and Na_2CO_3 are used in combination as the cooking agent in the soda process, a color photographic paper was affected to decrease the sensitivity. This phenomenon is caused by the alkali in the accomplished paper. The inventor investigated the range of the alkalinity affecting to decrease the sensitivity on a color photographic paper, and dound that when pH is not more than 9, the decrease of the sensitivity is small to be within the tolerance limit, particularly, when pH is not more than 8.5, the decrease of the sensitivity does not occur at all.

The present invention was achieved based upon the above-mentioned investigation, and the neutral paper comprises 20 to 100 % of partially chemically processed pulp produced in a 65 to 95 % yield using a cooking agent consisting essentially of NaOH, Na_2CO_3, $NaHCO_3$, Na_2SO_3, $NaHSO_3$ or a combination thereof and has a pH of 6 to 9.

DETAILED DESCRIPTION OF THE INVENTION

The partially chemically processed pulp includes semichemical pulp, chemiground pulp and chemithermomechanical pulp is produced in a yield of 65 to 95 %, preferably 80 to 90 %. The yield is from wood chips to paper, corresponding to the coolling yield.

The neutral paper may be composed of the above partially chemically processed pulp only, and unbleached kraft pulp may be added to the partially chemically processed pulp in order to prohibit break during making paper and improve weakness due to lignin. The partially chemically processed pulp is produced the partially chemically processed process, and contains much lignin. Therefore, to increase the quantity of the partially chemically processed pulp is preferred for products which needs light-shielding because of being in high opacity.

The pH of the neutral paper is adjusted to 6 to 9, preferably 6.5 to 8.5 according to JIS P 8113 § 4,2. In order to adjust the neutral paper to pH 6 to 9, in the case of raising the pH, NaOH, KOH and other alkalies are usable, and NaOH is the most preferred. While, in the case of lowering the pH, various acids such as H_2SO_4, HCl and CH_3COOH and salts which show acid in an aqueous solution such as aluminum sulfate, which is the most preferred.

Some photosensitive materials are not so much affected adversely by acid and alkali, and in the case of the above photosensitive materials, corrugated board old papers, unbleached kraft old papers, deinked pulp and the like may be blended in view of saving a cost and resources. The above blending materials are restricted to those wherein the agents substantially hardly affect adversely photosensitive materials or the agents are removed by washing during the break process.

The content of the partially chemically processed pulp is 20 to 100 %, preferably 50 to 100 %, more preferably 80 to 100 %.

The neutral paper is usually in the range of 100 to 800 g/m^2 in areal weight, desirably in the range of 200 to 600 g/m^2. The method for making the neutral paper is not restricted. When a thick board is made, a modified starch, a corn starch or the like is peferably blended in order to improve ply bond strength during making a multi-ply paper using a cylinder machine.

The paper tube is formed by joining the above neutral paper with an emulsion adhesive or a water-soluble adhesive of pH 6 to 9. When the pH of the adhesive is less than 6 or beyond 9, an increase or decrease of the sensitivity which is out of the tolerance limit occurs. The paper tube is usually a laminate of the neutral paper.

The emulsion adhesive includes polyvinyl acetate, polyacryl, ethylene-vinyl acetate (EVA), styrene-butadiene rubber (SBR). The water-soluble adhesive includes natural polymers such as starch, sea wead, and protein, modified substances of cellulose, starch and the like, synthetic polymers such as polyvinyl alcohol (PVA) sodium polyacrylate and the like.

The paper tube of the invention may be utilized as the core for winding a paper a foil a web and the like in addition to a photosensitive strip material.

The neutral paper of the invention may be utilized for packaging materials for various products such as protection sheets and boxes for protecting photosensitive materials.

The neutral paper of the invention is rendered inexpensive by using the partially chemically processed pulp of high yield, and does not affect adversely photosensitive materials by using a difinite cooking agent and adjusting the pH of the paper to 6 to 9, and moreover, rigidity of the neutral paper is improved by containing much lignin.

The paper tube is inexpensive as well as the neutral paper and great in compressive strength, and moreover, it does not affect adversely photosensitive materials by joining with an adhesive of pH 6 to 9.

EXAMPLES

Example 1

Pulp:

Material:	hardwood (L material)
Cooking Agent:	Na_2SO_3 and Na_2CO_3
Yield:	83 %
pH:	7.5 (adjusted with NaOH)

Neutral Paper:

Made in 380 g/m^2 of areal weight

Example 2

Pulp:

Material:	hardwood (L material)
Cooking Agent:	NaOH and Na_2CO_3
Yield:	90 %
pH:	8.5 (adjusted with $Al_2(SO_4)_3$)

Neutral Paper:

Made in 380 g/m^2 of areal weight

Example 3

Pulp:

The same pulp as Example 2: 80 %
Soft wood unbreached kraft pulp: 20 %
(NUKP)
pH: 8.0 (adjusted with $Al_2(SO_4)_3$)

Neutral Paper:

Made in 380 g/m^2 of areal weight

Comparative Example 1

Comparative Example 1 is the same as Example 1 except of using unadjusted pulp of pH 5.

Comparative Example 2

Comparative Example 2 is the same as Example 2 except of using unadjusted pulp of pH 9.5.

Conventional Example 1

Pulp:

Soft wood breached sulphite pulp: 100 %
(NBSP)

Material:	soft wood (N material)
Cooking Agent:	H_2SO_3, $NaHSO_3$ and Na_2SO_3
Yield:	46 %
pH:	5.0

Paper:

Made in 400 g/m^2 of areal weight

The above papers were placed in an atmosphere of 20°C and 65 % RH for two days to adjust moisture, and were cut out into a size of 4 cm x 15 cm. The papers cut out were packaged together with color photographic papers in seal by moistureproof bags and were kept at 50°C for five days and then were taken out. The color photographic papers were exposed and developed, and a exposure index according as 0.5 of reflection density was measured. The moistureproof bags are less than 0.5 g/m^2 24 hours of water vapor transmission rate and have a aluminum foil in 7 μm thick.

A package bag where photographic papers are placed alone was provided as a blank. The exposure index of the blank was subtracted from the exposure index of the above samples and the results were referred as variation of exposure index.

The results are shown in Table 1.

Table 1

Samples	Variation of Exposure Index
Example 1	0
Example 2	-0.01
Example 3	+0.01
Comparative Example 1	+0.07
Comparative Example 2	-0.05
Conventional Example 1	+0.01

Example 4

Paper tubes were made of the paper of Examples 1, 2 or 3 or Conventional Example 1 using a polyvinyl acetate adhesive of pH 6.5. The paper tubes are 76.2 mm in inner diameter, 100 mm in length and 10 ply. The paper tubes were kept at 40 ° C for one day to dry and then were kept at 20 ° C and 65 % RH for three days to adjust the moisture. A color photographic paper was wound on the paper tube one time and the paper tube was placed in the above moistureproof bag in a seal. The above treatments were conducted and the results were compared.

Moreover, other paper tubes adjusted in moisture were provided, the paper tube was pressed in diameter direction at 10 mm per a minute by two parallel plate, and the maximum load was measured.

The results are shown in Table 2.

Table 2

Samples	Variation of Example Index	Strength against Pressure (kg)
Example 1	+0.02	105
Example 2	+0.01	97
Example 3	+0.02	98
Conventional Example 1	+0.02	60

Claims

1. A neutral paper which comprises 20 to 100 % of partially chemically processed pulp produced in a 65 to 95 % yield using a cooking agent consisting essentially of NaOH, Na_2CO_3, $NaHCO_3$, Na_2SO_3, $NaHSO_3$ or a combination thereof and has a pH of 6 to 9.

2. The neutral paper of claim 1 of which the partially chemically processed pulp is produced using Na_2SO_3 and Na_2CO_3 as the cooking agent and which the pH is adjusted by adding NaOH.

3. The neutral paper of claim 1 of which the partially chemically processed pulp is produced using NaOH and Na_2CO_3 as the cooking agent and of which the pH is adjusted by adding aluminum sulfate.

4. A package of a photosensitive material which comprises the neutral paper of claim 1.

5. The package of claim 4 wherein the neutral paper is located to touch the photosensitive material.

6. A paper tube which is made of a neutral paper which comprises 20 to 100 % of partially chemically processed pulp produced in a 65 to 95 % yield using a cooking agent consisting essentially of NaOH, Na_2CO_3, $NaHCO_3$, Na_2SO_3, $NaHSO_3$ or a combination thereof and has a pH of 6 to 9.

7. The paper tube of claim 6 wherein the neutral paper is joined using emulsion adhesive or water-soluble adhesive of pH 6 to 9.

8. A paper core of a photosensitive material which consists essentially of the paper tube of claim 6.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 12 3231

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.5)
X,Y	"PULP AND PAPER. Chemistry and Chemical Technology. 3rd Edition, Volume 1." 1980, JAMES P. CASEY, NEW YORK * page 258, paragraph 2 - page 291, paragraph 1 *	1,2,4-8	D 21 C 3/02 D 21 H 11/06
Y	DATABASE WPIL, no. 88-268823 Derwent Publications Ltd., London, GB, & JP-A-63197945 (KONISHIROKU PHOTO KK) * whole abstract *	4-8	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D 21 C
D 21 H

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	21 March 91	SONGY O.M-L.A.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
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