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**Patent Management**

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(54) **Method for reducing negative effects of natural pitch contaminants in both pulping and papermaking operations**

(57) The instant invention relates to a method for inhibiting pitch deposition on pulping and papermaking equipment or machinery comprising adding to a pulp slurry containing pitch an effective amount of polymer dispersion comprising a component A and a component B, wherein component A being a homopolymer and/or copolymer of acrylic acid and/or its alkyl esters, or methacrylic acid and/or its alkyl esters, styrene and/or methylstyrene, vinyl acetate, itaconic acid, glycidyl methacrylate, 2-hydroxyalkyl (meth)acrylate, methacrylamide, N-

hydroxyethyl(meth)acrylamide, dimethacrylate monomers, 1,3-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, propylene glycol dimethacrylate, dipropylene glycol dimethacrylate, 4-methyl-1,4-pentanediol dimethacrylate, divinylbenzene and/or trivinylbenzene, and component B being an aqueous solution of a styrene copolymer with acrylic acid, maleimide and/or maleic anhydride.

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## Description

**[0001]** The invention relates to resin and pitch control agents, which are aqueous, non-film forming, polymer dispersions and to a process for preventing the deposition of pitch particles in cellulosic pulp suspensions, by use of such polymer dispersions.

**[0002]** Cellulosic pulps contain a considerable proportion of organosoluble matter which is generally referred to as resin or pitch. The resins are extracted from the wood during the pulping process and constitute a significant nuisance in cellulosic suspensions because the resin particles are sticky, tend to agglomerate and form adherent deposits on the pulping and papermaking machinery. The removal of water during papermaking is normally carried out using a type of fabric mesh, commonly referred to as machine wires or felts. Resin or pitch deposits clog and block the small openings in the fabrics inhibiting drainage and causing sheet defects, such as holes in the finished paper. Deposits which accumulate on the internal surfaces of pulp and backwater chests can suddenly be released and displayed as resin lumps in the paper sheet. Larger lumps can break the paper sheet in the machine, leading to loss of production.

**[0003]** For years there have already been products supplied as passivating agents for treating pulp contaminants such as resin or pitch. These dissolved products are intended to make the surface of the tacky impurities more hydrophilic and hence keep them more wettable, thereby reducing the affinity for hydrophobic surfaces. Hydrophobic surfaces are present on, for example, wires, felts and rollers; hydrophobizing is boosted further by coating, with sizing agent or defoamer, for example, thereby further promoting the attachment of pitch.

**[0004]** In certain cases, resins and pitch do not cause any problems in papermaking, if they do not agglomerate. To prevent agglomeration, various methods are known for chemically modifying the pitch particles that have remained in the stock stream and the adsorption thereof on support materials, such as machine wires.

**[0005]** In the context of these problems, the procedures below have been adopted in practice, but lead only to partial success.

**[0006]** On the one hand, dispersion may take place, with the aim of changing the charge on the pitch by means of anionic and nonionic dispersants. This forms colloidal, anionically charged or nonionic particles which counteract agglomeration and deposition. The wetting properties of the dispersant are very important in this case, since the pitch is hydrophobic.

**[0007]** Alternatively, according to the literature, the tack of the pitch can be reduced in the following ways:

- Fixing of the strongly anionic contaminants by means of strongly cationic fixatives (formation of what are called polyelectrolyte complexes; the reaction product then adsorbs on the anionic fiber).

- Absorption on pigments of high specific surface area (e.g., talc, modified clay, mica, smectite, bentonite), often with subsequent flocculation by means of polymers in order to bind separable macroflocs.

- Enveloping (masking) with nonionic hydrophilic polymers (polyvinyl alcohol) or zirconium compounds, more particularly zirconium acetate and ammonium zirconium carbonate.

**[0008]** Known strongly cationic fixatives include polyethyleneimine (PEI), polydiallyldimethylammonium chloride (polyDADMAC), polyvinylamine (PVAm), polyaluminum chloride (PAC), polyacrylamide (PAAM), polyamine, etc. The sphere of action of fixatives extends from about 1 nm to 50 micrometers in terms of the particle size of the pitch, depending on the nature and modification of the chemicals used.

**[0009]** Materials with a low surface energy (wires, felts, roller surfaces) exhibit a more hydrophobic behaviour and therefore possess a high affinity for hydrophobic compounds, such as resins and pitch, thereby resulting in contamination of the wires and hence to defects and/or reduction in the dewatering performance of felts.

**[0010]** Adsorbents used are, in particular, various types of talc with specific surface modifications and particle-size distribution, which on account of their hydrophobic and organophilic surface are capable of attaching to adhesive constituents and entraining them with the paper. Particles of adhesive encapsulated in this way have less of a tendency to deposit on hot machinery parts.

**[0011]** Protein solutions are also employed as agents for masking sticky impurities.

**[0012]** The pitch agglomerates tend to deposit on machinery parts, wires, cloths, drying cylinders, and this consequently leads to marks, holes, and instances of web sticking, and consequently to breakages in the wet section and drying section in the course of winding and rewinding or in the course of printing.

**[0013]** 2009DE002 by Clariant discloses a method for reducing negative effects of adhesive synthetic contaminants in systems of substances comprising waste paper. In waste paper the main problem are the pitch agglomerates (stickies) which lead to a deposit on the machinery parts.

**[0014]** In contrary in the process for producing cellulosic pulp suspensions the negative effects are caused by natural pitch contaminants in both pulping and papermaking operations. These contaminants tend to deposit during the production on the cellulosic material and lead to ugly black spots.

**[0015]** In order to prevent resin deposits talc has been known in the prior art to prevent and control pitch deposits. Using talc to control pitch deposits, however, has certain disadvantages. For instance, the system is highly sensitive to shear. Talc, moreover, has poor retention properties and frequently causes clogging of the felts.

Talc may adversely affect resin sizing, and stabilizes foam. The two inorganic products, talc and bentonite, require laborious dispersion.

**[0016]** There continues to be a need for improvement in reducing the tackiness of natural pitch and resin particles.

**[0017]** Surprisingly, the tackiness of pitch can be reduced considerably through the use of specific polymer dispersions.

**[0018]** The invention provides an aqueous polymer dispersion and the use thereof in a method for reducing sticky contaminants in the processing of wood pulp and in the papermaking procedure, which involves adding an aqueous polymer dispersion comprising a component A and a component B for passivating and detackifying the pitch particles, component A being a homopolymer and/or copolymer of acrylic acid and/or its alkyl esters, more particularly its methyl, ethyl, butyl, isobutyl, propyl, octyl, decyl, 2-ethylhexyl esters;

or methacrylic acid and/or its alkyl esters, more particularly its methyl, ethyl, butyl, isobutyl, propyl, octyl, decyl, 2-ethylhexyl esters;

styrene and/or methylstyrene;

vinyl acetate;

itaconic acid;

glycidyl methacrylate;

2-hydroxyalkyl (meth) acrylate;

methacrylamide;

N-hydroxyethyl (meth) acrylamide

dimethacrylate monomers, such as, for example, 1, 4-butylene glycol dimethacrylate, 1, 3-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, propylene glycol dimethacrylate, dipropylene glycol dimethacrylate, 4-methyl-1, 4-pentanediol dimethacrylate;

divinylbenzene and/or trivinylbenzene

and component B being an aqueous solution of a styrene copolymer with acrylic acid, maleimide and/or maleic anhydride.

**[0019]** Component A is a hydrophobic homopolymer and/or copolymer of the above-stated monomers having a very high glass transition temperature or softening temperature ( $T_g$ ), preferably methyl methacrylate or styrene. The glass transition temperature of A is preferably above 70°C, more particularly above 90°C, very preferably above 100°C.

**[0020]** Component B is a styrene copolymer with (meth)acrylic acid, maleimide and/or maleic anhydride. Component B is preferably a copolymer of styrene and acrylic acid. Component B preferably has a molecular weight of between 3000 g/mol and 15 000 g/mol, more particularly 3000 and 7000 g/mol.

**[0021]** Particularly preferred is an aqueous dispersion with particle sizes of less than 150 nm, preferably less than 120 nm.

**[0022]** The aqueous polymer dispersion may be applied in combination with calcium and/or magnesium salts, often naturally occurring in the processing water.

Hardness salts insolubilise component B, leading to the de-stabilisation of the tiny emulsion particles. The agglomerated emulsion particles are now more hydrophobic and associate readily and preferentially with any pitch particles in the pulp. The harder emulsion particles reduce the tackiness of the pitch and increase the softening temperature. Hard agglomerates show much less tendency to deposit on machinery.

**[0023]** Where water hardness levels are very low, there may not be sufficient electrolyte to initiate de-stabilisation of the emulsion particles. The aqueous polymer dispersion may therefore be optionally applied in combination with component C, a cationic fixative, which promotes coagulation of the emulsion particles in the cellulosic fibre slurry. Component C is preferably selected from the following group: polyethyleneimine (PEI), polydiallyldimethylammonium chloride (polyDADMAC), polyvinylamine (PVAm), polyaluminum chloride (PAC), zirconium salts, polyacrylamide (PAAM), polyamine and polyamideamine.

**[0024]** In order to boost the efficiency of the polymer dispersion of the invention and its stability, it is further possible to add a further component D optionally in the form of a surfactant.

**[0025]** Further to components A, B, and/or D, the polymer dispersion comprises water (component E).

**[0026]** In one preferred embodiment the aqueous dispersion comprises

2 % to 50 %, preferably 5 % to 30 % of component A, 1 % to 30 %, preferably 3 % to 10 % of component B, 0 % to 0.3 %, preferably 0 % to 0.2 % of component D, and 96 % to 17.7 %, preferably 90 % to 45 % of water (component E).

**[0027]** All percentages here relate to % by weight.

**[0028]** In the presence of  $\text{Ca}^{2+}$ , the aqueous dispersion constitutes a self-coagulating nanodispersion. The polymer dispersion of the invention attaches to the hydrophobic sticky particles, incorporating them into the precipitating polymer dispersion and thus detackifying them.

Examples:

Example 1 (version with methyl methacrylate)

**[0029]** A 2 l reactor with stirrer and reflux condenser was charged with 739.5 g of deionized water and 419.3 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0030]** Feed stream I:

384.8 g of methyl methacrylate

**[0031]** Feed stream II:

1.9 g of ammonium peroxodisulfate

136.3 g of deionized water

**[0032]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318.2 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0033]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 24.1 \%$$

$$D = 53 \text{ nm}$$

Example 2 (version with methyl methacrylate + crosslinker)

**[0034]** A 2 l reactor with stirrer and reflux condenser was charged with 739.5 g of deionized water and 419.3 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0035]** Feed stream I:

370.9 g of methyl methacrylate  
19.5 g of glycidyl methacrylate

**[0036]** Feed stream II:

1.9 g of ammonium peroxodisulfate  
136.3 g of deionized water

**[0037]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318.2 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0038]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 24.9 \%$$

$$D = 40 \text{ nm}$$

Example 3 (version with methyl methacrylate + second crosslinker)

**[0039]** A 2 l reactor with stirrer and reflux condenser was charged with 740 g of deionized water and 419 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0040]** Feed stream I:

370 g of methyl methacrylate  
19 g of ethylene glycol dimethacrylate

**[0041]** Feed stream II:

2 g of ammonium peroxodisulfate  
136 g of deionized water

**[0042]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0043]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 25 \%$$

$$D = 40 \text{ nm}$$

Example 4 (version with styrene)

**[0044]** A 2 l reactor with stirrer and reflux condenser was charged with 739.5 g of deionized water and 419.3 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0045]** Feed stream I:

384.8 g of styrene

**[0046]** Feed stream II:

1.9 g of ammonium peroxodisulfate  
136.3 g of deionized water

**[0047]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318.2 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0048]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 24.5 \%$$

$$D = 61 \text{ nm}$$

Example 5 (version with colloid + surfactant)

**[0049]** A 2 l reactor with stirrer and reflux condenser was charged with 1111 g of deionized water, 310 g of 25 % strength solution of styrene-acrylic acid copolymer, and 3 grams of lauryl sulfate, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0050]** Feed stream I:

387 g of methyl methacrylate

**[0051]** Feed stream II:

2 g of ammonium peroxodisulfate  
88 g of deionized water

**[0052]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 80 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0053]** The characterization of the copolymer obtained,

in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 24 \%$$

$$D = 50 \text{ nm}$$

Example 6 (styrene-methyl acrylate copolymer)

**[0054]** A 2 l reactor with stirrer and reflux condenser was charged with 739.5 g of deionized water and 420 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0055]** Feed stream I:

193 g of styrene  
193 g of methyl methacrylate

**[0056]** Feed stream II:

2 g of ammonium peroxodisulfate  
136 g of deionized water

**[0057]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318.2 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0058]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 30.0 \%$$

$$D = 70 \text{ nm}$$

Example 7 (styrene-maleic anhydride as component B)

**[0059]** A 2 l reactor with stirrer and reflux condenser was charged with 400 g of deionized water and 750 g of 14 % strength solution of styrene-maleic anhydride copolymer, this initial charge then being heated to 85 °C

with stirring under a nitrogen atmosphere.

**[0060]** Feed stream I:

390 g of methyl methacrylate

**[0061]** Feed stream II:

2 g of ammonium peroxodisulfate

130 g of deionized water

**[0062]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 318.2 g of deionized water. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0063]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 29.6 \%$$

$$D = 70 \text{ nm}$$

Example 8 (high colloid fraction)

**[0064]** A 2 l reactor with stirrer and reflux condenser was charged with 21.1 g of deionized water and 750 g of 25 % strength solution of styrene-acrylic acid copolymer, this initial charge then being heated to 85 °C with stirring under a nitrogen atmosphere.

**[0065]** Feed stream I:

390 g of methyl methacrylate

**[0066]** Feed stream II:

2 g of ammonium peroxodisulfate

130 g of deionized water

**[0067]** When an internal temperature of 85 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 3 h 30, with stirring and retention of the reaction temperature. The pumps were flushed with 80 g of deionized water. After the end of both feed streams, the mixture was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0068]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 44 \%$$

$$D = 80 \text{ nm}$$

Example 9 (styrene-acrylic acid copolymer with Tg of about 30 °C)

**[0069]** A 2 l reactor with stirrer and reflux condenser was charged with 433 g of deionized water, and 3 grams of lauryl sulfate (30 % strength solution), this initial charge then being heated to 80 °C with stirring under a nitrogen atmosphere.

**[0070]** Feed stream I:

5 g of ammonium peroxodisulfate

62 g of deionized water

**[0071]** Feed stream II:

400 g of styrene,

260 g of butyl acrylate,

10 g of methacrylic acid,

11 g of surfactant solution (lauryl sulfate, 30 %),

384 g of deionized water

**[0072]** When an internal temperature of 80 °C had been reached, feed stream I and feed stream II were metered continuously into the polymerization batch via two separate feeds, beginning simultaneously, over a period of 4 h, with stirring and retention of the reaction temperature. The pumps were flushed with 235 g of deionized water. After the end of both feed streams, the system was left to after react at the reaction temperature for a further 25 minutes. After that, the reaction mixture was cooled to room temperature and filtered on a filter having a mesh size of 160 µm.

**[0073]** The characterization of the copolymer obtained, in terms of solids content (SC) and average particle size (D), is given below:

$$SC = 37 \%$$

$$D = 185 \text{ nm}$$

$$T_g = 30\text{ }^{\circ}\text{C}$$

## Claims

1. A method for inhibiting pitch deposition on pulping and papermaking equipment or machinery comprising adding to a pulp slurry containing pitch an effective amount of polymer dispersion comprising a component A and a component B, wherein component A being a homopolymer and/or copolymer of acrylic acid and/or its alkyl esters, or methacrylic acid and/or its alkyl esters, styrene and/or methylstyrene, vinyl acetate, itaconic acid, glycidyl methacrylate, 2-hydroxyalkyl (meth)acrylate, methacrylamide, N-hydroxyethyl(meth)acrylamide, dimethacrylate monomers, 1,3-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, propylene glycol dimethacrylate, dipropylene glycol dimethacrylate, 4-methyl-1,4-pentanediol dimethacrylate, divinylbenzene and/or trivinylbenzene, and component B being an aqueous solution of a styrene copolymer with acrylic acid, maleimide and/or maleic anhydride.
2. The method as claimed in claim 1, wherein component A possesses a glass transition temperature > 90 °C.
3. The method as claimed in at least one of the preceding claims, wherein component B possesses a molecular weight in the range from 3000 to 15 000 g/mol, preferably 3000 to 7000 g/mol.
4. The method as claimed in at least one of the preceding claims, wherein the aqueous polymer dispersion is applied in combination with calcium and or magnesium salts, often naturally occurring in the processing water, or component C, a cationic fixative, any of which promote the coagulation of the aqueous emulsion particles.
5. The method as claimed in claim 4, wherein component C is selected from the following group: polyethyleneimine (PEI), polydiallyldimethylammonium chloride (polyDADMAC), polyvinylamine (PVAm), polyaluminum chloride (PAC), zirconium salts, polyacrylamide (PAAM), polyamine and polyamideamine.
6. The method as claimed in at least one of the preceding claims, wherein the aqueous polymer dispersion further comprises a component D in the form of a surfactant.
7. The method as claimed in any of the preceding
8. An aqueous polymer dispersion for coagulating and detackifying pitch in the processing of wood pulp or during the papermaking procedure, comprising a component A selected from a homopolymer and/or copolymer of the following group: acrylic acid and/or its alkyl esters, or methacrylic acid and/or its alkyl esters, styrene and/or methylstyrene, vinyl acetate, itaconic acid, glycidyl methacrylate, 2-hydroxyalkyl (meth)acrylate, methacrylamide, N-hydroxyethyl (meth)acrylamide, dimethacrylate monomers, 1,3-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, propylene glycol dimethacrylate, dipropylene glycol dimethacrylate, 4-methyl-1,4-pentanediol dimethacrylate, divinylbenzene and/or trivinylbenzene, and component B, which is an aqueous solution of a styrene copolymer with acrylic acid, maleimide and/or maleic anhydride.
9. The aqueous polymer dispersion as claimed in claim 8, wherein the dispersion is applied in combination with calcium and or magnesium salts, often naturally occurring in the processing water, or component C, a cationic fixative, selected from the following group: polyethyleneimine (PEI), polydiallyldimethylammonium chloride (polyDADMAC), polyvinylamine (PVAm), polyaluminum chloride (PAC), zirconium salts, polyacrylamide (PAAM), polyamine and polyamideamine.
10. The aqueous polymer dispersion as claimed in claim 8 and/or 9, wherein the dispersion comprises a further component D in the form of a surfactant.
11. The aqueous polymer dispersion as claimed in at least one of claims 8 to 10, which comprises 2 % to 50 %, preferably 5 % to 30 % of component A, 1 % to 30 %, preferably 3 % to 10 % of component B, 100 to 400 ppm calcium and/or magnesium carbonate (water hardness) 0 % to 2 % of component C, 0 % to 0.3 %, preferably 0 % to 0.2 % of component D, and 96 % to 17.7 %, preferably 90 % to 45 % of water (component E).
12. The use of an aqueous polymer dispersion comprising a component A and a component B, component A being a homopolymer and/or copolymer of methyl methacrylate, acrylate and/or styrene and component B being an aqueous solution of styrene copolymer with acrylic acid, maleimide and/or maleic anhydride, for coagulating and detackifying pitch particles in the processing of pulp and paper.

13. The use as claimed in claim 12, the polymer dispersion is further combined with calcium and/or magnesium salts or the natural water hardness in the pulp and/or papermaking process water or component C, a cationic fixative. 5
14. The use as claimed in claim 12, whereby the amount of aqueous dispersion applied to the cellulosic pulp slurry is preferably 0.05 to 0.5 %, more preferably 0.1 to 0.2 %, based on the dry weight of the cellulose. 10

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## EUROPEAN SEARCH REPORT

Application Number  
EP 12 00 1801

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                             |                                                   |                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                               | Relevant to claim                                 | CLASSIFICATION OF THE APPLICATION (IPC)         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WO 2011/015297 A1 (CLARIANT INT LTD [CH]; KOHLER ACHIM [DE]; COWMAN JOHN [GB]; CORPET DAN) 10 February 2011 (2011-02-10)<br>* claims 1-13 * | 1-14                                              | INV.<br>D21C9/08<br>D21H21/02                   |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WO 98/05819 A1 (ASHLAND INC [US])<br>12 February 1998 (1998-02-12)<br>* the whole document *                                                | 1-14                                              |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2006/048908 A1 (WANG XIANG [US] ET AL)<br>9 March 2006 (2006-03-09)<br>* the whole document *                                            | 1-14                                              |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 6 150 452 A (LING TIEN-FENG [US] ET AL)<br>21 November 2000 (2000-11-21)<br>* the whole document *                                       | 1-14                                              |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2011/094695 A1 (JIANG CHENGLIANG [US] ET AL) 28 April 2011 (2011-04-28)<br>* the whole document *                                        | 1-14                                              |                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2004/226676 A1 (SONG ZHIQIANG [US] ET AL) 18 November 2004 (2004-11-18)<br>* the whole document *                                        | 1-14                                              | TECHNICAL FIELDS SEARCHED (IPC)<br>D21C<br>D21H |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WO 01/25535 A1 (HERCULES INC [US])<br>12 April 2001 (2001-04-12)<br>* the whole document *                                                  | 1-14                                              |                                                 |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                             |                                                   |                                                 |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                             | Date of completion of the search<br>2 August 2012 | Examiner<br>Karlsson, Lennart                   |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                             |                                                   |                                                 |

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 00 1801

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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02-08-2012

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| WO 2011015297 A1                          | 10-02-2011          | EP 2462278 A1              | 13-06-2012          |
|                                           |                     | US 2012186761 A1           | 26-07-2012          |
|                                           |                     | WO 2011015297 A1           | 10-02-2011          |
| -----                                     | -----               | -----                      | -----               |
| WO 9805819 A1                             | 12-02-1998          | AU 716411 B2               | 24-02-2000          |
|                                           |                     | AU 4047197 A               | 25-02-1998          |
|                                           |                     | CA 2262953 A1              | 12-02-1998          |
|                                           |                     | EP 0929717 A1              | 21-07-1999          |
|                                           |                     | JP 2000515591 A            | 21-11-2000          |
|                                           |                     | US 7052579 B1              | 30-05-2006          |
|                                           |                     | WO 9805819 A1              | 12-02-1998          |
| -----                                     | -----               | -----                      | -----               |
| US 2006048908 A1                          | 09-03-2006          | CA 2579510 A1              | 16-03-2006          |
|                                           |                     | EP 1802806 A1              | 04-07-2007          |
|                                           |                     | US 2006048908 A1           | 09-03-2006          |
|                                           |                     | WO 2006029404 A1           | 16-03-2006          |
| -----                                     | -----               | -----                      | -----               |
| US 6150452 A                              | 21-11-2000          | AU 6563798 A               | 21-12-1998          |
|                                           |                     | CA 2293312 A1              | 10-12-1998          |
|                                           |                     | EP 0986670 A1              | 22-03-2000          |
|                                           |                     | JP 2002513450 A            | 08-05-2002          |
|                                           |                     | NO 995958 A                | 04-02-2000          |
|                                           |                     | US 5936024 A               | 10-08-1999          |
|                                           |                     | US 6150452 A               | 21-11-2000          |
|                                           |                     | WO 9855692 A1              | 10-12-1998          |
|                                           |                     | ZA 9801600 A               | 31-08-1998          |
| -----                                     | -----               | -----                      | -----               |
| US 2011094695 A1                          | 28-04-2011          | NONE                       |                     |
| -----                                     | -----               | -----                      | -----               |
| US 2004226676 A1                          | 18-11-2004          | AT 352659 T                | 15-02-2007          |
|                                           |                     | AU 2004238948 A1           | 25-11-2004          |
|                                           |                     | BR PI0410301 A             | 23-05-2006          |
|                                           |                     | CA 2524205 A1              | 25-11-2004          |
|                                           |                     | CN 1788119 A               | 14-06-2006          |
|                                           |                     | DE 602004004527 T2         | 22-11-2007          |
|                                           |                     | EP 1623067 A1              | 08-02-2006          |
|                                           |                     | ES 2280028 T3              | 01-09-2007          |
|                                           |                     | JP 4584929 B2              | 24-11-2010          |
|                                           |                     | JP 2007500290 A            | 11-01-2007          |
|                                           |                     | KR 20060011866 A           | 03-02-2006          |
|                                           |                     | MX PA05012092 A            | 08-02-2006          |
|                                           |                     | NZ 543245 A                | 31-07-2008          |
|                                           |                     | PT 1623067 E               | 30-03-2007          |
|                                           |                     | RU 2347865 C2              | 27-02-2009          |
|                                           |                     | US 2004226676 A1           | 18-11-2004          |
|                                           |                     | WO 2004101882 A1           | 25-11-2004          |

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 00 1801

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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02-08-2012

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
|                                           |                     | ZA 200508431 A             | 31-01-2007          |
| -----                                     | -----               | -----                      | -----               |
| WO 0125535 A1                             | 12-04-2001          | AU 7723600 A               | 10-05-2001          |
|                                           |                     | WO 0125535 A1              | 12-04-2001          |
| -----                                     | -----               | -----                      | -----               |