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PROCESS OF ROSIN SIZING PAPER

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ABSTRACT OF THE DISCLOSURE

A process of sizing paper in which papermaker's alum and a material yielding hydroxide ions (e.g., sodium hydroxide) are added to aqueous wood pulp, the pH thereof is kept at 7 or below, and rosin size is applied to the surface of paper made from the pulp.

This invention relates to the sizing of paper and to a novel method of increasing the resistance of paper to water penetration and otherwise enhancing the quality of the sizing of the paper.

This application is a continuation-in-part of copending U.S. Ser. No. 456,515, filed May 17, 1965, now abandoned.

U.S. Pat. No. 3,074,843, issued to Lagally et al. shows a process of producing paper having high dry strength and good wet strength wherein aluminum hydroxide is precipitated by mixing an aluminum-containing compound and an acid, a base, or an aluminum salt in the absence of nonaluminum-containing polyvalent anions (e.g., the sulfate ion). Optimum results were achieved at a pH within the range of 6 to 9. See, particularly, column 6, lines 29 to 32, and column 2, lines 61 to 63, of the Lagally et al. patent. Lagally et al. stress their need to be free of nonaluminum-containing polyvalent anions by calling it essential to their invention. See column 2, lines 27 and 28, of the Lagally et al. patent.

It has now been found, however, that the stated need of Lagally et al. for the attainment of strength when wet can be obviated, and that remarkable levels of sizing can be obtained concurrently with the development of strength. It has been found that, if papermaker's alum is added to an aqueous wood pulp slurry until its pH is 5 and below and if a base such as sodium hydroxide is then added to the pulp and alum mixture without bringing the overall pH to 7 and above, aluminum hydroxide will precipitate in such a manner and to such a degree as to assure excellent levels of sizing once rosin size or the like is added to complete the process. It has also been found that, if these steps are reversed, i.e., if the hydroxide is added first and the alum added second, similar advantageous results are achieved. In short, then, it has been found that, if the pH of the wood pulp is attended to correctly, the presence of the non-aluminum-containing polyvalent anions of papermaker's alum—$Al_2(SO_4)_3.14H_2O$—is of little or no deleterious effect. The following examples, which describe a standard sizing method (Examples 1 and 20) and variations of the method of present invention

(Examples 2 to 28, excepting 20), and tables, which compile data of tests made on products of the examples, confirm this finding:

EXAMPLE 1

Following standard laboratory procedure, a mixture of 75% pine and 25% hardwood kraft pulp, bleached to 85% G.E. brightness, was refined in an experimental beater at 1.75% consistency to 488 Canadian Standard freeness. Forty grams (ovendry basis) of the refined pulp were suspended in distilled water at 3% consistency. Fortified size (commercially available Paper Product 2409) was added to the slurry at a rate of 30 pounds of size solids per ton of pulp. A mechanical stirrer was used to keep the slurry thoroughly mixed during the addition. Stirring was continued. After 5 minutes, papermaker's alum was added at the rate of 30 pounds $Al_2(SO_4)_3.14H_2O$ per ton of pulp. Stirring was continued for 10 minutes. Slurry pH after the addition of alum was 4.2. A solution of half normal sodium hydroxide was added to pH 6.0. pH was adjusted to 5.0 by the addition of papermaker's alum (5.5 pounds per ton). Stirring was continued for 1 minute. Consistency was adjusted to 0.375% with water containing enough hydrochloric acid to give pH 5.0. Handsheets were formed on a British sheet mold, pressed between a polished metal plate and blotters, clamped in rings, and dried in a forced-draft oven at 105° C. for 30 minutes. Basis weight and caliper averaged 100 pounds and 7.0 mils, respectively. Before testing, sheets were brought into equilibrium with the atmosphere of a room maintained at 50% relative humidity and 73° F.

EXAMPLE 2

Twenty grams of pulp similar to that used in Example 1 were suspended in distilled water at 3% consistency. Six-tenths milliliter of 0.5 N hydrochloric acid was slowly added to pH 4.5. Cf., U.S. Pat. No. 3,112,242 to Jones. After stirring for a few minutes, a solution of papermaker's alum was added to the slurry at the rate of 20 pounds $Al_2(SO_4)_3.14H_2O$ per ton of pulp (ovendry basis). Stirring was continued for 5 minutes, during which time pH dropped to 3.8. A solution of sodium hydroxide (0.5 N) was added from a buret, to pH 5.5 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company; New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. After a retention period of 20 minutes (slow agitation), consistency was adjusted to 0.375% with water containing enough hydrochloric acid to give pH 5.5.

Handsheets were prepared, pressed, and dried as in Example 1. Each sheet was weighed, dipped in a fresh solution of fortified rosin size (Paper Product 2409), blotted lightly, weighed again, and heated to incipient dryness between a polished plate and blotters on a Carver press at 105° C. The sized sheets were clamped in rings and dried in a forced-draft oven at 105° C. for 30 minutes. Basis weight and caliper averaged 100 pounds and 7.0 mils, respectively. Size solids pickup was equivalent to 5.1 pounds per ton of pulp.

EXAMPLE 3

In accordance with the present invention, twenty-two grams of pulp similar to that used in Example 1 were suspended in demineralized water at 3.0% consistency. Slurry pH after thorough agitation was 6.7. Addition of a solution of alum equivalent to 40.0 pounds

$$Al_2(SO_4)_3.14H_2O$$

per ton of pulp lowered pH to 4.1. Half normal sodium hydroxide was added slowly, with agitation, to pH 5.5 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company; New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. Stirring was continued during a 25-minute retention period before the pulp was diluted with water at pH 5.5, and handsheets were prepared and dried as in Example 2. Each dried sheet was weighed, and dipped into a fresh solution of fortified rosin size. Sheets were blotted, weighed again, and dried as before. Size solids pickup was equivalent to 8.1 pounds per ton of pulp. Average basis weight was 100 pounds; caliper was 7.0 mils.

EXAMPLE 4

Twenty-two grams of kraft pulp similar to that used in Example 1 were adjusted to 3% consistency with demineralized water. After thorough mixing, pH was 6.7. A solution of papermaker's alum equivalent to 62.7 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp was added to pH 3.9. A 0.5 N solution of sodium hydroxide was used to adjust pH to 5.2 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company; New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. After a retention period of 25 minutes, handsheets were prepared and dried as before, dipped in a solution of Paper Product 2409 of such concentration as to give a size solids pickup of 8.8 pounds per ton of pulp. Final drying and pressing brought basis weight and caliper into the range reported for earlier experiments.

EXAMPLE 5

Example 4 was repeated, except that pH of the slurry of pulp and alum was adjusted to 5.5 by the addition of sodium hydroxide.

EXAMPLE 6

Example 4 was repeated, except that pH of the slurry of pulp and alum was adjusted to 5.8 by the addition of sodium hydroxide.

EXAMPLE 7

Pulp similar to that used in Example 1 was suspended in distilled water at 3% consistency. Half normal hydrochloric acid was slowly added, to pH 4.5. Cf., U.S. Pat. No. 3,112,242 to Jones. After stirring for a few minutes a solution of papermaker's alum was added to the slurry at the rate of 62.6 pounds of alum solids per ton of pulp. Stirring was continued for 5 minutes before 0.5 N sodium hydroxide was slowly added, to pH 5.5 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company; New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. After a retention period of 25 minutes (slow agitation), consistency was adjusted to 0.375% with water containing enough hydrochloric acid to give pH 5.5. Handsheets were prepared as in Example 1, dipped in a solution of fortified rosin size, blotted, and dried as in earlier experiments. Size solids pickup was 8.8 pounds per ton of pulp.

EXAMPLE 8

Example 7 was repeated, except that pH of the pulp slurry was adjusted to 6.0 with half normal hydrochloric acid before addition of alum. Cf., U.S. Pat. No. 3,112,242 to Jones.

EXAMPLE 9

Forty grams of kraft pulp similar to that used in Example 1 were adjusted to 3% consistency with demineralized water. A solution of papermaker's alum equivalent to 62.7 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp was added, to pH 3.8. A 0.5 N solution of sodium hydroxide was used to adjust pH to 5.5 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company; New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. After a retention period of 5 minutes, handsheets were prepared and dried as before, dipped in a solution of Paper Product 2409 of such concentration as to give a size solids pickup of 8.8 pounds per ton of pulp. Final drying and pressing brought basis weight and caliper into the range reported for earlier examples.

EXAMPLE 10

Example 9 was repeated, except that a 15-minute retention period was allowed between flocculation of alum, and dilution of slurry to handsheet-making consistency.

EXAMPLE 11

Forty grams of kraft pulp similar to that used in Example 1 were adjusted to 3% consistency with demineralized water. A solution of papermaker's alum equivalent to 63.0 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp was added, to pH 4.0. The mixture was transferred to a TAPPI standard disintegrator. The disintegrator was started, and as violent agitation began, a 10% solution of sodium hydroxide was poured into the slurry in such volume as to raise pH to 5.5 and flocculation occurred. Cf., Curtman, L. J.; Qualitative Chemical Analysis; The MacMillan Company, New York, 1938; P. 181 and Kolthoff et al.; Textbook of Quantitative Inorganic Analysis (3rd Ed.); The MacMillan Company; New York, 1952; P. 318. Violent agitation was continued for a total of 30 seconds. The treated pulp was returned to a beaker and stirred at a moderate rate for 20 minutes. Handsheets were prepared, pressed, and dried as in Example 1. Each dried sheet was weighed, dipped in a fresh solution of fortified size (Paper Product 2409), blotted lightly, weighed, and heated to incipient dryness between a polished plate and blotters on a Carver press at 105° C. The sized sheets were clamped in rings and dried in a forced-draft oven at 105° C. for 30 minutes. Size solids pickup was equivalent to 12.7 pounds per ton of pulp.

EXAMPLE 12

Example 11 was repeated, except that agitation during and after flocculation was slow.

EXAMPLE 13

Example 11 was repeated, except that alum and size were added at the rate of 90 and 11 pounds, respectively, per ton of pulp.

EXAMPLE 14

Example 11 was repeated, except that alum and size were added at the rate of 160 and 20 pounds, respectively, per ton of pulp.

EXAMPLE 15

Example 11 was repeated, except that alum and size were added at the rate of 180 and 22.5 pounds, respectively, per ton of pulp.

EXAMPLE 16

Example 11 was repeated, except that alum and size

were added at the rate of 200 and 25 pounds, respectively, per ton of pulp.

EXAMPLE 17

Example 12 was repeated, except that 17 pounds regular pale rosin size was used in place of 10 pounds Paper Product 2409.

EXAMPLE 18

Example 12 was repeated, except that the fiber furnish was bleached softwood sulfite pulp instead of 75% pine and 25% hardwood kraft pulp.

EXAMPLE 19

Example 18 was repeated, except that the fiber furnish was unbleached pine kraft pulp instead of bleached sulfite pulp.

EXAMPLE 20

Following standard laboratory procedure, a mixture of 45% pine and 55% hardwood kraft pulp, bleached to 85% G.E. brightness, was refined in an experimental beater at 1.75% consistency to 502 Canadian Standard freeness. Forty grams (ovendry basis) of the refined pulp were suspended in distilled water at 3% consistency. Fortified size (commercially available Paper Product 2409) was added to the slurry at a rate of 30 pounds of size solids per ton of pulp. A mechanical stirrer was used to keep the slurry thoroughly mixed during the addition. Stirring was continued. After 5 minutes, papermaker's alum was added at the rate of 30 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp. Stirring was continued for 10 minutes. Slurry pH after the addition of alum was 4.2. A solution of half normal sodium hydroxide was added to pH 6.0. pH was adjusted to 5.0 by the addition of papermaker's alum (5.5 pounds per ton). Stirring was continued for 1 minute. Consistency was adjusted to 0.375% with water containing enough hydrochloric acid to give pH 5.0. Handsheets were formed on a British sheet mold, pressed between a polished metal plate and blotters, clamped in rings, and dried in a forced-draft oven at 105° C. for 30 minutes. Basis weight and caliper averaged 100 pounds and 7.0 mils, respectively. Before testing, sheets were brought into equilibrium with the atmosphere of a room maintained at 50% relatively humidity and 73° F.

EXAMPLE 21

Example 5 was repeated, except that pH of the slurry of pulp and alum was adjusted to 5.5 by the addition of ammonium hydroxide, and that the pulp was the same as that used in Example 20.

EXAMPLE 22

Example 21 was repeated, except that pH of the slurry of pulp and alum was adjusted to 5.5 by the addition of ethanolamine.

EXAMPLE 23

Forty grams of pulp similar to that used in Example 1 were suspended in distilled water at 3% consistency. Slurry pH was adjusted to 4.5 by the slow addition of 0.5 N hydrochloric acid. After stirring for a few minutes a 0.5 N solution of sodium hydroxide was added to the slurry at the rate of 6.6 lb. of NaOH per ton of pulp (ovendry basis). After continued stirring for five minutes a solution of papermaker's alum was added from a buret, to pH 5.5. Flocculation occurred. After a retention period of 20 minutes (slow agitation), water containing hydrochloric acid to give pH 5.5 was added, to sheet making consistency.

Handsheets were prepared, pressed, and dried as in Example 1. Each sheet was weighed, dipped in a fresh solution of fortified rosin size (Paper Product 2409), blotted lightly, weighed again, and heated to incipient dryness between a polished plate and blotters on a Pasadena press at 105° C. The sized sheets were clamped in rings and dried in a forced-draft oven at 105° C. for 30 minutes. Basis weight and caliper averaged 100 pounds and 7.0 mils, respectively. Size solids pickup was equivalent to 5.1 pounds per ton of pulp.

EXAMPLE 24

Forty grams of pulp similar to that used in Example 1 were suspended in distilled water at 3% consistency. Addition of a solution of sodium hydroxide equivalent to 10.7 lb. NaOH per ton of pulp raised pH to 11.2. A solution of papermaker's alum (equivalent to 40.0 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp) was added slowly, with agitation, to pH 5.5. Flocculation followed. Stirring was continued during a 25-minute retention period before the pulp was diluted with water, at pH 5.5, and handsheets were prepared and dried as before. Each dried sheet was weighed, and dipped into a fresh solution of fortified rosin size. Sheets were blotted, weighed again, and dried as before. Size solids pickup was equivalent to 8.1 pounds per ton of pulp. Average basis weight was 100 pounds; caliper was 7.0 mils.

EXAMPLE 25

Forty grams of kraft pulp similar to that used in Example 1 were adjusted to 3% consistency with distilled water. A 0.5 N solution of sodium hydroxide, equivalent to 18.7 lb. NaOH per ton of pulp was added to pH 11.3. After 5 minutes of stirring a solution of papermaker's alum equivalent to 62.7 pounds $Al_2(SO_4)_3 \cdot 14H_2O$ per ton of pulp was added to adjust pH to 5.2. Flocculation occurred. After a retention period of 25 minutes, handsheets were prepared and dried as before, dipped in a solution of Paper Product 2409 of such concentration as to give a size solids pickup of 8.8 pounds per ton of pulp. Final drying and pressing brought basis weight and caliper into the range reported for earlier experiments.

EXAMPLE 26

Example 25 was repeated, except that after the addition of sodium hydroxide solution equipvalent to 20.0 lb. of NaOH per ton of pulp, pH of the alkaline slurry was adjusted to 5.8 by the slow addition of a solution of papermaker's alum.

EXAMPLE 27

Forty grams of kraft pulp similar to that used in Example 1 were adpusted to 3% consistency with distilled water. A 10% solution of sodium hydroxide equivalent to 18.9 lb. NaOH per ton of pulp was added to the slurry. The mixture was transferred to a TAPPI Standard disintegrator. The disintegrator was started, and as violent agitation began a solution of papermaker's alum was poured into the slurry in such volume as to lower pH to 5.5. Violent agitation was continued for a total of 30 seconds. The treated pulp was retruned to a beaker and stirred at a moderate rate for 20 minutes. Handsheets were prepared, pressed, and dried as in Example 1. Each dried sheet was weighed, dipped in a fresh solution of fortified size (Paper Product 2409), blotted lightly, weighed, and heated to incipient dryness between a polished plate and blotters on a Pasadena press at 105° C. The sized sheets were clamped in rings and dried in a forced-draft oven at 105° C. for 30 minutes. Size solids pickup was equivalent to 12.7 pounds per ton of pulp.

EXAMPLE 28

Forty grams of pulp similar to that used in Example 1 were adjusted to 3% consistency with distilled water. A 3 N solution of ammonium hydroxide was added to the slurry and stirred for 5 minutes. pH of the slurry at this point was 10.7. A solution of papermaker's alum was slowly added to the slurry to pH 5.5. After a retention period of 25 minutes handsheets were prepared and dried as before. They were dipped in a solution of Paper Product 2409 of such concentration as to give a

size solids pickup of 8.8 pounds per ton of pulp. Final pressing and drying brought basis weight and caliper into the range reported for earlier experiments.

Both fortified rosin size and regular pale rosin size are compatible with the flocculated alum system (Example 17).

TABLE I

Example number	Coffee penescope, minutes	Lactic acid penescope, minutes	Hercules ink, seconds	Dry indicator, seconds	Wet break	Cobb, g./sq. m.	Water absorption, percent	Tensile wet/dry, percent	Size furnish, dollar/ton
1	12.1	1.4	214	122	2.5 min.	38	58.1	5.0	4.94
2	24.3	7.5	248	126	1.9 min.	34	56.6	4.9	1.43
3	35.8	19.3	587	128	3.0 min.	25	47.6	5.9	2.34
4	90+	31.8	736	149	4.1 min.	25	48.2	6.5	3.21
5	90+	41.0	737	145	3.7 min.	25	47.0	6.8	3.25
6	90+	31.0	830	142	3.6 min.	25	48.2	6.9	3.29
7	14.9	31	1,544	149	6.8 min.	25	48.6	6.6	3.34
8	15.3	33	1,177	142	8.8 min.	24	47.7	7.1	3.28
9	46.9	40	1,005	148	12.5 min.	24	49.2	6.4	3.26
10	18.2	30	702	144	9.7 min.	25	46.9	7.0	3.26
11	90+	23.8	1,182	142	12.2 min.	26	47.7	7.4	3.78
12	21.0	16.8	934	140	7.8 min.	26	49.4	7.0	3.78
13	90+	39.0	1,165	144	10.9 min.	24	47.8	8.2	4.51
14	90+	90+	1,704	170	24+ hr.	23	45.5	10.9	8.07
15	90+	90+	1,530	163	24+ hr.	24	44.7	11.9	9.08
16	90+	90+	1,458	155	24+ hr.	24	45.7	12.7	10.09
17	19.3	90+	1,444	151	137 min.	25	49.2	8.4	4.76
18	90+	23.4	1,172	140	5.4 min.	22	43.1	7.7	4.02
19	90+	71.0	5,000+	156	47.7 min.	27	53.7	7.4	4.02
20	9.2	1.5	233	140	2.7 min.	38	63.2	4.3	4.94
21	61.2	16.2	764	141	4.8 min.	29	56.2	5.7	3.96
22	22.0	20.8	1,419	172	3.4 min.	28	71.0	5.8	12.25
23	18.1	15.5	843	209	1.9 min.	25	50.8	7.5	1.46
24	36.8	38.5	1,437	219	3.1 min.	25	48.0	8.8	2.47
25	90+	42.2	1,314	213	4.6 min.	24	48.4	9.9	3.52
26	43.5	37.5	1,501	221	3.2 min.	24	47.2	9.2	3.61
27	50.1	75.2	1,421	219	6.5 min.	24	46.7	10.7	4.03
28	23.3	22.1	1,446	191	6.5 min.	24	48.6	9.1	2.50

NOTE.—Examples 1 through 8: Mobile Mill pulp, 75% pine, 25% hardwood; 85% G.E. brightness; 500 Canadian standard freeness. Examples 9 through 17: Mobile Mill pulp, 75% pine, 25% Hardwood; 85% G.E. brightness; 500 Canadian standard freeness. Examples 20 through 22: Springhill Mill pulp, 45% pine, 55% hardwood; 85% G.E. brightness; 500 C.S. freeness. Examples 23 through 28: Mobile Mill pulp, 75% pine, 25% hardwood; 85% G.E. brightness, 500 Canadian standard freeness.

The data presented in the above table suggest that a unique and remarkably effective method of sizing paper has been developed. Sizing by the present flocculated alum-rosin size procedure has produced handsheets superior in the characteristics evaluated to similar sheets prepared by orthodox means—at less than half the size furnish cost. At costs approaching those required by a standard laboratory procedure, the flocculated alum-sized sheets outperformed standard sheets by an impressive margin. Increasing the alum and size content of the stock improved sizing up to a total size furnish cost at current prices of approximately $8 per ton of pulp, at which level very hard sizing was realized.

The data also show that the sequence of steps comprising the method of the invention can be reversed.

Data not shown reveal that the internal addition of part of the size after flocculation of alum, and part after the formation and drying of the sheet results in sizing that compares favorably with that obtained by adding the total amount in a simulated size press application. Little benefit is realized by adding all the size internally.

The following additional observations are worthy of note:

Variations in flocculation pH between 5.2 and 5.8 have little influence on sizing (Examples 4, 5, and 6, Table I);

Pre-alum adjustment of pH to 4.5 and 6.0 improved resistance to penetration by ink, but was damaging to resistance to penetration by hot coffee. Other characteristics were not greatly affected (Examples 5, 7, and 8);

Extended retention under mild agitation following flocculation improves resistance to hot coffee (Examples 5, 9, and 10). A 20-minute retention period is satisfactory;

Violent agitation during and immediately after flocculation improves sizing (Examples 11 and 12);

Sizing appears to reach a maximum at a size furnish cost at current prices between $8 and $9 per ton: wet/dry tensile increased progressively as size furnish cost at current prices approached $10 per ton (Examples 13, 14, 15, and 16);

Bleached sulfite and unbleached kraft pulps may be sized as effectively with flocculated alum-rosin size as bleached kraft pulps (Examples 18 and 19); and,

What is claimed:

1. A process for sizing paper made from wood pulp comprising a step of adding papermaker's alum to an aqueous slurry of wood pulp in an amount sufficient to bring the pH of the aqueous slurry of wood pulp to about 5 and below, a step of adding a material yielding hydroxide ions to the aqueous slurry of wood pulp in an amount sufficient to flocculate the papermaker's alum without raising the pH of the aqueous slurry of the wood to about 7 and above, and a step of adding a rosin size to the wood pulp after it is transformed from the aqueous slurry into a web of paper.

2. A process for sizing paper made from wood pulp comprising a first step of adding papermaker's alum to an aqueous slurry of wood pulp in an amount sufficient to bring the pH of the aqueous slurry of wood pulp to about 5 and below, a second step of adding a material yielding hydroxide ions to the aqueous slurry of wood pulp in an amount sufficient to flocculate the papermaker's alum without raising the pH of the aqueous slurry of the wood to about 7 and above, and a third step of adding a rosin size to the wood pulp after it is transformed from the aqueous slurry into a web of paper.

3. The process of claim 1 wherein the amount of papermaker's alum added to the aqueous slurry of wood pulp is sufficient to bring the pH thereof to about 4 and below.

4. The process of claim 1 wherein the material is sodium hydroxide.

5. The process of claim 1 wherein a portion of the rosin size is added to the aqueous slurry of the wood pulp.

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