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(54) **A BUILDER SYSTEM FOR A DETERGENT COMPOSITION**

BUILDERSYSTEM FÜR EINE WASCHMITTELZUSAMMENSETZUNG

SYSTÈME ADJUVANT DE DÉTERGENCE ("BUILDER") DESTINÉ À UNE COMPOSITION DÉTERGENTE

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Description

TECHNICAL FIELD

[0001] The invention relates to a builder system for use in detergent compositions. The invention more particularly relates to a builder system that ensures faster removal of Calcium ions from washing solutions while being less expensive than Phosphate and Zeolite based building systems.

BACKGROUND AND RELATED ART

[0002] Soaps which are alkali metal salts of fatty acids have traditionally been used for personal washing applications. Soaps have also been used for washing laundry. When washing laundry with soaps, the efficiency of washing is lower when washed in hard water. Hard water refers to water having high levels of dissolved Calcium and Magnesium salts. The dissolved Calcium and Magnesium ions react very quickly with the alkali metal cation (sodium or potassium) of the soap, leading to formation of Calcium soap which is insoluble in water and therefore leading to poor detergency. With the advent of synthetic detergents which are alkali metal salts of long chain acids of petroleum origin, the same problem persists. Most popular synthetic detergents include linear alkyl benzene sulphonates, alpha olefin sulphonates, and primary alkyl sulphates which belong to the class of anionic surfactants. Surfactants of the non-ionic, cationic, amphoteric and zwitterionic character are also known.

[0003] Cleaning performance of most synthetic surfactants are also affected by the washing in hard water.

[0004] Compounds that react preferentially with the dissolved Calcium and Magnesium ions present in hard water, thereby maintaining the desired high concentration of the detergent in its active form, have been used in detergent compositions. Such compounds or mixture of compounds are known as detergency builders. Commonly known detergency builders are alkali metal carbonates, silicates, phosphates and structured compounds like Zeolites. Alkali metal carbonates like Sodium Carbonate, commonly referred to as soda ash is a very inexpensive and widely used builder in low cost detergent formulations. Premium detergents use builders like phosphates and/or Zeolites since they have better building properties but are more expensive. There has been continuous work to develop more efficient and faster building systems using less expensive materials. Further, use of phosphates in detergents, is believed by many to be responsible for the eutrophication of rivers and other natural waters bodies. Thus a lot of effort has been made to develop faster building systems using sodium carbonate as the main raw material.

[0005] EP0234818 (Unilever, 1987) discloses a detergent composition containing (i) a detergent active system comprising a mixture of (a) an anionic non-soap detergent active; (b) a non-ionic detergent active; and (c) soap; (ii) a watersoluble alkali metal carbonate; and (iii) a water-insoluble particulate carbonate material which is a seed crystal for Calcium carbonate; characterised in a specific combination of weight ratios of the various detergent actives. The builder system in this publication is a mixture of soda and Calcium carbonate. There have been many improvements to this technology and many products launched which are improvements over this basic technology where combination of soda and Calcium carbonate is used. The present inventors have determined that the best building systems available presently using sodium carbonate as the basic builder still do not provide the desired fast building and there is scope for improvement on this technology which can be perceived by the consumers in the cleanliness of their washed laundry or in terms of costs of the products. The present inventors have found that use of the specific builder system disclosed in EP0234818 along with a specific co-builder provides for very fast building never before achieved with similar systems.

[0006] US7186677 (Henkel, 2007) describes a method for producing surfactant granules having good solubility and varying bulk densities comprising (a) providing a mixture of anionic surfactant acids and builder acids having a weight ratio of 1:100 to 1:20 of builder acid to surfactant acid; and (b) contacting the mixture with at least one solid neutralising agent. The builder acid is selected from citric, tartaric, succinic, malonic, adipic, maleic, fumaric, oxalic, gluconic, nitrilotriacetic, aspartic, ethylenediaminetetracetic, among many other acids wherein the builder acid has a particle size below 200 μm.

[0007] The use of a combination of calcium carbonate and sodium carbonate in a builder system for detergent compositions is known from CA 979772, US 4473485, WO 9840455 and CA 991942.

[0008] It is thus an object of the present invention to provide for a builder system for a detergent composition that provides faster building as compared to at least some of the prior art for similar systems.

[0009] It is another object of the present invention to provide for a builder system for a detergent composition that provides for fast building while having a lower cost as compared to at least some of the prior art systems.

SUMMARY OF THE INVENTION

[0010] The invention provides for a builder system for a detergent composition comprising:

(i) a water soluble alkali metal carbonate;
(ii) 5% to 50% by weight of the builder system, a seed for precipitating Calcium carbonate, which is Calcium carbonate; and
(iii) a co-builder which is a di-carboxylic acid or a salt thereof, wherein said co-builder has an average particle size less than 150 microns.

[0011] It is preferred that the water solubility of the co-builder is more than 1 g/l at 25˚C.
[0012] Particularly preferred di-carboxylic acids are oxalic, malonic and succinic acid.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The invention relates to a builder system for a detergent composition. One component of the builder system is a water soluble alkali metal carbonate. The alkali metal is preferably sodium or potassium, sodium being preferred. Thus the most preferred alkali metal carbonate is sodium carbonate. The alkali metal carbonate is preferably present in an amount in the range of 10% to 90%, more preferably 25% to 90%, most preferably 45% to 80% by weight of the builder system.
[0014] Another important element of the builder system of the invention is a seed for precipitating Calcium carbonate. By "a seed for precipitating Calcium carbonate" is meant a compound which has the ability to act as a seed for precipitation of Calcium carbonate in aqueous media. The seed for precipitating Calcium carbonate is a substantially water insoluble particulate material. This water insoluble particulate material may be present in the builder system or generated insitu when the builder system is dispersed in water. The more preferred aspect provides for the substantially water insoluble particulate material to be present in the builder system. The substantially water insoluble particulate material is Calcium carbonate. Calcium carbonate may be calcite, or aragonite; and is more preferably Calcite. Calcite is preferably High Surface Area Calcite. Preferably the Calcium carbonate seed has a surface area greater than 20 m^2/g, more preferably greater then 30 m^2/g, most preferably greater than 60 m^2/g. The seed for precipitating Calcium carbonate is present in an amount in the range of 5% to 50%, more preferably from 10% to 40%, most preferably from 15% to 30% by weight of the builder system.
[0015] The builder system of the invention comprises a co-builder which is a di-carboxylic acid or a salt thereof. The co-builder preferably has water solubility of more than 1 g/l at 25˚C. Preferred di-carboxylic acids are chosen from oxalic acid, malonic acid or succinic acid, most preferred being oxalic acid. The preferred salts of the di-carboxylic acid are alkali metal or ammonium salts, alkali metal salts being more preferred. The co-builder is present in an amount in the range of 2% to 20%, more preferably from 4% to 12% by weight of the builder system. The invention works best when the co-builder is present as a powder i.e in a low particle size form. The average particle size of the co-builder is less than 150 microns, more preferably less than 75 microns. Ideally, the co-builder is molecularly dispersed in the detergent composition in which the builder system is present. This can be achieved by dissolving the co-builder in water and spraying the solution onto the detergent composition or the builder system and then drying to the desired moisture content.
[0016] The builder system of the invention provides for relatively fast building kinetics, faster than prior art systems. The builder system ensures that the Ca^{2+} ion concentration in input water reduces from about 200 ppm to less than, or about, 1.2 ppm, more preferably to less than, or about, 1.0 ppm, further more preferably less than, or about, 0.5 ppm, optimally less than, or about, 0.3 ppm, in about 30 seconds. The builder system of the invention is preferably substantially free of phosphate builders. Further, more preferably the builder system is substantially free of Zeolite builders.
[0017] According to another aspect of the invention, there is provided a process to prepare a builder system for a detergent composition comprising mixing powders of a water soluble alkali metal carbonate, 5% to 50% by weight of the builder system a seed for precipitating Calcium carbonate, which is Calcium carbonate; and a co-builder which is a dicarboxylic acid or a salt thereof.
[0018] In the above process, the powders of the co-builder have an average particle size less than 150 microns, more preferably less than 75 microns.
[0019] In a preferred aspect, the process of the invention comprises:

(i) dissolving dicarboxylic acid or salts thereof in water to form a solution;
(ii) dry mixing powders of a water soluble alkali metal carbonate with 5% to 50% by weight of the builder system a seed for precipitating Calcium carbonate, which is Calcium carbonate to form a powder mix; and
(iii) mixing said solution from step (i) with the powder mix of step (ii).

[0020] The solution is preferably sprayed onto the powder mix during the mixing step (iii).
[0021] According to another aspect of the present invention, there is provided a detergent composition comprising (i) the builder system according to the invention and (ii) a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class. The builder system of the invention may be present in an amount in the range of 5%

to 80%, more preferably 15% to 60%, most preferably 25% to 50% by weight of the detergent composition. Suitable surfactants are compounds commonly used as surface-active agents given in the well-known textbooks "Surface Active Agents", Volume I by Schwartz and Perry and "Surface Active Agents and Detergents", Volume II by Schwartz, Perry and Berch.

[0022] According to another aspect of the present invention there is provided a process to prepare a detergent composition comprising dry mixing powders of a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class with the powders of the builder system of the present invention.

[0023] According to yet another aspect of the present invention there is provided a process to prepare a detergent composition comprising the steps of:

(i) dissolving a dicarboxylic acid or salts thereof in water to form a solution;
(ii) dry mixing powders of a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class with a water soluble alkali metal carbonate and 5% to 50% by weight of the builder system a seed for precipitating Calcium, which is Calcium carbonate, to form a powder mix; and
(iii)mixing said solution from step (i) with the powder mix of step (ii).

[0024] Preferably the process comprises a step of drying the detergent composition to moisture content of less than 10%.

[0025] The invention will now be illustrated with the following non-limiting examples.

Examples

Comparative Examples A to F

[0026] These are examples as per prior art builder systems.

[0027] Various builder compositions were prepared and added to hard water containing 200 ppm Calcium ions at concentrations as shown in Table -1. Disodium oxalate, when used, was added after crushing to powder to an average particle size of about 145 microns. The building kinetics was studied by measuring the Ca^{2+} ion concentration, at various time periods and the data is presented in Table -1. The method of determining Ca^{2+} concentration is given below:

Measurement of Calcium ion concentration

[0028] The method involved titration with EDTA (di sodium salt of Ethylene Diamine Tetra Acetic acid) using EBT (Eriochrome Black - T) as indicator. About 2 ml of the Calcium ion solution was pipetted out into a 150 ml conical flask. The solution was diluted with about 10 ml water. To this was added 5 ml of Ammonia-Ammonium chloride pH 10 buffer. Further, about 35 mg of 1% EBT in potassium nitrate solution was added. A wine red colour was obtained. A standardized EDTA solution was added dropwise from a burette with constant stirring. As more EDTA was added the colour gradually changed from wine red to violet. The end point was identified by a sudden colour change from violet to blue. The Calcium ion concentration was calculated by using the formula:

$$Ca^{2+} \text{ ion concentration} = \frac{\text{volume of EDTA X strength of EDTA}}{\text{volume of Calcium solution taken.}}$$

Table - 1

Comparative Example	Sodium carbonate, g/l	HSAC g/l	Disodium Oxalate, g/l	Time, s	Concentration of Calcium ions, ppm
A	1.5	0	0	60	10.4
B	1.5	0	0	300	1.8
C	1.5	0.5	0	60	4.7
E	1.5	0.5	0	120	1.2
F	1.5	0	0.4	30	3.6

(continued)

Comparative Example	Sodium carbonate, g/l	HSAC g/l	Disodium Oxalate, g/l	Time, s	Concentration of Calcium ions, ppm
G	1.5	0	0.4	60	1.7
Note: HSAC means High Surface Area Calcite with surface area of (20-30) m^2/g.					

[0029] The comparative examples of the prior art are able to bring the Ca^{2+} ion concentration down from 200 ppm to a minimum of about 1.2 to 2 ppm and the time required is about 1 to 2 minutes (Best being Comparative Examples E and G).

Examples 1 to 6

[0030] These are examples as per the invention having a combination of sodium carbonate, HSAC and di sodium oxalate.

[0031] Various builder compositions were prepared and added to hard water containing 200 ppm Calcium ions at concentrations as shown in Table -2. In Examples 1 to 5, the builder system was a dry mix of the sodium carbonate and High Surface Area Calcite (HSAC) to which a solution of disodium oxalate in water was sprayed and mixed. In Example 6, the disodium oxalate granules were first crushed to a powder to an average particle size of about 145 microns. The disodium oxalate powder was then dry mixed with the sodium carbonate and HSAC. The building kinetics was studied by measuring the Ca^{2+} ion concentration, at various time periods. The results are summarized in Table -2

Table - 2

Example	Sodium carbonate, g/l	HSAC, g/l	Disodium Oxalate, g/l	Time, s	Concentration of Calcium ions, ppm
1	1.5	0.5	0.1	30	1.2
2	1.5	0.5	0.1	60	0.7
3	1.5	0.5	0.15	30	1.0
4	1.5	0.5	0.15	60	0.4
5	1.5	0.5	0.3	30	0.28
6	1.5	0.5	0.3	30	0.96

[0032] The data in Table-2 when compared to data in Table - 1 indicates that the builder system of the invention provides for relatively faster building kinetics as compared to builder systems of the prior art.

Comparative Example H and Examples 7 and 8:

[0033] These are examples pertaining to the performance of builder systems as per the invention (Examples 7, 8) as compared to prior art building system (Comparative Example - H).

[0034] Various builder compositions were prepared and added to hard water containing 200 ppm Calcium ions at concentrations (in grams per litre or g/l) as shown in Table -3. The building efficacy was studied by measuring the Ca^{2+} ion concentration, 2 minutes after addition of the compositions and the data is presented in Table -3. The method of determining Ca^{2+} concentration is same as given earlier:

Table - 3

Example	Sodium carbonate, g/l	HSAC, g/l	Oxalic acid, g/l	Concentration of Calcium ions, ppm
Comparative Example H	1.5	0.5	0	1.2
Example 7	1.5	0.5	0.3	0.4
Example 8	1.5	0.5	0.42	0.28
Note: Oxalic acid was used in the above experiments in a particle size of < 0.075 mm.				

[0035] The data in Table-3 indicates that inclusion of a dicarboxylic acid viz. Oxalic acid in a Sodium Carbonate/Calcite building system provides for more efficient building as compared to builder system of the prior art.

Comparative Examples I to N and Examples 9 to 11:

[0036] These examples relate to the cleaning performance of fabrics cleaned with detergent compositions of the invention compared to commercial detergent products.

[0037] Detergent compositions were used to clean various test monitors as shown in Table -4. WFK10D (composite soil on cotton fabric) had an initial reflectance of about 45, WFK20D (composite soil on poly-cotton fabric) of about 40 and WFK30D (composite soil on polyester fabric) of about 40. All detergent compositions had sodium linear alkyl benzene sulphonate as the active surfactant at about 0.7 g/l in the wash liquor. The builder systems of the various detergent compositions in the wash liquor were as follows:

SURF EXCEL™ : 1.02 g/l STPP + 0.89 g/l sodium carbonate + 0.07 g/l HSAC
RIN ADVANCED™ : 0.16 g/l STPP + 1.4 g/l sodium carbonate + 0. 3 g/l HSAC
Examples 9 to 11: 1.5 g/l sodium carbonate + 0.5 g/l HSAC+ 0. 4 g/l disodium oxalate.
STPP is sodium tri poly phosphate.

[0038] The cost of the compositions as per the invention (Examples 9 to 11) is comparable to the RIN ADVANCED™ composition and about 30% lower than the SURF EXCEL™ composition. The water used for cleaning had hardness value of 48 FH. The protocol used for cleaning is given below.

[0039] The experiments were carried out in a Tergo-to-meter. The various compositions were dissolved in the tergo-o-meter pot for 10 minutes at 90 rpm speed. The test monitors were soaked in the solution for 15 minutes followed by 30 minutes of wash cycle in the pot at 90 rpm. The test monitors were then rinsed three times at a liquid to cloth ratio of 25.

[0040] The test monitors were then dried. The reflectance of the monitors was then measured. Average of reflectance data (ΔR 460) on three different monitors was taken.

[0041] The data on the reflectance is given in Table -4 below.

Table - 4

Examples	Product	Test Monitor	ΔR 460
Comparative Example I	SURF EXCEL™	WFK10D	20.0
Comparative Example J	RIN ADVANCED™	WFK10D	17.4
Example 9	As per invention	WFK10D	19.6
Comparative Example K	SURF EXCEL™	WFK20D	14.9
Comparative Example L	RIN ADVANCED™	WFK20D	12.2
Example 10	As per invention	WFK20D	17.8
Comparative Example M	SURF EXCEL™	WFK30D	16.7
Comparative Example N	RIN ADVANCED™	WFK30D	14.3
Example 11	As per invention	WFK30D	19.2

[0042] The data in Table -4 indicates that detergent composition according to the invention provides same or superior cleaning as compared to one of the best commercial detergent product SURF EXCEL™, but at lower cost. Further the detergent composition of the invention provides superior cleaning for all test monitors as compared to RIN ADVANCED™, at same cost.

Claims

1. A builder system for a detergent composition comprising:

(i) a water soluble alkali metal carbonate;
(ii) 5% to 50% by weight of the builder system, a seed for precipitating Calcium carbonate, which is Calcium carbonate; and

(iii) a co-builder which is a di-carboxylic acid or a salt thereof, wherein said co-builder has an average particle size less than 150 microns.

2. A builder system as claimed in claim 1 wherein said co-builder has water solubility of more than 1 g/l at 25˚C.

3. A builder system as claimed in any one of the preceding claims wherein said di-carboxylic acid is selected from oxalic acid, malonic acid or succinic acid.

4. A builder system as claimed in any one of the preceding claims wherein said co-builder is present in an amount in the range of 2 to 20 % by weight of the builder system.

5. A builder system as claimed in any one of the preceding claims wherein said alkali metal carbonate is present in an amount in the range of 10 to 90 % by weight of the builder system.

6. A process to prepare a builder system for a detergent composition comprising mixing powders of a water soluble alkali metal carbonate, 5% to 50% by weight of the builder system a seed for precipitating Calcium carbonate, which is Calcium carbonate; and a co-builder which a dicarboxylic acid or a salt thereof, said co-builder having an average particle size of less than 150 microns.

7. A process to prepare a builder system for a detergent composition as claimed in claim 6, comprising the steps of:

(i) dissolving dicarboxylic acid or salts thereof in water to form a solution;
(ii) dry mixing powders of a water soluble alkali metal carbonate with 5% to 50% by weight of the builder system a seed for precipitating Calcium carbonate, which is Calcium carbonate to form a powder mix; and
(iii) mixing said solution from step (i) with the powder mix of step (ii).

8. A detergent composition comprising:

(i) a builder system as claimed in any one of the preceding claims 1 to 5; and,
(ii) a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class.

9. A detergent composition as claimed in claim 8 wherein said builder system is present in an amount in the range of 5 to 80% by weight of the detergent composition.

10. A process to prepare a detergent composition comprising the step of dry mixing powders of a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class with the builder system as claimed in any one of the preceding claim 1 to 5.

11. A process to prepare a detergent composition comprising the steps of:

(i) dissolving a dicarboxylic acid or salts thereof in water to form a solution said acid or salts thereof having an average particle size of less than 150 microns;
(ii) dry mixing powders of a surfactant selected from any one of the anionic, non-ionic, cationic, zwitterionic or amphoteric class with a water soluble alkali metal carbonate and 5% to 50% by weight of the builder system a seed for precipitating Calcium, which is Calcium carbonate, to form a powder mix; and
(iii)mixing said solution from step (i) with the powder mix of step (ii).

Patentansprüche

1. Builder-System für ein Waschmittel, umfassend:

(i) ein wasserlösliches Alkalimetallcarbonat;
(ii) 5 bis 50 Gewichts-%, bezogen auf das Builder-System, an Impfmaterial zum Präzipitieren von Calciumcarbonat, das Calciumcarbonat ist, und
(iii) einen Co-Builder, der eine Dicarbonsäure oder ein Salz davon ist, wobei der Co-Builder eine durchschnittliche Partikelgröße von weniger als 150 Mikrometer hat.

2. Builder-System, wie es in Anspruch 1 beansprucht ist, wobei der Co-Builder eine Wasserlöslichkeit von mehr als 1 g/l bei 25 ˚C hat.

3. Builder-System, wie es in einem der vorangehenden Ansprüche beansprucht wird, wobei die Dicarbonsäure aus Oxalsäure, Malonsäure und Bernsteinsäure ausgewählt ist.

4. Builder-System, wie es in einem der vorangehenden Ansprüche beansprucht wird, wobei der Co-Builder in einer Menge im Bereich von 2 bis 20 Gewichts-%, bezogen auf das Builder-System, vorliegt.

5. Builder-System, wie es in einem der vorangehenden Ansprüche beansprucht wird, wobei das Alkalimetallcarbonat in einer Menge im Bereich von 10 bis 90 Gewichts-%, bezogen auf das Builder-System, vorliegt.

6. Verfahren zur Herstellung eines Builder-Systems für ein Waschmittel, umfassend Mischen von Pulvern eines wasserlöslichen Alkalimetallcarbonats, von 5 bis 50 Gewichts-%, bezogen auf das Builder-System, Impfmaterial zum Präzipitieren von Calciumcarbonat, welches Calciumcarbonat ist, und eines Co-Builders, der eine Dicarbonsäure oder ein Salz davon ist, wobei der Co-Builder eine durchschnittliche Partikelgröße von weniger als 150 Mikrometer hat.

7. Verfahren zur Herstellung eines Builder-Systems für ein Waschmittel, wie in Anspruch 6 beansprucht, umfassend die Schritte:

(i) Lösen von Dicarbonsäure oder Salzen davon in Wasser unter Bildung einer Lösung;
(ii) trockenes Mischen von Pulvern eines wasserlöslichen Alkalimetallcarbonats mit 5 bis 50 Gewichts-%, bezogen auf das Builder-System, eines Impfmaterials zum Präzipitieren von Calciumcarbonat, welches Calciumcarbonat ist, unter Bildung einer Pulvermischung und
(iii) Mischen der Lösung aus Schritt (i) mit der Pulvermischung von Schritt (ii).

8. Waschmittel, umfassend:

(i) ein Builder-System, wie es in einem der vorangehenden Ansprüche 1 bis 5 beansprucht wird, und
(ii) ein Tensid, ausgewählt aus einer der anionischen, nicht-ionischen, kationischen, zwitterionischen oder amphoteren Klassen.

9. Waschmittel, wie es in Anspruch 8 beansprucht wird, wobei das Builder-System in einer Menge im Bereich von 5 bis 80 Gewichts-% des Waschmittels vorliegt.

10. Verfahren zur Herstellung eines Waschmittels, umfassend den Schritt des trockenen Mischens von Pulvern eines Tensids, ausgewählt aus einer der anionischen, nicht-ionischen, kationischen, zwitterionischen oder amphoteren Klassen, mit dem Builder-System, wie es in einem der vorangehenden Ansprüche 1 bis 5 beansprucht wird.

11. Verfahren zur Herstellung eines Waschmittels, umfassend die Schritte:

(i) Lösen einer Dicarbonsäure oder von Salzen davon in Wasser unter Bildung einer Lösung, wobei die Säure oder Salze derselben eine durchschnittliche Partikelgröße von weniger als 150 Mikrometer haben;
(ii) trockenes Mischen von Pulvern eines Tensids, ausgewählt aus einer der anionischen, nicht-ionischen, kationischen, zwitterionischen oder amphoteren Klassen, mit einem wasserlöslichen Alkalimetallcarbonat und von 5 bis 50 Gewichts-%, bezogen auf das Builder-System, Impfmaterial zum Präzipitieren von Calcium, welches Calciumcarbonat ist, um eine Pulvermischung zu bilden, und
(iii) Mischen der Lösung aus Schritt (i) mit der Pulvermischung von Schritt (ii).

Revendications

1. Système adjuvant de détergence destiné à une composition détergente, qui comprend :

(i) un carbonate de métal alcalin soluble dans l'eau ;
(ii) de 5 % à 50 % en poids du système adjuvant de détergence d'un germe cristallin destiné à précipiter le carbonate de calcium, qui est un carbonate de calcium ; et

(iii) un co-adjuvant qui est un acide dicarboxylique ou un sel de celui-ci, ledit co-adjuvant ayant une taille moyenne de particules inférieure à 150 microns.

2. Système adjuvant de détergente selon la revendication 1, ledit co-adjuvant ayant une solubilité dans l'eau supérieure à 1 g/L à 25 ˚C.

3. Système adjuvant de détergence selon l'une quelconque des revendications précédentes, ledit acide dicarboxylique étant choisi parmi l'acide oxalique, l'acide malonique ou l'acide succinique.

4. Système adjuvant de détergence selon l'une quelconque des revendications précédentes, ledit co-adjuvant étant présent en une quantité dans la plage de 2 à 20 % en poids du système adjuvant de détergence.

5. Système adjuvant de détergence selon l'une quelconque des revendications précédentes, ledit carbonate de métal alcalin étant présent en une quantité variant de 10 à 90 en poids du système adjuvant de détergence.

6. Procédé de préparation d'un système adjuvant de détergence destiné à une composition détergente qui comprend le mélange de poudres d'un carbonate de métal alcalin soluble, de 5 % à 50 % en poids du système adjuvant de détergence d'un germe cristallin destiné à précipiter le carbonate de calcium, qui est un carbonate de calcium ; et un co-adjuvant qui est un acide dicarboxylique ou un sel de celui-ci, ledit co-adjuvant ayant une taille moyenne de particules inférieure à 150 microns.

7. Procédé de préparation d'un système d'adjuvant de détergence destiné à une composition détergente selon la revendication 6, qui comprend les étapes consistant à :

(i) dissoudre l'acide dicarboxylique ou les sels de celui-ci dans l'eau pour former une solution ;
(ii) mélanger à sec les poudres d'un carbonate de métal alcalin soluble avec 5 % à 50 % en poids du système d'adjuvant de détergence d'un germe cristallin destiné à précipiter le carbonate de calcium, qui est le carbonate de calcium, pour former une mélange de poudres ; et
(iii) mélanger ladite solution de l'étape (i) avec le mélange de poudres de l'étape (ici).

8. Composition détergente qui comprend :

(i) un système adjuvant de détergente selon l'une quelconque des revendications 1 à 5 précédentes ; et
(ii) un tensioactif choisi dans l'une quelconque des classes anionique, non ionique, cationique, zwitterionique ou amphotère,

9. Composition détergente selon la revendication 6, ledit système adjuvant de détergence étant présent en une quantité dans la plage de 5 à 80 % en poids de la composition détergente.

10. Procédé de préparation d'une composition détergente qui comprend l'étape consistant à mélanger à sec des poudres d'un tensioactif choisi dans l'une quelconque des classes anionique, non ionique, cationique, zwitterionique ou amphotère avec le système adjuvant de détergence selon l'une quelconque des revendications 1 à 5 précédentes.

11. Procédé de préparation d'une composition détergente qui comprend les étapes consistant à :

(i) dissoudre un acide dicarboxylique ou des sels de celui-ci dans l'eau pour former une solution, ledit acide ou lesdits sels de celui-ci ayant une taille moyenne de particules inférieure à 150 microns ;
(ii) mélanger à sec des poudres d'un tensioactif choisi dans l'une quelconque des classes anionique, non ironique, cationique, zwitterionique ou amphotère avec un carbonate de métal alcalin soluble dans l'eau et de 5 % à 50 % en poids du système adjuvant de détergente d'un germe cristallin destiné à précipiter le carbonate de calcium, qui est du carbonate de calcium, pour former un mélange de poudres ; et
(iii) mélanger ladite solution de l'étape (i) avec le mélange de poudres de l'étape (ii).

REFERENCES CITED IN THE DESCRIPTION

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