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(54) Title: PROCESS FOR THE MANUFACTURE OF A MOTTLED FIBRE PACKAGING

(57) Abstract: The present invention relates to a process for the manufacture of a mottled fibre packaging, wherein: (a) a first coloured paper pulp is mixed at a dosage rate of 1.0 - 10.0 wt.% on dry fibre weight with a second paper pulp to form a coloured papermaking stock; and (b) moulding the coloured papermaking stock to the mottled packaging material. The process according to the invention provides fibre packaging materials, in particular to egg boxes, having a mottled appearance.



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Process for the manufacture of a mottled fibre packaging

Field of the invention

5 The present invention relates to a process for the manufacture of fibre packaging materials, in particular to egg boxes, wherein the fibre packaging materials have been coloured in such a way that they show a mottling effect.

Background of the invention

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 Usually, fibre packaging materials such as egg boxes and fibre trays are uniform in colour. However, such fibre packaging materials are less appealing to the customer. Although the packaging materials could be provided with different colours by employing printing techniques, such techniques are generally much too expensive.
15 Consequently, there is a need within the art for a cheap and uncomplicated process for the manufacture of coloured fibre packaging materials.

 US 6,096,167 discloses a process for the manufacture of coloured fibre material containing a certain portion of fibre material, wherein the coloured fibre material may have a complete and uniform coloured appearance or a mottled coloured appearance. If
20 a mottled appearance is desired, a dyestuff is applied onto a part of sheet pulp, whereupon the sheet pulp is dispersed in a liquid or foam. Subsequently, the fibre dispersion is applied onto a wire, dewatered and dried. Optionally, the sheet pulp is mixed with other fibres, e.g. synthetic fibres, vegetable fibres, regenerated cellulose fibres or pulp fibres originating from the original paper stock. Example 1 discloses a
25 process for the preparation of a mottled paper sheet consisting of about 88 wt.% white pulp fibres and about 12 wt.% coloured pulp fibres. The coloured fibres were prepared by applying a dyestuff solution on about 12% of the width of the pulp web which corresponds to a dose rate of about 0.3 wt.% of dyestuff relative to the total amount of fibres that were coloured. However, the method according to US 6,109,167 has several
30 disadvantages. First of all, a special membrane pump located in close proximity of the paper web must be used to apply the dyestuff solution to only a part of the pulp web. Additionally, the process produces highly coloured process water ("backwater") due to

a lack of adherence of the dyestuff to the fibres which requires additional expensive purification treatments.

US 6.319.360 discloses a process for the manufacture of a two-colour mottle effect patterned paper, wherein a first papermaking stock is coloured by adding a dye formulation thereby providing a first coloured papermaking stock. Subsequently, the first coloured papermaking stock is made into a dyed paper web, where after a second coloured papermaking stock having a colour different from the first papermaking stock is added to the web. Finally, the web is dried. Also this process produces highly coloured process water which requires additional purification.

WO 94/29526 discloses a method for the manufacture of articles having a flecked appearance from a pulp prepared from cellulose fibre raw material. According to this method, an amount of 5 – 25 % (calculated on the total final pulp) of flakelets of a paper material, the fibre structure thereof being partially bare, is added to and incorporated in a pulp prepared from the cellulose fibre material, wherein the flakelets are said to preserve their integrity, i.e. their size and/or shape and/or colour, and wherein the flakelets and the pulp have a contrasting colour. In a subsequent step, a layer of the pulp is deposited on a shaping surface by suction-moulding. Finally, the layer is removed and dried to obtain the article. It is further preferred that that the flakelets are added relatively late, i.e. shortly before the article is suction-moulded onto the shaped surface. Although the size of the flakelets is not disclosed, they have supposedly a greater size than individual fibres of a pulp. Consequently, the method disclosed in WO 94/29526 is unlikely to provide a mottled article. This is also supported by the fact that WO 94/29526 does not disclose the time during which the flakelets and the pulp are mixed. Apparently, the mixing time is not essential as the flakelets are said to retain their integrity which implies that they are relatively large so that an article having relatively large specks is formed.

WO 2004/106633 discloses a method for preparing a moulded pulp packaging material comprising subjecting a mixture comprising a paper furnish, a colouring agent and a cationic colouring agent fixing additive to a pulp moulding process. Typically, the packaging material is uniformly coloured as appears *inter alia* from Example 1 and has no mottled appearance.

Summary of the invention

It is an object of the invention to provide a process for the manufacture of mottled fibre packaging or mottled fibre packaging materials which process does not suffer from deleterious backwater problems.

The present invention therefore relates to a process for the manufacture of a mottled fibre packaging, wherein:

- (a) a first coloured paper pulp is mixed at a dosage rate of 1.0 – 10.0 wt.% on dry fibre weight with a second paper pulp to form a coloured papermaking stock, wherein the first coloured paper pulp is mixed with the dry strength agent for a period not longer than one minute; and
- (b) moulding the coloured papermaking stock to the mottled packaging material.

Detailed description of the invention

It is preferred that the first coloured paper pulp is mixed at a dosage rate of 2.0 – 8.0 wt.% on dry fibre weight, that is that 2.0 – 8.0 wt.% of coloured fibre is mixed with respect to the total amount of fibre.

Preferably, the first coloured paper pulp and the second paper pulp are not mixed for prolonged period as otherwise too uniformly coloured papermaking stocks are obtained. Accordingly, it is preferred that the first coloured paper pulp and the second paper pulp are mixed for up to one minute, preferably up to 30 seconds.

It is also preferred that the first coloured paper pulp comprises 0.1 to 5.0 wt.% of coloured fibres, based on the total weight of the coloured paper pulp. More preferably, the first coloured paper pulp comprises 0.5 to 3.0 wt.% of coloured fibres.

Advantageously, especially to provide serious backwater problems, the first coloured paper pulp is mixed with 0.1 to 5.0 wt.%, more preferably 0.5 to 4.0 wt.%, of dry strength agent, based on the total weight of the coloured paper pulp. Additionally, it is preferred that the first paper pulp is mixed with the dry strength agent for no longer than one minute, preferably no longer than 30 seconds.

According to the present invention, the first coloured paper pulp is prepared from a papermaking stock comprising fibres from recycled paper that preferably comprises de-inked paper.

It is preferred that the dry strength agent comprises a polyacrylamide. Preferably, the polyacrylamide are of medium number average molecular weight, i.e. that the polyacrylamide have an apparent viscosity (Broomfield RVT, ISO 2555; solids content 15 wt.%; aqueous composition) in the range of 500 – 15.000 mPa.s, preferably in the range of 1000 – 10.000 mPa.s. The polyacrylamide may be anionic or cationic.

Cationic polyacrylamides are to be understood as copolymers of acrylamide and, preferably from 10 to 90% by weight, a cationic ethylenically unsaturated monomer. Cationic monomers are, for example, esters of amino alcohols and C₃₋₅ ethylenically unsaturated carboxylic acids, amides of said carboxylic acids derived from diamines, N-vinylimidazole and vinylpyridine. Specific examples of cationic monomers are dimethylaminoethyl acrylate, diethylaminoethyl acrylate, dimethylaminoethyl methacrylate, dibutylaminoethyl methacrylate, dimethylaminomethyl acrylate, dimethylaminomethyl methacrylate, diethylaminopropyl acrylate and diethylaminopropyl methacrylate. The said monomers may be copolymerized with acrylamide in neutralized or quaternised form by methods well known in the art.

Anionic polyacrylamides are to be understood as copolymers of acrylamide and, preferably from 10 to 90% by weight, an anionic ethylenically unsaturated monomer. Anionic comonomers are, for example, C₃₋₅ ethylenically unsaturated carboxylic acids, for example acrylic acid, methacrylic acid, and dicarboxylic acids such as maleic acid and fumaric acid, acrylamidopropanesulfonic acid, vinylsulfonic acid, vinylactic acid, half-esters of ethylenically unsaturated dicarboxylic acids and the alkali metal and/or ammonium salts of said carboxylic acids.

Suitable polyacrylamides are Luredur® and Baystrength®, both manufactured by BASF.

Most preferably, however, the polyacrylamide is a cationic polyacrylamide. It has been found that anionic polyacrylamides have a high affinity for dyestuffs and that their use gives rise to enhanced backwater problems.

The second paper pulp may be uncoloured, that is that it is essentially white. Alternatively, the second paper pulp may be coloured, obviously provided that it has a colour different from the colour of the first coloured paper pulp.

According to the present invention, wherein the first coloured paper pulp is manufactured by addition of a pigment to a papermaking stock in the presence of a binding agent. In case the second paper pulp is coloured as well, it can be prepared by the same method. Preferably, the pigment or dyestuff is a colourfast pigment. Suitable pigments or dyestuffs are Fastusol P Blue FN, Basazol C Yellow 50L, Basazol Red 44LC and Basazol Red 72 L from BASF.

The binding agent employed in the manufacturing process of the first coloured paper pulp preferably comprises an aqueous composition comprising aluminium sulphate, preferably in an amount of 25 to 80 wt.% aluminium sulphate, based on the total weight of the binding agent. The binding agent preferably also comprises aluminium oxide, preferably in an amount of 1.0 to 15.wt.%, based on the total weight of the binder. The remainder of the binder may comprise various amounts of other materials. A suitable binder is an aqueous aluminium sulphate composition that is available from Eka Chemicals.

The present invention is not limited to particular mottled fibre packagings or packaging materials. However, the process according to the present invention appears to very useful for the manufacture of egg boxes having a mottled appearance.

Examples

Example 1

About 10 kg Greenfield P & w quality paper was used as stock which was pulped during about 10 minutes in about 100 l. of water. Subsequently, about 3 kg of aqueous aluminium sulphate composition (45 – 47 wt.% aluminium sulphate) was added. After two to three minutes of further pulping, 3 litre Fastuzol Blue FN was added and pulping was continued for an additional two minutes. Fixation of the pigment was checked and if fixation was insufficient, another amount of 1 kg aqueous aluminium sulphate composition was added. In a next step, approximately 5 litre PAA KE 2025 (cationic polyacrylamide) was added and mixing was continued for approximately 30 seconds under low shear conditions. The overfloculated deep blue coloured fibres were mixed with a white furnish that was coloured with a yellow pigment (Basazol Yellow 47L) as a dose rate of about 5 wt.%. The papermaking stock was fed to a molding machine for

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the manufacturing of egg boxes which all show a nice and uniform mottling appearance. The backwater was only moderately coloured.

Example 2

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Example 1 was repeated, although the polyacrylamide used was an anionic polymer. The backwater was highly coloured.

Claims

1. A process for the manufacture of a mottled fibre packaging, wherein:
 - (a) a first coloured paper pulp is mixed at a dosage rate of 1.0 – 10.0 wt.% on
5 dry fibre weight with a second paper pulp to form a coloured papermaking stock, wherein the first coloured paper pulp is mixed with the dry strength agent for a period not longer than one minute; and
 - (b) moulding the coloured papermaking stock to the mottled packaging material.
- 10 2. Process according to Claim 1, wherein the first coloured paper pulp comprises 0.1 to 5.0 wt.% of coloured fibres, based on the total weight of the coloured paper pulp.
3. Process according to Claim 1 or Claim 2, wherein the first coloured paper pulp is mixed with 0.1 to 5.0 wt.% of dry strength agent, based on the total weight of the
15 coloured paper pulp.
4. Process according to any one of Claims 1 – 3, wherein the first coloured paper pulp is prepared from a papermaking stock comprising fibres from recycled paper.
5. Process according to Claim 4, wherein the recycled paper comprises de-inked
20 paper.
6. Process according to any one of Claims 1 – 5, wherein the dry strength agent comprises a polyacrylamide.
7. Process according to Claim 6, wherein the polyacrylamide is a cationic polyacrylamide.
- 25 8. Process according to any one of Claims 1 – 7, wherein the second paper pulp has a colour different from the colour of the first coloured paper pulp.
9. Process according to any one of Claims 1 – 8, wherein the coloured paper pulp is manufactured by addition of a pigment to a papermaking stock in the presence of a binding agent.
- 30 10. Process according to Claim 9, wherein the pigment is a colourfast pigment.
11. Process according to Claim 9 or Claim 11, wherein the binding agent comprises aluminium sulphate.

12. Process according to any one of Claims 1 - 11, wherein the mottled fibre packaging is an egg box.
13. A mottled fibre packaging obtainable by the process according to any one of Claims 1 - 12.