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Production of patterned paper
Herstellung von dressierten Papier
Production de papier à dessins

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This invention relates to the production, on the paper machine, of paper which is patterned in contrasting colours without the use of printing techniques. Papers of this general kind are commercially available from Arjo Wiggins Limited under the trademark COUNTRYSIDE and are typically used when it is desired to impart distinctive aesthetic appeal to products such as brochures, folders, menus, invitations, and stationery. Although the paper is patterned during its production on the paper machine, it can be overprinted if desired to give additional decorative effects.

The pattern is introduced into the paper by the incorporation in the papermaking furnish of inclusions which contrast in appearance with the papermaking fibres which make up the bulk of the finished paper. The contrast in appearance arises as a result of the papermaking fibres being of a contrasting colour, shade or hue from that of the inclusions. For example, the papermaking fibres can be coloured and the inclusions white or vice versa. Alternatively both the papermaking fibres and the inclusions can be coloured, provided that the contrast between their colours is adequate.

Suitable inclusions are long contrasting-colour fibres of the kind known in the paper industry as "Silurian fibres", which impart a mineral or rock-like appearance to the paper; planchettes of contrasting appearance to the paper itself; or dark coloured particulate or fibrous material, which imparts a dark-speckled effect.

Just as dark-coloured inclusions give a dark-speckled effect, a white- or colour-speckled effect can be achieved by the addition to the papermaking furnish of small pieces of partially wet-disintegrated white or coloured paper (or, in principle, other material). The wet-disintegration can be carried out in a hydropulper or other apparatus of the kind used to disintegrate pulp bales at the start of the papermaking process (the starting paper must be a wet-strengthened or water-resistant coated paper, or else it will disintegrate to such an extent that it will not produce suitable speckles). Whilst a speckled paper produced in this way is fairly distinctive, the speckles lack sharpness, and hence the aesthetic appeal is not as great as desirable.

It is an object of the present invention to provide a method of making patterned paper with a white- or colour-speckled effect in which the speckles are of generally random size and shape and are sharp and well-defined, and which consequently has an attractive appearance.

We have now found that the key to achievement of this objective lies in the manner in which the speckle-forming material is produced. Specifically, we have found that suitable speckle-forming material can be formed by pre-agglomerating a mixture of papermaking fibre, particulate pigment and a binder.

US-A-2905583 discloses a beater saturated fibrous sheet having a decorative pattern. This can be produced by adding a suspension of clumped fibres to a suspension of fibres having a colour different from that of the clumped fibre suspension and then forming a fibrous sheet from the mixed suspensions by means of a paper-forming machine. The clumped fibres can be formed by adding a tacky synthetic rubber to an aqueous slurry of sheet-making fibres to produce coated fibres of at least about 30% of said rubber and then depositing the rubber on the fibres by addition of an electrolyte in the form of a salt of a polyvalent metal or by addition of a precipitating solution consisting of acetic acid alone or a solution of alum alone or a solution of alum, citric acid or sodium citrate in water.

According to the present invention, there is provided a process for the production of speckle- or similarly-patterned paper, said process comprising the steps of:

1. preparing speckle-forming material by agglomerating a mixture of papermaking fibre, particulate pigment and a latex binder present in an amount of from 0 to 20% by weight, based on the weight of dry binder to weight of dry fibre in the mixture, by the addition to the mixture of one or more polymeric flocculants; ("Process Variant A");

2. introducing the resulting speckle-forming material into a papermaking furnish of which the fibres are of a contrasting colour to that of the speckle-forming material and on which dye, if present, has been fully fixed; and

3. draining the speckle-containing furnish to produce a patterned paper web.

The invention also extends to the patterned paper so produced and to the production of speckle-forming material for use in the process.

The term "paper" in this specification includes heavyweight papers of the kind often referred to as "boards".

The speckles in the final paper product are of varying dimensions, being of generally random size and shape (in contrast to conventional planchettes). They are generally elongate or fibrous in appearance, and appear sharp and well-defined, the whole giving an attractive decorative effect.

The speckle-forming material can be white or coloured. If the latter, the colour can be the result of the use of coloured starting materials. Alternatively, the speckle-forming material can be dyed during or after its production. When dye is used, it should desirably be fully-fixed before the speckle-forming material is mixed with the papermaking furnish.

The presence of fibres in the speckles is thought to assist in anchoring the speckles in the paper, since the speckle fibres can bond chemically and mechanically with the other fibres in the normal way.
The speckle-forming material is introduced to the furnish at a point close to the headbox of the papermaking machine, in order that the agglomerated or comminuted material is not re-dispersed or otherwise adversely affected by conditions of heavy shear and is not removed from the furnish altogether (as might happen, for example, if the agglomerated or comminuted material were introduced prior to a stock cleaning operation).

It is important that any dye present should be fully fixed before addition of the speckle-forming material, as otherwise the speckle-forming material might itself become dyed to a colour similar to that of the background paper.

In Process Step 1, the flocculant is typically a material of the kind used in the paper industry for increasing retention of fibre fines and/or fillers on the papermaking wire, i.e. a so-called retention aid, or a flocculant of the kind used to promote sedimentation in waste water treatment in the paper or other industries.

Preferably, a combination of oppositely-charged flocculants is used to generate an enhanced agglomerating action and thereby agglomerate said mixture.

In a preferred embodiment of Process Step 1, the fibre and pigment to be agglomerated are mixed in aqueous suspension, together with a suitable latex, for example a styrene-acrylic or styrene-butadiene latex, and an anionic flocculant is added (typically this has a relatively high molecular weight and a relatively low charge density). A cationic flocculant (typically having a relatively high molecular weight and a relatively low charge density) or a cationic flocculant (typically having a relatively low molecular weight and relatively high charge density) is then added to enhance the stability of the initial agglomerate. This enhancement probably results from reaction or interaction between the cationic flocculant on the one hand and the anionic flocculant and the latex (also anionic) on the other. However, we do not wish to be bound by any particular theory as to the processes involved. The papermaking fibre content of the aqueous suspension prior to the anionic flocculant addition is typically from 1.5% to 3% by weight.

Although the mixing sequence and order of addition just described is currently considered to be preferred, it will be appreciated that the key point is the formation of adequately stable fibre/pigment agglomerates, and that the precise sequence of mixing and addition of raw materials which achieves this is secondary. However, we have found that although satisfactory agglomerates can be formed when cationic flocculant is added prior to addition of anionic flocculant, the agglomeration formation is more difficult to control and is not always achieved satisfactorily. This sequence of addition is therefore not preferred. We have also found that addition of pigment after the flocculant(s) have been added tends to lead to formation of pigment lumps, which is undesirable.

Although the use of a latex or alternative binder is currently considered highly desirable, papermaking fibre and pigment can be flocculated in the absence of latex or other binder, and suitably stable agglomerates obtained in this way can be used in the present process. Our experience is that the aesthetic effect obtained in the final product is less attractive when no latex or other binder is present. When latex is used, the amount is typically about 20% based on the weight of dry latex to weight of dry fibre in the speckle-forming mixture.

The types of fibre used for producing speckle-forming material can vary quite widely, but a significant proportion of relatively long softwood fibres is desirable in order to enhance the cohesion or tangled character of the fibre/pigment agglomerate formed. We have found that a 50/50 blend of hardwood and softwood fibres gives good results, but this precise ratio is not critical, although when agglomerates were made with a 70/30 hardwood/softwood blend, they were less satisfactory than those obtained with higher proportions of softwood fibres.

The pigment used, in the case of white speckles, is preferably titanium dioxide, since this imparts a high degree of both opacity and whiteness. However, other white pigments can be used, for example barium sulphate in the form of blanc fixe or baryta; calcium sulphate in the form of gypsum or anhydrite; kaolin; or, if neutral- or alkaline-sizing is used in the papermaking operation, chalk or precipitated calcium carbonate. The amount of pigment present in the speckle-forming stock can vary widely, depending on the aesthetic effect desired. We have successfully used titanium dioxide in amounts of from below 25% to approaching 150% (specifically from 24% to 143%) based on the total dry weight of fibre in the speckle-forming mixture.

The amount of flocculant(s) to be used can also vary quite widely, for example from about 0.2% to about 1.0% by weight, based on the dry weight of fibres in the speckle-forming mixture (these figures apply to each agglomerating agent when both cationic and anionic agents are used). These agents are used in solution and the concentration of this solution affects the agglomerating action. We have so far found concentrations of the order of 0.5 to 0.75% by weight to be most satisfactory. Concentrations of 1% were less satisfactory as large clumps of fibre and pigment were mainly formed, with fewer smaller agglomerates - this was found to detract from the aesthetic effect achieved. The solutions of flocculant should be used soon after being made up, say within about 1 hour, as otherwise their agglomerating action may deteriorate. Addition of the flocculant solutions should be carried out quickly, preferably within a period of well below two minutes and ideally over a period of less than about 30 seconds, as otherwise the agglomerating action is less effective (although this may depend on the particular chemical being used).

The mixture of fibre, pigment and latex, when present, is normally kept stirring during at least part of the agglomeration stage of the process. The intensity and duration of this stirring influences the size and shape of the agglomerates obtained and hence affords
a degree of control over the appearance of the final paper product.

[0022] The amount of speckle-forming material to be added to the papermaking furnish is determined by the aesthetic effect desired. The speckle-forming material is added typically at a level of about 10 to 20% of the final paper (based on dry weight of speckles to dry weight of the fibre and filler in the main furnish). The proportion of visible speckles in the final paper is less than this, as not all the fibres in the fibre/pigment mixture become incorporated in agglomerates. Hence they become effectively invisible constituents of the final paper product. The papermaking furnish to which the speckle-forming material is added is generally conventional in nature, and typically comprises a blend of hardwood and softwood pulps. It may include a major proportion of recycled fibre.

[0023] In a typical production operation, given by way of example only, a 70% hardwood/30% softwood fibre stock is prepared in conventional manner in a pulper at about 5 to 6% consistency and subjected to conventional refining. Dye fixing agent is added, followed later by dyes and internal sizing agent (e.g. alkyl ketene dimer). The stock is then pumped to a header tank. A chalk loading between the header tank and fan pump, prior to conventional stock cleaning. The speckle stock from (a) above was added to the furnish at a point just prior to the headbox, typically at additional levels already referred to. The resulting speckle stock/furnish mixture is then projected on to the papermaking wire from the headbox slice and paper is produced in the normal way to give a product having sharply defined speckles of varying dimensions against a continuous contrasting background.

[0024] The invention will now be illustrated by the following Examples, in which all parts and percentages are by weight unless otherwise stated:

Example 1

[0025] This illustrates the manufacture of approximately one tonne of patterned paper.

a) Preparation of speckle stock

[0026] A pulper of capacity c. 14200 litres was approximately three-quarter filled with water. 86 Kg of c.10% moisture content eucalyptus pulp, 86 Kg of c.10% moisture content softwood kraft pulp and 75 Kg titanium dioxide were added with normal mixing agitation. The fibre consistency was then adjusted to about 1.5% by the addition of further water. The resulting aqueous dispersion was then pumped to a larger chest, and 29 Kg of 50% solids content styrene-acrylic latex ("ACRONAL S360D" supplied by BASF, and stated by the suppliers to be a copolymer based on n-butyl acrylate, acrylonitrile and styrene) were added with normal agitation. 120 litres of a 0.75% solution of high molecular weight anionic flocculant ("NALCO A626" supplied by Nalco Chemical Company were added batchwise from a bucket over a target period about 30 seconds. After around 5 to 10 minutes, 120 litres of 0.75% solution of high molecular weight cationic polyelectrolyte flocculant ("NALCO 4634-SC" also supplied by Nalco Chemical Company) were added in the same manner. Agglomerated clumps of latex-bound fibre and filler were seen to begin forming immediately.

b) Preparation of main furnish

[0027] A 70% hardwood/30% softwood fibre stock was prepared in conventional manner in a pulper at about 5 to 6% consistency and subjected to conventional refining. Dye fixing agent was added, followed later by dyes and internal sizing agent (alkyl ketene dimer). The dyes chosen were such as to produce a grey shade in the final paper. The stock was then pumped to a header tank. A chalk loading was added between the header tank and fan pump, prior to conventional stock cleaning.

c) Preparation of Patterned Paper

[0028] The speckle stock from (a) above was added to the furnish from (b) above at a point just prior to the headbox at an addition level of about 10 to 20% (based on dry weight of fibre and pigment in the speckles to dry weight of the remaining fibre and filler in the furnish). The resulting speckle stock/furnish mixture was then projected on to the papermaking wire from the headbox slice and paper was produced in the normal way. It had sharply defined white speckles of generally fibrous appearance but varying dimensions against a continuous grey background. Fig. 1 is a photocopy derived from part of the patterned paper produced illustrating the decorative effect obtained. Although this shows the shape and distribution of the speckles, the photocopying process exaggerates rather than properly reproduces the contrast in shade between the speckles and the background.

Example 2

[0029] This illustrates, on a laboratory scale, a process similar to that of Example 1 but in which the fibre consistency in the speckle-forming operation is 3%.

[0030] 35 ml of 3% hardwood pulp suspension and 35 ml of 3% softwood pulp suspension were first mixed (total dry fibre weight of 2.1 g). 0.8 ml of 50% solids content styrene-acrylic latex ("ACRONAL S360D") and 1 g of titanium dioxide were added and the mixture was stirred for 5 minutes. 12 ml of 0.1% anionic flocculant ("NALCO A626") were added over a period of about 20 to 30 seconds, and the mixture was stirred for a further 5 minutes. 12 ml of 0.1% cationic flocculant ("NALCO 4634-SC") were then added over a
period of 20 to 30 seconds. Clumps of entangled fibre and pigment were seen to start forming immediately. The resulting mixture was then added to 450 ml of 1.5% consistency 50/50 hardwood/softwood fibre blend which had been previously dyed grey and fixed. Approximately 100 gm⁻² handsheets were produced using a British Standard Sheet Making machine. The resulting sheet had a random pattern of white speckles on a grey background.

**Example 3**

[0031] This illustrates the production of white-speckled grey papers using a variety of relative proportions and types of raw materials in the speckle-forming process. 50 ml of 3% hardwood fibre stock and 20 ml of 3% softwood fibre stock were mixed and 1.5 g titanium dioxide pigment were added with stirring, followed by 50 ml water. 0.4 g of styrene-acrylic latex (“ACRONAL S360D”) were added, followed by 2 ml of 0.1% solution of anionic flocculant (“NALCO A626”). After stirring for 5 minutes, 2 ml of 0.1% cationic flocculant (“NALCO 4634-SC”) were added, resulting in formation of entangled fibre/pigment agglomerates.

[0033] These agglomerates were filtered off and then re-dispersed in water to give a total volume of dispersion of 200ml. 20 to 40 ml additions of the resulting speckle-forming stock were added to 100 ml portions of previously dyed and fixed grey 1.5% papermaking stock and made into handsheets, generally as described in Example 2. The handsheets exhibited white speckles against a grey background.

[0034] In variants of the above procedure, the following changes were made, either separately or in combination:

a) amount of titanium dioxide (1 g and 0.5 g additions instead of 1.5 g)

b) amount of speckle-forming stock added (50 ml instead of 20 to 40 ml)

c) amount of flocculants added (two or three times as much of each, and/or 1.5 times as much anionic flocculant used as cationic, or vice versa, instead of the same amounts)

d) titanium dioxide was added after instead of before the flocculants

e) styrene-butadiene latex (“DL950” supplied by Dow Chemical) used instead of styrene-acrylic latex

f) mixing times varied

g) latex amount varied (0.2 ml instead of 0.4 ml)

h) blanc fixe or kaolin used instead of titanium dioxide

i) latex omitted altogether

j) flocculant concentration increased (1%, 0.75% and 0.5% instead of 0.1%)

k) speckle-stock fibre dispersion consistency reduced (1.5% instead of 3%).

Example 4

[0036] This further illustrates the production of speckle-patterned paper on a full-size papermachine, 344 Kg of c. 10% moisture content softwood kraft pulp were added to c. 10,600 litres of fresh water in a pulper and the mixture was stirred until the pulp had fully disintegrated. 60 Kg of styrene-acrylic latex (“ACRONAL S360D”) were then added, whilst maintaining stirring. This represented c. 9.7% latex on a dry basis, based on dry fibre content. 125 Kg titanium dioxide were then added, still with stirring, and the mixture was pumped to a mixing chest, where agitation was continued. 404 litres of a 0.5% solution of anionic flocculant (“NALCO A626”) were pumped in, after which agitation was continued for a further 10 to 15 minutes before being stopped (or, in a repeat run, slowed down). 404 litres of a 0.75% solution of cationic flocculant (“NALCO 4634-SC”) were then added by means of a bucket (or, in a repeat run, pumped in). Full agitation was then resumed, and was continued for 10 to 15 minutes. 200 litres of a 25% aqueous talc dispersion were then added to counteract any tendency for polymeric deposits to form on the paper machine at a later stage. The mixture was then pumped to a header tank by means of a relatively low shear pump. The subsequent procedure was then generally as described in Example 1, except that the main furnish was blue rather than grey. The final paper was thus blue with white speckles.

[0037] In a further repeat run, 225 Kg of titanium dioxide were used, in order to achieve speckles of a different appearance.

Example 5

[0038] This illustrates the use of different anionic and cationic flocculants from those used in previous Examples.

[0039] 0.8 ml of 50% solids content styrene-acrylic latex (“ACRONAL S360D”) was added to 140 ml of 3% softwood pulp suspension, and the mixture was stirred rapidly (1300 rpm). 1.34 g of titanium dioxide were added and stirring was continued at the same speed for a
further 5 minutes. 5.5 ml of 0.5% high molecular weight medium anionic acrylamide copolymer flocculant ("POLYPLUS 430" supplied by Betz Limited of Winsford, Cheshire, Great Britain) were then added, and stirring was continued at 1300 rpm for a further 5 minutes. 5.5 ml of 0.75% moderate molecular weight high cationic charge density polyacrylamide flocculant emulsion ("POLYMER 1268L", also supplied by Betz Limited) were then added, and the mixture was stirred less rapidly (200 rpm) for 1 minute. 2.3 g of 30% aqueous talc suspension were then added and stirring was continued for one minute. Fibre/pigment agglomerates were seen to have formed, and these were incorporated into hand-sheets, generally as described in Example 2. The resulting sheet had a random pattern of elongate white speckles on a coloured background.

Claims

1. A process for the production of speckle- or similarly-patterned paper, said process comprising the steps of:-

   (1) preparing speckle-forming material by agglomerating a mixture of papermaking fibre, particulate pigment and a latex binder present in an amount of from 0 to 20% by weight, based on the weight of dry binder to weight of dry fibre in the mixture, by the addition of one or more polymeric flocculants;

   (2) introducing the resulting speckle-forming material into a papermaking furnish of which the fibres are of a contrasting colour to that of the speckle-forming material and on which dye, if present, has been fully fixed; and

   (3) draining the speckle-containing furnish to produce a patterned paper web.

2. A process as claimed in claim 1 wherein a combination of oppositely-charged polymeric flocculants are used to agglomerate said mixture.

3. A process as claimed in claim 2 wherein the speckle-forming material is produced by adding anionic flocculant to an aqueous mixed suspension of papermaking fibre and pigment, which preferably also contains a latex binder, and subsequently adding a cationic flocculant.

4. A process as claimed in claim 2 or claim 3 wherein anionic flocculant and cationic flocculant are each added in an amount of from 0.2% to 1.0% by weight, based on the dry weight of fibres in the speckle-forming mixture.

5. A process as claimed in any of claims 2 to 4, wherein anionic flocculant and cationic flocculant are each added in aqueous solutions of concentration 0.5% to 0.75% by weight.

6. A process as claimed in any of claims 3 to 5, wherein the papermaking fibre content of the aqueous suspension prior to the anionic flocculant addition is from 1.5% to 3% by weight.

7. A process as claimed in any preceding claim wherein the latex is a styrene-acrylic or styrene-butadiene latex.

8. A process as claimed in any preceding claim wherein latex is present in an amount of about 20% by weight, based on weight of dry latex to weight of dry fibre in the speckle-forming mixture.

9. A process as claimed in any preceding claim wherein the papermaking fibre in the speckle-forming mixture is a blend of hardwood and softwood fibre, of which softwood constitutes at least 30%, preferably around 50%, of the total weight of fibre in the blend.

10. A process as claimed in any preceding claim wherein the pigment in the speckle-forming mixture is titanium dioxide.

11. A process as claimed in any preceding claim wherein agglomerated speckle-forming material is introduced into the papermaking furnish at a level of about 10% to 20%, based on dry weight of speckles to dry weight of fibre and filler in the papermaking furnish.

12. A method for preparing speckle-forming material for use in the production of speckle-patterned paper by a process as claimed in claim 1, said method being as defined in step (1) of claim 1.

Patentansprüche

1. Verfahren zum Herstellen von gesprenkeltem oder ähnlich gemustertem Papier, wobei das Verfahren die Schritte umfasst:

   (1) Herstellen des sprenkelbildenden Materials durch Agglomerieren eines Gemisches aus Papierherstellungsmaterial, teilchenförmigem Pigment und einem Latexbindemittel, das in einer Menge von 0 bis 20 % bezüglich des Gewichts basierend auf dem Gewicht von trockenem Bindemittel zu trockener Faser in dem Gemisch, vorliegt, durch die Zugabe eines oder mehrerer polymerer Flokungsmittel zu dem Gemisch;
(2) Einbringen des resultierenden sprenkelbildenden Materials in einen Papierherstellungsfasersstoff dessen Fasern eine kontrastbildende Farbe zu dem des sprenkelbildenden Materials aufweisen und auf welchen Farbstoff, falls welcher vorliegt, vollständig fixiert worden ist; und

(3) Entwässern des sprenkelenthaltenden Fasersstoffs, um ein gemustertes Papierfasergerbe zu bilden.

2. Verfahren nach Anspruch 1, worin eine Kombination von entgegengesetzt geladenen polymeren Flockungsmitteln verwendet wird, um das Gemisch zu agglomerieren.


4. Verfahren nach Anspruch 2 oder 3, worin das anionische Flockungsmittel und das kationische Flockungsmittel jeweils in einer Menge von 0,2 % bis 1,0 % bezüglich des Gewichts basierend auf dem Trockengewicht der Fasern in dem sprenkelbildenden Gemisch zugegeben werden.

5. Verfahren nach einem der Ansprüche 2 bis 4, worin anionisches Flockungsmittel und kationisches Flockungsmittel jeweils in wässrigen Lösungen mit einer Konzentration von 0,5 % bis 0,75 % bezüglich des Gewichts zugegeben werden.

6. Verfahren nach einem der Ansprüche 3 bis 5, worin der Papierherstellungsfasergehalt der wässrigen Suspension vor der Zugabe von anionischem Flockungsmittel von 1,5 % bis 3 % bezüglich des Gewichts ist.


10. Verfahren nach einem der vorhergehenden Ansprüche, worin das Pigment in dem sprenkelbildenden Gemisch Titandioxid ist.


12. Verfahren zur Herstellung von sprenkelbildendem Material zur Verwendung bei der Herstellung von gesprenkeltem Papier durch ein Verfahren nach Anspruch 1, wobei das Verfahren wie in Schritt (1) von Anspruch 1 definiert ist

Revendications

1. Procédé pour la production de papier moucheté ou à motifs similaires, ledit procédé comprenant les étapes consistant à :

   (1) préparer le matériau formant des mouchettes en agglomérant un mélange de fibre à papier, un pigment particulier, et un liant de latex présent en une quantité de 0 à 20 % en poids, sur la base du poids de liant sec rapporté au poids de la fibre sèche dans le mélange, par l’addition au mélange d’un ou de plusieurs floculants polymériques ;

   (2) introduire le matériau résultant formant des mouchettes dans une couche fibreuse de fabrication de papier dont la couleur des fibres est d’une couleur contrastant par rapport à celle du matériau formant des mouchettes et sur laquelle un colorant, si présent, a été complètement fixé ;

   (3) drainer la couche fibreuse contenant des mouchettes pour produire un tissu de papier contenant un motif.

2. Procédé selon la revendication 1 dans lequel une combinaison de floculants polymériques de charges opposées est utilisée pour agglomérer ledit mélange.

3. Procédé selon la revendication 2 dans lequel le matériau formant des mouchettes est produit en ajoutant un floculant anionique à une suspension aqueuse mélangée de fibre de fabrication de papier et de pigment, qui contient aussi de préférence un liant de latex, et en ajoutant ensuite un floculant ca-
4. Procédé selon la revendication 2 ou la revendication 3 dans lequel le floculant anionique et le floculant cationique sont chacun ajoutés à quantité variable de 0,2 % à 1,0 % en poids, par rapport au poids sec de fibres dans le mélange formant des mouchetures.

5. Procédé selon l’une quelconque des revendications 2 à 4, dans lequel le floculant anionique et le floculant cationique sont chacun ajoutés en solutions aqueuses de concentration de 0,5 % à 0,75 % en poids.

6. Procédé selon l’une quelconque des revendications 3 à 5, dans lequel la teneur en fibres à fabriquer le papier de la suspension aqueuse avant l’addition de floculant anionique varie de 1,5 % à 3 % en poids.

7. Procédé selon l’une quelconque des revendications précédentes, dans lequel le latex est un latex styrene-acrylique ou styrene-butadiène.

8. Procédé selon l’une quelconque des revendications précédentes, dans lequel le latex est présent en une quantité d’environ 20 % en poids, sur la base du poids de latex sec rapporté au poids de fibres sèches dans le mélange formant les mouchetures.

9. Procédé selon l’une quelconque des revendications précédentes, dans lequel la fibre à papier dans le mélange formant les mouchetures est un mélange de fibres de bois dur et de bois tendre, dont le bois tendre constitue au moins 30 %, de préférence environ 50 %, du poids total de fibres dans le mélange.

10. Procédé selon l’une quelconque des revendications précédentes, dans lequel le pigment dans le mélange formant des mouchetures est du dioxyde de titane.

11. Procédé selon l’une quelconque des revendications précédentes, dans lequel un matériau aggloméré formant des mouchetures est introduit dans la fibre à papier à un niveau d’environ 10 % à 20 %, sur la base du poids sec des mouchetures rapporté au poids sec de fibres et de charge dans la fibre à papier.

12. Procédé de préparation de matériau formant des mouchetures à utiliser dans la production de papier à motif moucheté par un procédé tel que revendiqué à la revendication 1, ledit procédé étant tel que défini à l’étape (1) de la revendication 1.