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(54) Title: WATER DISPERSIBLE COMPOSITION FOR TREATING PAPER

(57) Abstract: A water-dispersible composition consisting of the components (A) to (B), in the following weight (wt) percentages comprising one or more compounds selected from the group consisting of: (A) 20 to 90 wt % of styrene butadiene latex (SBR), styrene acrylate latex and ethylene acrylate latex, (B) 10 to 80 wt % of spherical solid / hollow micro glass beads.

WO 2006/111184 A1

## WATER DISPERSIBLE COMPOSITION FOR TREATING PAPER

### Field of the invention

5 The present invention relates to a water-dispersible composition, which when applied to paper, or cardboard gives a low permeability for grease, gas, moisture and has no tacky, sticky or abrasive behaviour with a high solid content and a low viscosity and no dilatant behaviour (in high shear area) made using the foregoing composition.

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### Background of the invention

Recently, from the standpoint of saving resources, a demand of collecting used paper and regenerating papers again after dissolving the papers in water has  
15 been increased.

It is required for the papers meeting the demand to have a so-called easily macerating property, that is, when the paper is dissolved in water the paper is easily macerated into fine fibrous forms.

A composition for making an easily macerating moisture proof paper is known  
20 from WO- A.2004/022647.

The composition is based upon a mixture of polyvinyl butyral, styrene maleic imide and ethylene acrylate and possibly other components. As such satisfactory results have been obtained, but the use of polyvinyl butyral offers a number of disadvantages. As such this product is difficult to produce and  
25 always contains residue of solvent, which can lead to unwanted effects in the paper to be coated with the final composition. Furthermore polyvinyl butyral is difficult to bring into a suspension and depending upon the pH-value the emulsion may be unstable. Normally the pH should be at least 9. When lower pH-values are to be used polyvinyl butyral must be dispersed and therefore a  
30 solvent must be used.

Also a composition like this gives a high Tack (sticky behaviour) when coated (or treated by size or film press) on the paper. These compositions have also a low solid content with a high viscosity.

### Summary of the invention

The object of the present invention is to provide a composition, for making a water repellent paper with a low permeability for grease and moisture vapour, consisting of the components (A) to (B), in the following weight (wt) percentages comprising one or more compounds selected from the group consisting of :

- (A) 20-90 wt % styrene butadiene latex (SBR),  
styrene acrylate latex and ethylene acrylate latex
- (B) 10-80 wt % spherical solid / hollow micro glass beads.

### Detailed description of the invention

The present invention is described in detail below. The aqueous emulsion of the present invention contains the components (A), and (B) described above as the essential components.

Component (A) is 20 to 90 % by weight of SBR. If the content of the SBR in the composition of the present invention is below 20 wt %; the paper obtained with such emulsion has poor grease repulsive properties and a too high moisture permeability. A composition with more than 90 wt % of SBR has a too high tack (sticky behaviour).

A preferred composition comprises 20 to 90 wt % SBR. Paper treated with a composition according to the invention comprising less than 32 wt % of SBR can be macerated with a home mixer using a low mixing speed while a paper casted from a thus obtained pulp exhibits no sticky and agglomerated particles. Paper treated with a composition comprising at least 28 wt % of the SBR turned out to have an excellent resistance against penetration of solvents.

SBR generally is used as an emulsion in water. A suitable concentration of the SBR emulsion is about 50 wt %. A concentration above 50 wt % is hard to process due to its fast drying character.

The emulsion comprises SBR particles with a preferred average particle size of between 5 and 1000 nm. In order to stabilize the SBR emulsion, the emulsion further comprise an emulsifier.

- 5 Component (B) is 10 to 80 % by weight of spherical solid/hollow micro glass beads, spherical solid/hollow micro glass beads can be coated and uncoated (the coating act as a coupling agent between the spherical solid/hollow micro glass beads and the binder, and changing the surface activity of the composition). Preferable their diameter is between 5 nanometers and 50  
10 micrometers.

The aqueous emulsion of the present invention can be produced by, for example, the following method. The SBR emulsion as the component (A) is placed in a vessel equipped with a stirrer and stirred to an extent of not forming  
15 bubbles. Component (B) is added and followed by stirring for mixing.

The aqueous emulsion of the present invention can be thus obtained.

The invention further relates to an easily macerating grease-proof paper comprising a base paper being coated (or treated) on at least one surface  
20 thereof a layer of an aqueous emulsion comprising a water-dispersible composition according to the invention, wherein the solid content in the aqueous emulsion is from 10 to 85 % by weight. Preferably the solid content is from 25 to 75 % by weight. Within the range from 40 to 75 wt % the viscosity of the composition according to the invention is suitable for processing on a coating  
25 machine. The viscosity of a composition with 45 to 65 wt % of solid content allows processing on high speed paper coating machines.

The easily macerating grease-proof paper/carboard of the present invention is obtained by coating (or other form of treatment) the aqueous emulsion on at least one surface of a base paper in an amount of from 1 to 75 g/m<sup>2</sup>. If the  
30 amount of the aqueous emulsion used is below 1 g/m<sup>2</sup>, the paper obtained has poor grease-proof property and water repellency by the formation of pinholes and the occurrence of fluffing of the fibers of the base paper, while if the amount of the aqueous emulsion is above 75 g/m<sup>2</sup> no relevant improvement of the vapor transmission rate is obtained.

A kraft paper, a wood free paper, a corrugated board base paper, etc., can be used as the base paper, but the base paper used in the present invention is not limited to those.

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For obtaining the easily macerating grease-proof paper of the present invention, for example, the definite amount of the aqueous emulsion is coated (or other treatment) on a base paper with e.g. a blade, a rollercoater or an air-knife coater, and dried at a temperature of higher than about 125 °C. and up to  
10 200 °C. In addition, when the drying temperature is too low, it sometimes happens that the easily macerating moisture-proof paper obtained is inferior in the grease-proof property.

The easily macerating moisture-proof paper of the present invention is most  
15 suitably used in a wide field, for example, as a wrapping paper, a water-resistant corrugated fibreboard paper, food packaging paper or carboard, petfood packaging paper or carboard, a wrapping paper for copying paper owing to the excellent characteristics.

20 An extra advantage of the present invention is that the composition according to the invention is free of halogens, has a high resistance against solvents and can be applied on-line on a paper production machine. A paper treated with the composition of the invention exhibits a high oxygen barrier, which makes it very suitable for the packaging of food.

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### Experimental

The present invention is explained in more detail by the examples I - VI

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- I. Aqueous compositions were obtained with amount of the components (A) to (B) as shown in Table 1. For each of the compositions coated paper was made under the following coating condition : each coated paper was obtained by coating each aqueous emulsion on a kraft paper having a

basis weight as given in table 1 with a roller coater at a coating amount as shown in table 1.

- 5 II. The coated paper was dried at 140 °C and items of the vapor transmission rate, the water repellency, the coefficient of friction, gloss and the grease resistance were evaluated as follows.
- 10 III. The tack was measured by measuring the gloss of the paper (less gloss means less tack )
- 15 IV. The water repellency was measured according to the Cobb method during 3 respectively 10 minutes with a kraft paper treated with 17 -18 g/m<sup>2</sup> of a composition according to table 1.
- 20 V. The grease resistance is measured according to the Kitt test according to 3M.
- 25 VI. The coefficient of friction (C.O.F.) was measured with a Incleanometer. The ratings were given as the angle between the slope and the horizontal plane. The results obtained are shown in table 2. The higher the angle the higher the C.O.F..

TABLE 1

Composition – (wt%)	1	2	3	4	5	6	7	8	9	10
SBR	90	80	75	70	65	60	50	40	30	20
Glass Particles	10	20	25	30	35	40	50	60	70	80

TABLE 2

FORMULA	BASIC PAPER	SIZEPRESS-TREATMENT AND WEIGHT/M <sup>2</sup>	COATING WEIGHT M <sup>2</sup>	TOTAL WEIGHT	COBB 3MIN H <sub>2</sub> O G/M <sup>2</sup>	COBB 10MIN H <sub>2</sub> O G/M <sup>2</sup>	KITT 3 M TEST	C.O.F.	VAPOR TRANSMISSION 65 % RH AT + 20°C G/M <sup>2</sup> AFTER 24 H	GLOSS
1	Cardboard 295 g	Starch 2 g	18 g	20 g	11	35	14	39	DIN 22 g/m <sup>2</sup>	22
2	Cardboard 295 g	Starch 2 g	18 g	20 g	12	36	14	37	22 g/m <sup>2</sup>	20
3	Cardboard 295 g	Starch 2 g	18 g	20 g	14	38	14	33	22 g/m <sup>2</sup>	18
4	Cardboard 295 g	Starch 2 g	18 g	20 g	16	40	14	29	29 g/m <sup>2</sup>	17
5	Cardboard 295 g	Starch 2 g	18 g	20 g	17	44	14	25	42 g/m <sup>2</sup>	16
6	Cardboard 295 g	Starch 2 g	18 g	20 g	17	47	11	20	50 g/m <sup>2</sup>	12
7	Cardboard 295 g	Starch 2 g	17,5 g	19,5 g	19	49	13	16	58 g/m <sup>2</sup>	9
8	Cardboard 295 g	Starch 2 g	17,5 g	19,5 g	22	54	14	12	67 g/m <sup>2</sup>	7
9	Cardboard 295 g	Starch 2 g	17,5 g	19,5 g	28	56	13	11	75 g/m <sup>2</sup>	5
10	Cardboard 295 g	Starch 2 g	18 g	20 g	33	61	13	9	81 g/m <sup>2</sup>	3

The measurement of the gloss was done by coating the paper with the different compositions and to coil the paper. During coiling the coated surface of the paper is contacting the rear surface of the paper/cardboard. If the two contacting surfaces are sticking to each other one or both of the surfaces may be damaged after decoiling. Measuring the gloss therefore can represent an indication of the sticking properties of the coated paper/cardboard. Based upon this measurement it has been found that the addition of spherical solid/hollow micro glass beads particles reducing the sticking tendency of the coated paper, as becomes evident from the values in the column C.O.F.

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CLAIMS

1. A water-dispersible composition consisting of the components (A) to (B),  
in the following weight (wt) percentages comprising one or more  
5 compounds selected from the group consisting of :
- (A) 20 to 90 wt % of styrene butadiene latex (SBR),  
styrene acrylate latex and ethylene acrylate latex
  - (B) 10 to 80 wt % of spherical solid / hollow micro glass beads
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2. Composition according to claim 1, wherein the amount of component (A)  
is at least 20 wt%.
3. Composition according to claim 1 and 2 wherein the amount of  
15 component (A) is at most 90 wt %.
4. Composition according to any one of the preceding claims wherein the  
average particle size of SBR is between 5 and 1000 nm.
- 20
5. composition according to any of the preceding claims, wherein the  
component (B) is at least 10 wt %.
6. Composition according to any one of the preceding claims, wherein the  
component (B) is at most 80 wt %.
- 25
7. Composition according to any one of the preceding claims, wherein  
spherical solid/hollow micro glass beads are coated or not coated.
8. Composition according to any one of the preceding claims, wherein the  
30 spherical solid/hollow micro glass beads have a diameter between 5  
nanometers and 50 micrometers.

10. Aqueous emulsion according to claim 10, wherein the solid content is between 25 and 75 % by weight, preferably between 41 and 75 % by weight.

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11. An easily macerating grease-proof material comprising a base cellulose material having coated (or treated) on at least one surface thereof a layer of the composition according to any of claims 1 to 6, in an amount of from 1 to 75 g/m<sup>2</sup>.

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**INTERNATIONAL SEARCH REPORT**

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**A. CLASSIFICATION OF SUBJECT MATTER**  
 C08K7/28      C08L21/02      D21H21/54      D21H19/22      D21H19/40

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 C08K    D21H    C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
 EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

° Special categories of cited documents :

*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family
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Date of the actual completion of the international search  6 December 2005	Date of mailing of the international search report  20/12/2005
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Russell, G
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## INTERNATIONAL SEARCH REPORT

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