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STABILIZED PARTICULATE COMPOSITION.

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Description**TECHNICAL FIELD**

- 5 The invention relates to a particulate composition comprising:
 (1) particles containing an enzyme, mixed with
 (2) separate particles containing a bleaching agent of the peroxy type or a detergent builder.
 More specifically, the invention relates to such a composition with improved stability during storage of component (1).
- 10 The invention also relate to particles of an enzyme or an optical brightener for use in said composition and to a method of producing said composition or particles.

BACKGROUND ART

- 15 Particulate detergents containing particles of an enzyme mixed with separate particles of a bleaching agent or a detergent builder are commonly used. It is known that the latter components may negatively affect the storage stability of the enzyme.
- As a solution to this stability problem, the prior art suggests coating of the particles of the enzyme. It is known that the coating material needs to be carefully selected since it must on one hand protect the enzyme and on the other hand release the component rapidly when the detergent is dissolved.
- 20 As an example, WO 87/07292 (Novo) teaches that the use of an enteric coating on enzyme particles improves the stability in detergent with bleach; the enteric coating material dissolves at the pH of the detergent solution. However, we have found that this does not always give sufficient storage stability.
- Thus, we have recognized that a need exists for a composition wherein the enzyme has improved stability during storage.
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STATEMENT OF THE INVENTION

- We have surprisingly found that an enzyme in a particulate composition can be stabilized in the above-mentioned mixed composition by applying a clay coating to one or both components.
- 30 Clay coating has previously been applied to other components, e.g. bleach activator (EP 51,987), but the use of this coating to the components considered here is novel.
- Accordingly, the invention provides a particulate composition comprising:
 (1) particles containing an enzyme, mixed with
 (2) separate particles containing a bleaching agent of the peroxy type or a detergent builder,
 35 the composition being characterized in that the particles of the first and/or the second component have a coating containing clay.
- The invention also provides a particulate product comprising an enzyme for use in the above composition, characterized by having a coating containing clay.
- 40 The invention further provides a method for producing said composition or said particulate product, wherein the particles to be coated and an aqueous dispersion of the coating agent are introduced into a fluid bed drying apparatus, whereafter the material leaving the apparatus is collected as the product.
- Finally, the invention provides a method for producing said composition or said particulate product, comprising introducing the particles to be coated and the coating agent together with water and a binder into a mixer,
 45 followed by drying.

DETAILED EXPLANATION OF THE INVENTION

- Typical examples of particulate compositions according to the invention are cleaning compositions, such as detergents and laundry bleaches.
- 50 The composition of the invention contains separate particles of component (1) and (2) as defined above. The latter tend to destabilize the former during storage. According to the invention, one or both is/are coated with clay. The particulate composition of the invention may obviously contain more than one type of particles of component (1) and/or component (2), in which case one or more may be coated according to the invention.
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Component (1)

Component (1) is an enzyme, which is commonly used in detergents.

Detergent enzymes are generally microbial, e.g. proteases, amylases, cellulases and lipases. Typical examples of detergent enzymes are: proteases derived from *Bacillus* (e.g. from *B. licheniformis*, from alkalophilic strains according to US 3,723,250 or subtilisin Novo) or *Fusarium* (e.g. *F. oxysporum*); amylase derived from *Bacillus*, especially *B. amyloliquefaciens* (*B. subtilis* or *B. licheniformis*); cellulase derived from *Humicola*, especially *H. insolens*; lipase derived from *Pseudomonas* (e.g. *Ps. cepacia* or *Ps. stutzeri*), *Humicola* (e.g. *H. insolens*) or *Fusarium* (e.g. *F. oxysporum*). Examples of commercial detergent enzymes are: Alcalase, Savinase, Esperase, BAN, Termamyl, Celluzyme and Lipolase (all trade names of Novo Industri A/S).

Compositions of the invention typically contain 0.005-5%, e.g. 0.01-2% and especially 0.1-1.5% by weight of particles containing component (1).

Component (2)

Component (2) is a bleaching agent of the peroxy type, or a detergent builder.

Typical bleaching agents of the peroxy type are organic and inorganic peracids and salts thereof, e.g. sodium perborate, sodium percarbonate, potassium persulphate, magnesium peroxy phthalate and diperoxy dodecane dioic acid.

Typical detergent builders are sodium or potassium salts of tripolyphosphoric acid, citric acid, zeolite, ethylenediamine tetraacetic acid (EDTA), diethylene triamine pentaacetic acid (DTPA), and nitrilo triacetic acid (NTA).

The particles containing component (2) will typically be present in amounts above 0.5%, e.g. above 1% and especially above 2% by weight. The amount of component (2) may be more than 50%, and even more than 80%, e.g. in laundry bleaches.

Coating material

The clay used in the coating is preferably a layered clay of the smectite type, such as montmorillonite or bentonite.

Examples of commercially available bentonite products are ASB, e.g. ASB 350 Powder and ASB 350S Powder (ECC International Ltd., St. Austell, Cornwall, England).

The coating material used in the invention may consist essentially of clay, or it may comprise binders, colouring agents (such as TiO_2), etc. Conventional binders may be used, e.g. polyvinyl pyrrolidone, polyvinyl alcohol, cellulose derivatives (such as hydroxypropyl-, carboxymethyl- or methyl-cellulose) or carbohydrates (such as dextrin, starch hydrolysates, mono- and di-saccharides and sugar alcohols). If a binder is used, the amount will typically be in the range 1-30% of the coating material.

To obtain the stabilization that forms the object of the invention, the amount of coating material should generally be above 0.1%, preferably above 0.5% and most preferably above 2% by weight of the coated particles.

The clay types used in the invention may be useful detergent ingredients in their own right, acting as anti-redeposition agents. To obtain this effect, it is generally preferred that the amount of clay makes up 0.1-20% of the total weight of the composition of the invention.

For increased protection against a bleaching agent, the clay coating applied to the enzyme according to the invention may additionally comprise an antioxidant. The antioxidant may be a thiosulphate, a sulphite, a bisulphite, ascorbic acid or an ascorbate, the salts being preferably sodium or ammonium salts.

For increased stabilization, the enzyme may have an additional protective coating, e.g. consisting of or containing a low-melting wax (such as polyethyleneglycol), enteric coating according to WO 87/02979, a mono- or diglyceride or a sorbitan ester. This additional coating and the clay coating may both be applied to the same particles of enzyme, with either coating as the top coating. Alternatively, the additional coating may be applied to the enzyme and the clay coating to component (2).

Particle form

The particles to be coated according to the invention are preferably granulated. Granulation may be done according to methods known in the art, e.g. NL-C 167,993 (Novo), US 4,106,991 (Novo) or US 4,661,452 (Novo).

The particle size is preferably such that at least 90% lie in the range 3-2000 μm . For a granulate, at least 90% will usually lie in the range 250-2000 μm (standard granulate) or in the range 100-400 μm (microgranulate).

Coating method

The coating according to the invention can be applied by means of any fluid bed method, e.g. a usual fluid bed process, a Wurster bed process or a rotor bed (Glatt) process (vide e.g. David M. Jones, "Factors to consider in fluid-bed processing", Pharmaceutical Technology, April 1985). The fluid bed method can be carried out batch wise or continuously.

Alternatively, the coating can be applied by introducing the particles and the coating agent together with water and a binder into a mixer, followed by drying (e.g. fluid-bed drying). The mixer may be a Lodige mixer or any type of granulator described in US 4,106,991 at col. 4. Conveniently, the coating agent is introduced as a dry powder, and the binder as an aqueous solution or dispersion. The amount of water should be adjusted so as to avoid agglomeration on one hand, and avoid excessive dust on the other hand. The particles may be introduced first, and the coating agent and binder later, either continuously or intermittently.

EXAMPLES

EXAMPLE 1

A base (uncoated) granulate of alkaline protease was prepared with the following composition:

22% protease concentrate (SAVINASE (reg. TM of Novo Industri A/S), prepared according to US 3,723,250 at col. 12, activity 40 KNPU/g)
15% fibrous cellulose (ARBOCEL BC 200) (TM)
4% titanium dioxide
10% carbohydrate binder
49% finely ground sodium sulphate

The granulate was prepared as described in Example 1 of US 4,106,991, using pure water as granulating agent. After drying, the granulate was sieved, and the fraction between 300 and 900 μm was collected.

Part of the above base granulate was coated with bentonite which was sealed to the granulate surface with carbohydrate binder, as follows: 15 kg of the base granulate was introduced into a Lodige mixer FM 50. 5 kg of bentonite ASB 350 ECC was dosed continuously by the use of a self-regulating loss-in-weight feeding system into the mixer which ran at 95 rpm during the whole layering process. The feeding rate of the bentonite was 50 kg/h. Simultaneously, 0.45 kg of carbohydrate binder as a 25% solution was sprayed to bind the bentonite to the granulate surface using a peristaltic pump and an air atomizing nozzle (atomizing pressure 19.6 N/cm²/g (2 kg/cm²/g), pumping rate 300 g/min). After layering of the bentonite, the wet coated granulate was treated for 1 min. with the granulating device as described in US 4,106,991. The velocity of the mixing device was during this period raised to 180 rev/min. The granulate was finally dried to a water content below 1% and sieved to between 300 μm and 1000 μm .

Another sample of base granulate was coated as above except that the bentonite was type 350S, ECC. Part of this granulate was further coated by applying a solution containing 7% of polyethylene glycol and 12.5% of a 1:1 mixture of titanium dioxide and kaolin (SPESWHITE ECC) as described in example 22 of US 4,106,991.

For comparison, part of the base granulate was coated with PEG as described above, to represent a prior-art coated granulate.

Storage stability tests were carried out by adding granulate to a powder detergent with 25% perborate, storing this at 37°C and 70% relative humidity, and determining the residual protease activity. Results are expressed in percentage of initial activity. The storage tests were run in 2 series.

Granulate coating	% residual activity after		
	3 days	7 days	14 days
<u>Series A</u>			
Bentonite ASB 350	71	49	37
Bentonite ASB 350S	62	39	27
Bentonite ASB 350S + PEG	75	41	31
Prior art (PEG)	50	26	19
<u>Series B</u>			
Bentonite ASB 350	66	47	38
Prior art (PEG)	59	41	19
None	59	36	25

The results show a marked improvement of storage stability in samples coated according to the invention. The prior-art coating shows no improvement over the uncoated granulate.

EXAMPLE 2

A base granulate of alkaline protease was prepared and sieved as in Example 1, except that the following composition was used:

- 7% protease concentrate (ESPERASE (reg. TM of Novo Industri A/S), prepared according to US 3,723,250 at col. 12, activity 82 KNPU/g)
- 10% fibrous cellulose (ARBOCEL BC 200) (TM)
- 4% kaolin SPESWHITE ECC (TM)
- 10% carbohydrate binder
- 69% finely ground sodium sulphate

15 kg of the base granulate was coated with 5 kg of bentonite ASB 350 and sealed with 0.45 kg of carbohydrate binder in the following manner. The base granulate was introduced into a Lodige mixer FM 50. The coating/layering was applied with continuous mixing and alternately applying bentonite and binder solution (25% carbohydrate in water) in such a balanced way that the charge was neither too sticky nor contained a substantial amount of free bentonite powder. The actual sequences and amounts of material were:

1. 200 g binder solution
2. 1670 g bentonite
3. 500 g binder solution
4. 1670 g bentonite
5. 500 g binder solution
6. 1670 g bentonite
7. 500 g binder solution
8. 2 min treatment with granulating device, mixer 180 rev/min
9. 150 g binder solution
10. 1 min treatment with granulating device, mixer 180 rev/min

The granulate was finally dried to a water content below 1% and sieved to between 300 µm and 100 µm.

Part of the above bentonite-coated granulate was further coated with a water-insoluble sorbitan ester of a fatty acid (FAMODAN TS, Grindsted Products) (TM) as described in Example 1 for PEG.

For comparison, part of the base granulate was coated with PEG as in Example 1. Storage stability tests were carried out as in Example 1. Results:

Granulate coating	% residual activity after		
	3 days	7 days	14 days
None	32	25	19
Bentonite	52	32	25
Bentonite + sorbitan ester	86	56	36
Prior art (PEG)	30	22	13

The results show that storage stability is significantly improved by use of a bentonite coating according to the invention, and is further improved by combining this with a wax coating. The prior-art coating gives no improved stability.

EXAMPLE 3

A base granulate of alkaline protease prepared as in Example 1 was coated with a layer of bentonite ASB 350 and sodium thiosulphate by a conventional fluid-bed process. 350 g of bentonite and 350 g of sodium thiosulphate were dispersed/dissolved in water and sprayed onto 7 kg of base granulate in a Glatt WSG 5 fluid-bed with continuous layering and drying (Air inlet temperature 50°C, air outlet temperature 35°C). The process was completed by a 5 min. drying period with air inlet temperature 50°C. The granulate was hereafter coated with 5% glyceryl stearate/palmitate (Grindtek MSP 90, Grindsted Product) (TM) and 12.5% TiO₂:kaolin as described in Example 1 for PEG.

Storage tests were made as in Example 1. A prior-art coating (PEG) was included for comparison.

Granulate coating	% residual activity after		
	3 days	7 days	14 days
Bentonite/thiosulphate + monoglyceride	100	87	53
Prior art (PEG)	53	23	15

Comparison of the above results with Example 1 shows that incorporation of thiosulphate and monoglyceride gives a further improvement of the storage stability obtained with bentonite coating.

EXAMPLE 4

Lipase was produced according to EP 305,216 and concentrated by ultrafiltration and evaporation. The resulting liquid lipase concentrate had an activity of 520,000 LU/g (see EP 305,216). The following powder components:

6.0 kg fibrous cellulose ARBOCEL BC200
4.0 kg kaolin SPESWHITE/ECC
4.2 kg carbohydrate binder
24.4 kg finely grounded sodium sulphate

were mixed and granulated in a Lodge FM 130 mixer. 11 kg of the above fluid lipase concentrate was used as the granulating liquid by spraying it on the powder components. Otherwise the granulation process was performed as described in example 1 of US 4, 106, 991.

15 kg of the base granulate was coated with 5 kg of bentonite (ASB 350) and sealed with 0,45 kg of carbohydrate binder in a manner as described in example 3. The granulate was finally dried to a water content below 1% and sieved to between 300 µm and 1000 µm.

Storage stability tests were carried out with storage conditions as described in example 1.

The bentonite coated lipase granulate showed 2% loss of activity after 4 days storage and 11% loss after 10 days storage.

For comparison, the base granulate showed 9% loss of activity after 4 days storage and 23% after 10 days storage.

5 Claims

1. A particulate composition comprising:
 - (1) particles containing an enzyme, mixed with
 - (2) separate particles containing a bleaching agent of the peroxy type or a detergent builder,the composition being characterized in that the particles of the first and/or the second component have a coating containing clay.
2. A cleaning composition according to Claim 1, preferably a laundry bleach or a detergent composition.
3. The composition of Claim 1 or 2, wherein component (1) is a microbial enzyme, preferably a protease, an amylase, a lipase or a cellulase.
4. The composition of Claims 1 - 3, wherein component (2) is a bleaching agent selected from the group of an organic or inorganic peracid or a salt thereof.
5. The composition of Claim 4, wherein the bleaching agent is sodium perborate, sodium percarbonate, potassium persulphate, magnesium peroxy phthalate or diperoxy dodecane dioic acid.
6. The composition of Claims 1 - 3, wherein component (2) is a detergent builder selected from the group of an alkali metal salt of tripolyphosphoric acid, citric acid, a zeolite, ethylene diamine tetraacetic acid, diethylene triamine pentaacetic acid or nitrilotriacetic acid.
7. The composition of Claims 1 - 6, wherein the particles of component (1) make up 0.005-5%, preferably 0.01-2% and most preferably 0.1-1.5% of the total weight of the composition.
8. The composition of Claims 1 - 7, wherein the particles of component (2) make up above 0.5%, preferably above 1% and most preferably above 2% of the total weight of the composition.
9. The composition of Claims 1 - 8, wherein said coating material contains above 70% and preferably above 90% of clay.
10. The composition of Claims 1 - 9, wherein the coating further comprises a binder, preferably a carbohydrate, and preferably in an amount of 1-30% of the weight of the coating.
11. The composition of Claims 1 - 10, wherein the clay is a layered clay, preferably montmorillonite or bentonite.
12. The composition of Claims 1 - 11, wherein the amount of said coating makes up above 0.1%, preferably above 0.5% and most preferably above 2% of the weight of said coated particles.
13. The composition of Claims 1 - 12, wherein the clay contained in said coating makes up 0.1-2% of the weight of the total composition.
14. The composition of Claims 1 - 13, wherein said particles of component (1) additionally have a protective coating, preferably containing or consisting of a wax (with melting point preferably above 35°C), an enteric substance, a mono- or diglyceride or a sorbitan ester.
15. The composition of Claims 1 - 14, wherein the clay coating is applied to component (1) and this coating also contains a reducing agent, preferably a sulphite or a thiosulphate.
16. The composition of Claims 1 - 15, wherein more than 90% of said coated particles are in the range 2-3000 µm, and more preferably in the range 250-2000 µm.
17. A particulate product comprising an enzyme for use in the composition of Claims 1 - 16, characterized by having a coating containing clay.
18. The particulate product of Claim 17, further characterized as in Claims 3 or 9 - 16.
19. Method for producing the composition of Claims 1-16 or the particulate product of Claims 17 or 18, wherein the particles to be coated and an aqueous dispersion of the coating agent are introduced into a fluid bed drying apparatus, whereafter the material leaving the apparatus is collected as the product.
20. Method for producing the composition of Claims 1-16 or the particulate product of Claims 17 or 18, comprising introducing the particles to be coated and the coating agent together with water and a binder into a mixer, followed by drying.

Patentansprüche

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1. Teilchenzusammensetzung, die:
 - (1) Teilchen, die ein Enzym enthalten, vermischt mit
 - (2) separaten Teilchen, die ein Bleichmittel vom Peroxy-Typ oder einen Gerüststoff enthalten,

umfaßt, wobei die Zusammensetzung dadurch gekennzeichnet ist, daß die Teilchen der ersten und/oder der zweiten Komponente einen Überzug aufweisen, der Ton enthält.

2. Reinigungszusammensetzung nach Anspruch 1, vorzugsweise ein Wäschebleichmittel oder eine Waschmittelzusammensetzung.

3. Zusammensetzung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß Komponente (1) ein Mikrobielles Enzym ist, vorzugsweise eine Protease, eine Amylase, eine Lipase oder eine Cellulase.

4. Zusammensetzung nach den Ansprüchen 1-3, dadurch gekennzeichnet, daß Komponente (2) Bleichmittel ist, das ausgewählt ist aus der Gruppe einer organischen oder anorganischen Persäure oder eines Salzes derselben.

5. Zusammensetzung nach Anspruch 4, dadurch gekennzeichnet, daß das Bleichmittel Natriumperborat, Natriumpercarbonat, Kaliumpersulfat, Magnesiumperoxyphthalat oder Diperoxydodecandisäure ist.

6. Zusammensetzung nach den Ansprüchen 1-3, dadurch gekennzeichnet, daß Komponente (2) ein Gerüststoff ist, der ausgewählt ist aus der Gruppe eines Alkalimetallsalzes von Tripolyphosphorsäure, Zitronensäure, einem Zeolith, Ethylendiamintetraessigsäure, Diethylentriaminpentaessigsäure oder Nitrilotriessigsäure.

7. Zusammensetzung nach den Ansprüchen 1-6, dadurch gekennzeichnet, daß die Teilchen von Komponente (1) 0,005-5 %, Gesamtgewichts der Zusammensetzung ausmachen.

8. Zusammensetzung nach den Ansprüchen 1-7, dadurch gekennzeichnet, daß die Teilchen von Komponente (2) über 0,5 %, vorzugsweise über 1 % und am bevorzugtesten über 2 % des Gesamtgewichts der Zusammensetzung ausmachen.

9. Zusammensetzung nach den Ansprüchen 1-8, dadurch gekennzeichnet, daß besagtes Überzugsmaterial über 70 % und vorzugsweise über 90 % Ton enthält.

10. Zusammensetzung nach den Ansprüchen 1-9, dadurch gekennzeichnet, daß der Überzug zusätzlich ein Bindemittel umfaßt, vorzugsweise ein Kohlehydrat, und zwar vorzugsweise in einer Menge von 1-30 % des Gewichts des Überzuges.

11. Zusammensetzung nach den Ansprüchen 1-10, dadurch gekennzeichnet, daß der Ton ein Schichtton, vorzugsweise Montmorillonit oder Bentonit ist.

12. Zusammensetzung nach den Ansprüchen 1-11, dadurch gekennzeichnet, daß die Menge besagten Überzugs über 0, 1 %, vorzugsweise über 0,5 % und am bevorzugtesten über 2 % des Gewichts besagter mit Überzug versehener Teilchen ausmacht.

13. Zusammensetzung nach den Ansprüchen 1-12, dadurch gekennzeichnet, daß der Ton, der in besagtem Überzug enthalten ist, 0,1 bis 2 % des Gewichts der Gesamtzusammensetzung ausmacht.

14. Zusammensetzung nach den Ansprüchen 1-13, dadurch gekennzeichnet, daß besagte Teilchen von Komponente (1) zusätzlich einen Schutzüberzug aufweisen, der vorzugsweise ein Wachs (mit einem Schmelzpunkt von vorzugsweise über 35°C), eine darmlösliche Substanz, ein Mono- oder Diglycerid oder einen Sorbitanester enthält oder daraus besteht.

15. Zusammensetzung nach den Ansprüchen 1-14, dadurch gekennzeichnet, daß der Tonüberzug auf Komponente (1) aufgebracht wird und daß dieser Überzug auch ein Reduktionsmittel enthält, vorzugsweise ein Sulfid oder ein Thiosulfat.

16. Zusammensetzung nach den Ansprüchen 1-15, dadurch gekennzeichnet, daß mehr als 90 % besagter mit Überzug versehener Teilchen im Bereich 2-3000 µm und bevorzugter im Bereich 250-2000 µm liegen.

17. Teilchenförmiges Produkt, das ein Enzym zur Verwendung in der Zusammensetzung nach den Ansprüchen 1-16 umfaßt, dadurch gekennzeichnet, daß es einen Überzug aufweist, der Ton enthält.

18. Teilchenförmiges Produkt nach Anspruch 17, weiter gekennzeichnet wie in den Ansprüchen 3 oder 9-16.

19. Verfahren zur Herstellung der Zusammensetzung nach den Ansprüchen 1-16 oder des teilchenförmigen Produktes nach den Ansprüchen 17 oder 18, dadurch gekennzeichnet, daß die mit einem Überzug zu sehenden Teilchen und eine wäßrige Dispersion des Überzugsmittels in eine Fließbett-Trocknungsvorrichtung eingebracht werden, woraufhin das Material, das die Vorrichtung verläßt, als Produkt gesammelt wird.

20. Verfahren zur Herstellung der Zusammensetzung nach den Ansprüchen 1-16 oder des teilchenförmigen Produktes nach den Ansprüchen 17 oder 18, dadurch gekennzeichnet, daß die mit einem Überzug zu sehenden Teilchen und das Überzugsmittel zusammen mit Wasser und einem Bindemittel in einen Mischer eingebracht werden, gefolgt von einer Trocknung.

Revendications

1. Composition particulière comprenant :

- (1) des particules contenant une enzyme, mélangées avec
- (2) des particules séparées contenant un agent de blanchiment du type peroxy ou un adjuvant de détergent la composition étant caractérisée en ce que les particules du premier/ou du second composant ont un revêtement contenant de l'argile.
- 5 2. Composition de nettoyage selon la revendication 1, de préférence un agent de blanchiment de laverie ou une composition de détergent.
3. Composition selon la revendication 1 ou 2, dans laquelle le composant (1) est une enzyme microbienne, de préférence une protéase, une amylase, une lipase ou une cellulase.
4. Composition selon les revendications 1 - 3, dans laquelle le composant (2) est un agent de blanchiment
- 10 choisi dans le groupe d'un peracide organique ou minéral ou de son sel.
5. Composition selon la revendication 4, dans laquelle l'agent de blanchiment est du perborate de sodium, du percarbonate de sodium, du persulfate de potassium, du peroxy-phthalate de magnésium ou un acide dipe- roxy dodécane dioïque.
6. Composition selon les revendications 1 - 3, dans laquelle le composant (2) est un adjuvant de détergent
- 15 choisi dans le groupe d'un sel de métal alcalin de l'acide tripolyphosphorique, de l'acide citrique, une zéolithe, un acide éthylène-diamine tétraacétique, un acide diéthylène-triamine pentaacétique ou un acide nitrilotriacé- tique.
7. Composition selon les revendications 1 - 6, dans laquelle les particules du composant (1) constituent 0,005-5 % en poids, de préférence 0,01-2 % et de façon plus préférentielle 0,1-1,5 % en poids du poids total
- 20 de la composition.
8. Composition selon les revendications 1 - 7, dans laquelle les particules du composant (2) constituent plus de 0,5 %, de préférence plus de 1 % et de façon plus préférentielle plus de 2 % du poids total de la compo- sition.
9. Composition selon les revendications 1 - 8, dans laquelle le matériau de revêtement contient plus de
- 25 70 % et de préférence plus de 90 % d'argile.
10. Composition selon les revendications 1 - 9, dans laquelle le revêtement comprend de plus un liant, de préférence un hydrate de carbone, et de préférence dans une quantité de 1-30 % du poids du revêtement.
11. Composition selon les revendications 1 - 10, dans laquelle l'argile est une argile en couche, de préfé- rence de la montmorillonite ou de la bentonite.
- 30 12. Composition selon les revendications 1 - 11, dans laquelle la quantité du revêtement constitue plus de 0,1 %, de préférence plus de 0,5 % et de façon plus préférentielle plus de 2 % du poids des particules revêtues.
13. Composition selon les revendications 1 - 12, dans laquelle l'argile contenue dans le revêtement consi- tute 0,1-2 % en poids de la composition totale.
14. Composition selon les revendications 1 - 13, dans laquelle les particules du composant (1) compren-
- 35 nent de plus un revêtement protecteur, de préférence contenant ou consistant en une cire (avec un point de fusion de préférence supérieur à 35°C), une substance entérique, un mono- ou diglycéride ou un ester de sor- bitan.
15. Composition selon les revendications 1 - 14, dans laquelle le revêtement d'argile est appliqué sur le
- composant (1) et ce revêtement contient également un agent de réduction, de préférence un sulfite ou un thio- sulfate.
- 40 16. Composition selon les revendications 1 - 15, dans laquelle plus de 90 % des particules revêtues se situent dans la plage de 2-3 000 μm et de façon plus préférentielle dans la plage de 250-2 000 μm .
17. Produit particulaire comprenant une enzyme pour l'utilisation dans la composition selon les revendi- cations 1 - 16, caractérisé en ce qu'il possède un revêtement contenant de l'argile.
- 45 18. Produit particulaire selon la revendication 17, caractérisé de plus selon les revendications 3 ou 9 - 16.
19. Procédé pour la production de la composition selon les revendications 1 - 16 du produit particulaire des revendications 17 ou 18, dans lequel les particules sont revêtues et une dispersion aqueuse de l'agent de revêtement sont introduites dans un appareil de séchage à lit fluidisé après quoi, le matériau quittant l'appareil est recueilli sous la forme du produit.
- 50 20. Procédé pour la production de la composition des revendications 1 - 16 ou du produit particulaire selon les revendications 17 ou 18, comprenant l'étape consistant à introduire les particules à revêtir et l'agent de revê- tement conjointement avec l'eau et un liant dans un mélangeur, opération suivie du séchage.