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(54) Title: COMPOSITION

(57) Abstract: A laundry composition comprising defibrillated primary cell wall material comprising cellulose microfibrils, wherein the defibrillated primary cell wall material comprises at most 20 wt. % of water, based on the total weight of the fibrils; and wherein the cellulose has an average degree of crystallinity of less than 50 %, and wherein the defibrillated primary cell wall material comprises liquid polyols distributed between the fibrils.



COMPOSITION

Technical Field

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The invention relates to a laundry composition comprising defibrillated primary cell wall material comprising cellulose microfibrils, wherein the cellulose has a degree of crystallinity of less than 50 %.

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Background

The primary cell walls of plants comprises cellulose microfibrils, hemicellulose and pectin. In native primary cell walls the cellulose microfibrils are tethered by the hemicellulose and bound in the pectin matrix to form a rigid 2D structure. Primary cell wall material is widely available, also on industrial scale, in the form of waste streams, e.g. from the citrus processing industry. It is known that such primary cell wall material, optionally after de-pectinizing, can undergo defibrillation (also known as activation) by high shear treatment. An example is high-pressure homogenization in the presence of an aqueous medium. In the defibrillated primary cell wall material the cellulose fibrils are disentangled and rearranged from the mostly 2D structure into a more 3D structure. As a result, the surface area of the primary cell wall material is expanded and with the greater surface area provides improved functionality or structuring to the aqueous media. When used in products as part of an aqueous-phase this allows for improved e.g. thickening, freeze-thaw stability and/or foam stability of the products in which they are present.

The cellulose degree of crystallinity is characteristic for the source of material used. For example, bacterial cellulose or wood pulp cellulose (i.e. or paper-pulp cellulose) has a degree of crystallinity of greater than 50 %. The cellulose derived from the primary cell walls of non-wood plant parts, (e.g. citrus fruits) has a crystallinity of 50 % or less.

For reasons of reducing bulk and energy for transport, it is desirable to provide defibrillated primary cell wall material in dry form. However once dried such compositions again need very high shear treatment to fully recover the structuring

properties in aqueous media. This is undesirable as high-shear equipment increases cost and energy input to manufacture products using the dry defibrillated primary cell wall material. Furthermore, this may also limit its applicability to products comprising shear sensitive ingredients. For example, many liquid laundry products contain
5 encapsulated materials, which can be sensitive to high-shear treatment.

US2001/0004869 A1 describes the use of co-additives, homogenized together with the nanofibrils (microfibrils), to provide a composition in dry form, which can be more readily dispersed in water. In particular it describes the use of one or more co-additives
10 chosen from carboxymethyl cellulose with a degree of substitution of at most 0.95, saccharide monomers or oligomers, certain compounds of the formula $(R_1R_2N)COA$ and/or cationic or amphoteric surfactants. In the first place the required use of carboxymethyl cellulose is undesirable as it is a chemically modified form of cellulose, which reduced consumer acceptance for the products comprising it. Secondly, it was
15 observed that when using such co-additives the functionality of the cellulose nanofibril composition in dry form leaves to be desired as incomplete recovery of the functional properties was observed, in particular when low-shear mixing is used.

To clarify, it is not that dispersibility in water is the issue of the defibrillated primary cell wall material in dry form, but rather the recovery of the functional properties imparted
20 by the defibrillated cell wall material to an aqueous medium. This is believed due to the fact that upon drying the defibrillated material forms clumps which as such can be readily dispersed, but to recover the original functional properties, the clumps themselves require further disruption and de-agglomeration, requiring high shear.

25 It is an object of the present invention to provide a composition comprising dry defibrillated primary cell wall material comprising cellulose microfibrils, wherein the cellulose has a degree of crystallinity of less than 50 %, which can provide improved structuring to liquid media, preferably aqueous media, under low-shear mixing.

30 Furthermore, in view of improved consumer acceptance of short ingredient lists, it is desirable that the solution involves no further ingredients other than those already found in the products of which a liquid medium is structured by the defibrillated primary cell wall material. This is particularly the case for regularly used (daily/weekly) home
35 and personal cleaning products.

Summary of the Invention

Accordingly, the present invention provides a composition according to claim 1.

The invention further relates to a process for the manufacture of a composition

5 according to claim 1 comprising the steps of:

- a) Providing a composition according to claim 1;
- b) Providing further ingredients comprising at least a water-phase;
- c) Mixing the ingredients provided at step a) and b) under low shear to provide a cleaning product.

10

Liquid polyols distributed between the fibrils improve the recovery of defibrillated fibrils comprising at most 20 wt. % of water, based on the total weight of the fibrils, upon mixing with a water-phase. This allows improved structuring upon low shear mixing with a water-phase. This allows the process for the manufacture of a structured liquid

15 laundry composition to use low-shear equipment, which therefore is much more efficient. Further, it was observed that the recovery is improved when compared to use of e.g. sucrose and/or sorbitol distributed between said fibrils, which are non-liquid polyols.

20 **Detailed Description**

Any feature of a particular embodiment of the present invention may be utilised in any other embodiment of the invention. The word "comprising" is intended to mean

25 "including" but not necessarily "consisting of" or "composed of". In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and are not intended to limit the invention to those examples per se. All weight percentages (wt. %) are based on the final weight of the composition unless otherwise indicated. Similarly, all volume percentages (vol. %) are based on the final volume of the composition unless

30 otherwise indicated. Except in the examples and comparative experiments, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about". Unless specified otherwise, numerical ranges expressed in the format "from x to y" are understood to include x and y. When
35 for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also

contemplated. For the purpose of the invention ambient (or room) temperature is defined as a temperature of about 20 degrees Celsius.

Composition

- 5 Preferably the defibrillated primary cell wall material comprises at most 15 wt. %, more preferably at most 12 wt. %, even more preferably at most 10 wt. % and still even more preferably at most 8 wt. % of water, based on the total weight of the fibrils.

- As such the defibrillated primary cell wall material may optionally comprise (e.g.
10 encapsulated) water as long as it remains sufficiently dry. Preferably the defibrillated primary cell wall material of the composition according to the invention comprises at most 20 wt. %, preferably at most 15 wt. %, more preferably at most 12 wt. %, even more preferably at most 10 wt. % and still even more preferably at most 8 wt. % of water, preferably as based on the total weight of the fibrils.

15

- The composition according to the invention preferably comprises further ingredients to form an instant laundry cleaning product composition. The cleaning product can be suitably diluted by a consumer by adding an appropriate amount of water and shaking (i.e. low-shear mixing). The benefit of such instant cleaning product compositions is
20 that the energy/volume and weight of the compositions are reduced when compared to the final cleaning product composition made by addition of water by the consumer. Another benefit of such instant cleaning product compositions is that the concentration of cleaning agents for application can be chosen by the consumer by appropriate dilution with water to suit the specific cleaning needs. For example for difficult and/or
25 concentrated stains the consumer may choose to add less water. For example, for to clean large surfaces having low to medium staining, the consumer can choose to add more water. As such the instant cleaning product compositions according to the invention also aid application flexibility for the consumer and allows for more effective cleaning based on the cleaning task chosen.

30

Preferably the instant cleaning product compositions is in the form of a powder or paste, preferably a powder and more preferably a free-flowing powder.

Primary cell wall material

- 35 In general, primary cell wall material typically contains cellulose microfibrils, hemicellulose, pectin and in many cases lignin. This contrasts with the cell walls of

fungi (which are made of chitin), and of bacteria, which are made of peptidoglycan. Primary plant cell walls contain lignin only in minor amounts, if at all. The primary cell wall material according to the invention may comprise some lignin, preferably at most 10 wt. %, calculated on total amount of cell wall material, and more preferably does not contain substantial amounts of lignified tissue. Even more preferably the primary cell wall material consists essentially of non-lignified tissue as understood by the skilled person in the area of plant biology. Preferably at least 50 wt. %, more preferably at least 75 wt. %, even more preferably at least 90 wt. % of the primary cell wall material is derived from plant parenchymal tissue. The source of the plant parenchyma cells may be any plant that contains plant parenchyma cells having a cellulose skeleton.

Preferably the primary cell wall material comprises primary cell wall material derived from (preferably the parenchymal tissue of) fruits, roots, bulbs, tubers, seeds, leaves and combinations thereof; more preferably is derived from citrus fruit, tomato fruit, peach fruit, pumpkin fruit, kiwi fruit, apple fruit, mango fruit, sugar beet, beet root, turnip, parsnip, maize, oat, wheat, peas and combinations thereof; and even more preferably is derived from citrus fruit, tomato fruit and combinations thereof. The most preferred source of primary cell wall material is from (preferably the parenchymal tissue of) citrus fruit. The citrus family is a large and diverse family of flowering plants. Common varieties of the citrus fruit include oranges, sweet oranges, clementines, kumquats, tangerines, tangelos, satsumas, mandarins, grapefruits, citrons, pomelos, lemons, rough lemons, limes and leech limes.

The primary cell wall material preferably has undergone several pre-treatment steps before it is defibrillated. Such pre-treatments preferably comprise one or more steps of heating, cooking, washing, refining, depectinating; and more preferably comprise the steps of washing and/or depectinating. Preferably the "primary cell wall material" is primary cell wall material from which most (i.e. more than 50 wt. %) of all water-soluble components, and preferably essentially all, water soluble components have been removed. Water-soluble components being components, which can be removed by washing with water at a temperature of 20 degrees Celsius. Preferably the source of primary cell wall material is in the form of a washed paste or pulp. Such are commercially available from Herbafood (Citrus fiber AQ + N).

Plant cell walls, especially in parenchymal tissue contain hemicelluloses and pectin in addition to cellulose microfibrils. However, the primary cell wall material of the

invention need not contain hemicellulose and/or pectin. The hemicellulose may have been (partly) removed when the primary cell wall material is prepared/pre-treated.

Preferably the primary cell wall material comprises at most 40 wt. %, more preferably at most 30 wt. %, even more preferably at most 20 wt. % and still even more preferably at most 5 wt. % of hemicelluloses, based on the total dry weight of the primary cell wall material. Likewise, the pectin may have been (partly) removed when the primary cell wall material prepared/pre-treated. Preferably the primary cell wall material comprises at most 30 wt. %, more preferably at most 25 wt. %, even more preferably at most 20 wt. % and still even more preferably at most 5 wt. % of pectin, based on the total dry weight of the primary cell wall material.

Cellulose microfibrils

Cellulose microfibrils are well-known in the art. A typical microfibril generally comprises 20 to 50 aligned beta-1-4-glucose polymer chains. In native primary cell wall material, cellulose microfibrils can be (partly) present in the form of aggregates building the cell wall.

Preferably the primary cell wall material according to the invention comprises at least 50 wt. %, more preferably at least 60 wt. %, even more preferably at least 70 wt. %, still more preferably at least 80 wt. % and still even more preferably at least 90 wt. % of cellulose microfibrils, based on total the dry weight of the primary cell wall material. Still even more preferably the primary cell wall material consists essentially of cellulose microfibrils.

The weight percentage of cellulose microfibrils in the primary cell wall material preferably is increased by removing soluble and unbound sugars, protein, polysaccharides, oil soluble oils, waxes and phytochemicals (e.g. carotenoids, lycopene). This is suitably achieved using well-known techniques including cutting up the cell wall material, cooking, washing, centrifugation, decanting and drying as is well-known to the skilled person.

The composition of the invention comprises defibrillated cell wall material, i.e. the cellulose microfibrils that are present in the primary cell wall are at least partially disentangled, preferably without substantially breaking them. Preferably the average length of the cellulose microfibrils in the defibrillated primary cell wall material is more than 1 micrometer and preferably more than 5 micrometers.

Preferably at least 80 wt. % of the cellulose microfibrils is smaller than 50 nm in diameter, more preferably is smaller than 40 nm in diameter, even more preferably is smaller than 30 nm, still even more preferably is smaller than 20 nm and still even more preferably is smaller than 10 nm. The microfibril diameter is determined using the following method using transmission electron microscopy (TEM) according to (D. Harris et. al. Tools for Cellulose Analysis in Plant Cell Walls Plant Physiology, 2010(153), 420). In particular, a dispersion of plant source rich in primary cell wall material is diluted in distilled water resulting in a thin layer. These dispersions are then imaged on a Carbon only 300 mesh Copper TEM grid (Agar Scientific) using a Tecnai 20 Transmission electron microscope (FEI Company) operated at a voltage of 200 kV. To enhance image contrast between individual microfibrils, a 2 % phosphotungstic acid solution at pH 5.2 is used as a negative stain. To do this the fiber-loaded TEM grids are incubated with 2% phosphotungstic acid and air-dried after removal of the excess of fluid.

15

The cellulose microfibrils according to the invention preferably have an average degree of crystallinity of less than 50%. Preferably the average degree of crystallinity of the cellulose in the microfibrils is at most 40%, more preferably at most 35% and even more preferably at most 30%.

20

Table 1 shows the average degree of crystallinity of typical sources of cellulose microfibrils. It shows that the cellulose in primary cell wall material sourced from plant parenchymal tissue typically has a degree of crystallinity of less than 50 wt. %.

25

Table 1: Average degree of crystallinity of cellulose (all polymorph cellulose I).

Source	Average degree of crystallinity (%)
Tomato fibers	32
Citrus fiber (Citrus Fiber AQ+N)	29
Nata de Coco	74
Cotton	72
Wood pulp fiber (Meadwestvaco)	61
Sugar beet fibre (Nordix Fibrex)	21
Pea fibres (PF200vitacel)	42
Oat fibres (780 Sunopta)	43
Corn hull (Z-trim)	48
Sugar cane Fiber (Ultracel)	49

30

The average degree of crystallinity is measured according to the following method using wide angle X-ray scattering (WAXS) with the following protocol. The measurements are performed on a Bruker D8 Discover X-ray diffractometer with GADDS (General Area Detector Diffraction System) (From Bruker-AXS, Delft, NL) (Part
 5 No: 882-014900 Serial No: 02-826) in a theta/theta configuration. A copper anode is used, and the K- alpha radiation with wavelength 0.15418 nm is selected. The used instrumental parameters are shown in table 2.

10 **Table 2: D8 Discover instrumental parameters for WAXS measurements.**

	2 θ (9 – 42°)
Theta 1	10.000
Theta 2	10.000 / 25.000
Detector Bias (kV / mA)	40 / 40
Time (sec)	300
Collimator (mm)	0.3
Detector distance (cm)	25
Tube Anode	Cu

The average degree of crystallinity (X_c) is calculated from the following equation:

15
$$X_c (\%) = \frac{\text{Area crystalline phase}}{\text{Area crystalline} + \text{amorphous phase}} * 100\%$$

The areas of the diffraction lines of the crystalline phase are separated from the area of the amorphous phase by using the Bruker EVA software (version 12.0).

20 Liquid polyols

Liquid polyols are alcohols comprising multiple (i.e. more than one) hydroxyl group. For example, liquid polyols do not cover all of the sugar alcohols, such as sorbitol or sucrose as these are not liquid at ambient conditions. Preferably the liquid polyol has a molecular weight of at most 400 MW and more preferably is one or more of glycerol,
 25 diglycerol, monopropylene glycol, dipropylene glycol, ethylene glycol and polyethylene glycol. Even more preferred polyethylene glycols are diethylene glycol and triethylene glycol.

The liquid polyols may be monomeric or polymeric polyols as long as they are liquid.

30 Preferably the liquid polyols are monomeric.

Preferably the polyols comprise from 2 to 50, more preferably from 2 to 20, even more preferably from 2 to 10, still even more preferably from 2 to 5 and still even more preferably 2 hydroxyl groups.

- 5 With “distributed between the fibrils” is herein understood that the liquid polyols are in contact with at least part of the cellulose microfibril surface area. It was surprisingly observed that the presence of said liquid polyols distributed between the fibrils reduces the energy/shear requirement for the defibrillated material comprising at most 20 wt. % of water, based on the total dry-weight of the fibrils, to recover its structuring capacity
10 upon mixing with an aqueous medium.

- Preferably the total amount of liquid polyols according to the invention distributed between the fibrils in the composition according to the invention is at least 15 wt. %, more preferably is from 20 to 1000 wt. %, even more preferably is from 25 to 500 wt. %
15 and still even more preferably is from 30 to 400 wt. %, based on the dry-weight of the primary cell wall material. In particular it was observed that use of liquid polyols at a level of at least 15 wt. %, based on the dry-weight of the primary cell wall material provided further improved recovery of the structuring capacity.

- 20 The liquid polyols according to the invention are preferably water-soluble. This allows for improved distribution between the fibrils leading to improved recovery of the structuring capacity. More preferably they are water-soluble at a concentration of 0.2 wt. %, even more preferably at a concentration of 0.5 wt. %, still even more preferably at a concentration of 1.0 wt. % and still even more preferably at a
25 concentration of 2.0 wt. % when measured in (pure) water at ambient conditions.

Method to manufacture the composition

- At step a) of the process to manufacture the composition according to the invention, the primary cell wall material comprising cellulose microfibrils is defibrillated by
30 subjecting it to sufficient mechanical energy (e.g. shear). The source of primary cell wall material preferably is non-defibrillated, however already defibrillated material can suitable be used (and converted to a composition according to the invention comprising liquid polyols distributed between the fibrils). Non-defibrillated primary cell wall material as such and without the presence of liquid polyols distributed between the fibrils is
35 commercially available, for example as fruit and vegetable purees, Herbacel AQ Plus citrus fibre (Supplier: Herbafoods).

Suitable defibrillation techniques are known in the art. Defibrillation is preferably carried out using high shear treatment, pressure homogenization, cavitation, explosion, pressure increase and pressure drop treatments, colloidal milling, intensive blending, extrusion, ultrasonic treatment, extrusion, grinding, and combinations thereof and more preferably by pressure homogenization treatment. Preferred homogenizers include high-pressure homogenizers manufactured by GEA Niro Soavi of Parma (Italy), such as the NS Series, or the homogenizers of the Gaulin and Rannie series manufactured by APV Corporation of Everett, Massachusetts (US). Preferred pressures when using high-pressure homogenizers are from 500 bar to 2000 bar, more preferably between 600 bar and 1000 bar. Preferably extrusion, grinding or a combination thereof is used to defibrillate primary cell wall material comprising cellulose microfibrils at higher concentration of from 5 to 50 wt.%.

The defibrillation is performed in the presence of an aqueous medium. Preferably the aqueous medium comprises at least 50 wt. %, more preferably at least 75 wt. % and even more preferably at least 90 wt. % of water. The defibrillation can be done as part of the process for obtaining the primary cell wall material. The defibrillation treatment can be arrived at by a single or a succession of treatments. The amount of aqueous medium at step a) can vary but preferably is such that a liquid slurry is formed. Preferably at step a) the amount of aqueous medium is at least 1 times, preferably at least 5 times, more preferably from 10 to 500 times and even more preferably from 20 to 200 times the amount of primary cell wall material, wherein the latter is based on dry-weight.

At step b) the water content of the mixture obtained at step a) is reduced. Depending on other liquids present, the final composition according to the invention is in the form of a paste, cake or powder, preferably is in the form of a cake or powder and more preferably is in the form of a powder. It will be appreciated that a cake can suitably be modified into a powder by appropriate milling. Preferably the powder is a free-flowing powder. The reducing of water at step b) can be done using techniques known in the art. Preferably the amount of water is reduced using evaporation and/or filtration.

In a preferred method to manufacture the composition according to the invention after step a) and before step b) the defibrillated primary cell wall material in aqueous medium is contacted with an organic solvent to obtain a precipitate phase and a liquid phase, followed by separating said precipitate phase from the liquid phase to obtain a

semi-dry cake of the defibrillated primary cell wall material having a dry substance-content of at least 10 wt. % relative to the mass of said cake. The cake may subsequently be further treated in step b) as the mixture. Said preferred precipitation step further improves the capacity of the composition the recover and structure a
5 water-phase.

Preferably the liquid polyols are added at step a).

Preferably the amount of liquid polyols added is at least 15 wt. %, based on the dry-weight of the primary cell wall material in the final composition according to the
10 invention, more preferably is from 20 to 1000 wt. %, even more preferably is from 25 to 500 wt. % and still even more preferably is from 30 to 400 wt. %.

Preferably e.g. for the manufacture of an instant cleaning product composition optional further ingredients are added after step b).

15

Process for the manufacture of the cleaning product - step a)

The invention further relates to use of the composition according to the invention to manufacture a laundry cleaning composition comprising a water-phase, which allows use of low-shear mixing step.

20

Preferably the amount of the composition according to the invention added at step a) of the process to manufacture the cleaning product, is from 0.01 to 4.0 wt. %, based on the dry weight of the defibrillated primary cell wall material comprising cellulose microfibrils comprised by the composition. The amount of defibrillated cell wall material
25 is suitably selected to obtain the desired effect and depends on the overall product format. More preferably, the amount of the composition added is from 0.05 to 3.0 wt. %, even more preferably from 0.1 to 2.0 wt. %, still even more preferably from 0.11 to 1.5 wt. % and still even more preferably from 0.12 to 0.6 wt. %, based on the dry weight of the defibrillated primary cell wall material comprising cellulose microfibrils
30 comprised by the composition.

Preferably the water-phase of the final laundry product comprises from 0.01 to 10 wt. %, more preferably from 0.05 to 5 wt. % and even more preferably from 0.1 to 3 wt. % of defibrillated primary cell wall material based on the total weight of the water-
35 phase.

Process for the manufacture of a cleaning product - step b)

At step b) in the process for the manufacture of a cleaning product according to the invention a water-phase is provided. Preferably the total amount of water-phase provided at step b) is from 10 to 99 wt. %, more preferably from 30 to 90 wt. %, even
5 more preferably from 50 to 85 wt. % and still even more preferably from 60 to 80 wt. %, based on the total weight of the cleaning product.

The cleaning product according to the invention preferably is a laundry product and even more preferably is a liquid laundry product.

10

Further ingredients

At step b) further ingredients, besides at least a water-phase are added. Preferably the further ingredients are as typically found in the target cleaning product, which are known to the person skilled in the art. The amount of such further ingredients are
15 based on the final total weight of the cleaning product unless otherwise specified.

Surfactant

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention comprises surfactant. More preferably the cleaning product comprises
20 deterative surfactant. By deterative surfactant is meant that the surfactant provides a deterative (i.e. cleaning effect) to textile fabrics treated as part of a cleaning, preferably a laundering, process. Preferably, the deterative surfactant comprises anionic surfactant, nonionic surfactant or a mixture thereof and more preferably comprises anionic and nonionic surfactants.

25

Preferably the total amount of surfactant present is from 2 to 85 wt.%, more preferably from 3 to 60 wt.%, even more preferably from 4 to 40 wt.% and still even more preferably from 5 to 35 wt.%.

30 The amount of anionic surfactant or nonionic surfactant or the combination thereof preferably is from 0.5 to 95 wt. %, more preferably from 1 to 50 wt. % and even more preferably from 1.5 to 25 wt. %, based on total weight of surfactant. If a deterative surfactant mixture is used that incorporates both anionic and nonionic surfactants, then preferably the ratio of anionic surfactant to nonionic surfactant is from 10:1 to 1:10.

35

'Nonionic surfactant' is defined as amphiphilic molecules with a molecular weight of less than about 10,000, unless otherwise noted, which are substantially free of any functional groups that exhibit a net charge at the normal wash pH of 6-11. Any type of nonionic surfactant may be used. Nonionic surfactants preferably are fatty acid

5 alkoxyates and more preferably ethoxyates. Preferred ethoxyates have an alkyl chain of from C8 to C35, more preferably of from C10 to C24; and have preferably 3 to 25, more preferred 5 to 15 ethylene oxide groups. These are commercially available such as under Neodols from Shell (The Hague, The Netherlands); ethylene oxide/propylene oxide block polymers which may have molecular weight from 1,000 to 30,000, for

10 example, Pluronic (trademark) from BASF (Ludwigshafen, Germany); and alkylphenol ethoxyates, for example Triton X-100, available from Dow Chemical (Midland, Mich., USA).

'Anionic surfactants' are defined as amphiphilic molecules comprising one or more

15 functional groups that exhibit a net anionic charge when in aqueous solution at the normal wash pH of between 6 and 11. Preferred anionic surfactants are the alkali metal salts of organic sulphur reaction products having in their molecular structure an alkyl radical containing from about 6 to 24 carbon atoms and a radical selected from the group consisting of sulphonic and sulphuric acid ester radicals. More preferred

20 anionic surfactants are the alkali and alkaline earth metal salts of fatty acid carboxylates, fatty alcohol sulphates, preferably primary alkyl sulfates, more preferably they are ethoxylated, for example alkyl ether sulfates; and alkylbenzene sulfonates or mixtures thereof.

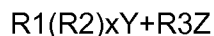
25 Preferably the cleaning product, more preferably the liquid laundry product, according to the invention comprises one or more of cationic, amphoteric surfactants and zwitterionic surfactants. Preferred cationic surfactants are quaternary ammonium salts of the general formula $R_1R_2R_3R_4N^+ X^-$, for example where R1 is a C12-C14 alkyl group, R2 and R3 are methyl groups, R4 is a 2 hydroxyethyl group, and X⁻ is a chloride

30 ion. This material is available commercially as Praepagen (Trade Mark) HY from Clariant GmbH, in the form of a 40 wt. % aqueous solution. Amphoteric surfactants are molecules that contain both acidic and basic groups and will exist as zwitterions at the normal wash pH of between 6 and 11. Preferably the amount of amphoteric or zwitterionic surfactant is from 0.1 to 20 wt. %, more preferably from 0.25 to 15 wt. %

35 and even more preferably from 0.5 to 10 wt. %. Suitable zwitterionic surfactants are exemplified as those which can be broadly described as derivatives of aliphatic

quaternary ammonium, sulfonium and phosphonium compounds with one long chain group having about 8 to about 18 carbon atoms and at least one water solubilizing radical selected from the group consisting of sulfate, sulfonate, carboxylate, phosphate or phosphonate. A general formula for these compounds is:

5



wherein R₁ contains an alkyl, alkenyl or hydroxyalkyl group with 8 to 18 carbon atoms, from 0 to 10 ethylene-oxy groups or from 0 to 2 glyceryl units; Y is a nitrogen, sulfur or
 10 phosphorous atom; R₂ is an alkyl or hydroxyalkyl group with 1 to 3 carbon atoms; x is 1 when Y is a sulfur atom and 2 when Y is a nitrogen or phosphorous atom; R₃ is an alkyl or hydroxyalkyl group with 1 to 5 carbon atoms and Z is a radical selected from the group consisting of sulfate, sulfonate, carboxylate, phosphate or phosphonate.

15 Preferred amphoteric or zwitterionic surfactants are betaine surfactants. More preferably these are one or more from the following list:
 Sulfobetaines, such as 3-(dodecyldimethylammonium)-1-propane sulfate; and 2-(cocodimethylammonium)-1-ethane sulfate. Sulfobetaines, such as: 3-(dodecyldimethyl-ammonium)-2-hydroxy-1-propane sulfonate; 3-(tetradecyl-
 20 dimethylammonium)-1-propane sulfonate; 3-(C₁₂-C₁₄ alkyl-amidopropyldimethylammonium)-2-hydroxy-1-propane sulfonate; and 3-(cocodimethylammonium)-1-propane sulfonate. Carboxybetaines, such as (dodecyldimethylammonium) acetate (also known as lauryl betaine); (tetradecyldimethylammonium) acetate (also known as myristyl betaine);
 25 (cocodimethylammonium) acetate (also known as coconut betaine); (oleyldimethylammonium) acetate (also known as oleyl betaine); (dodecyloxymethyldimethylammonium) acetate; and (cocoamido-propyldimethylammonium) acetate (also known as cocoamido-propyl betaine or CAPB). Sulfoniumbetaines, such as: (dodecyldimethylsulfonium) acetate; and 3-
 30 (cocodimethyl-sulfonium)-1-propane sulfonate. Phosphoniumbetaines, such as 4-(trimethylphosphonium)-1-hexadecane sulfonate; 3 (dodecyldimethylphosphonium)-1-propanesulfonate; and 2 (dodecyldimethylphosphonium)-1-ethane sulfate.

The cleaning product, more preferably the liquid laundry product, according to the
 35 present invention preferably comprise one or more of carboxybetaines or

sulphobetaines as amphoteric or zwitterionic surfactants and more preferably comprises lauryl betaine.

Bleaching agent

5 The cleaning product, more preferably the liquid laundry product, according to the invention preferably comprises bleaching agent. The bleaching agent component for use herein can be any bleaching agents suitable for use in detergency compositions such as oxygen bleaches as well as others known in the art. The bleaching agent can be activated or non-activated bleaching agent. Preferably the cleaning composition,
10 more preferably the liquid laundry composition, according to the invention comprises oxygen bleaching agent, halogen bleaching agent or a combination thereof. Preferred oxygen bleaching agents are percarboxylic acid bleaching agents and salts thereof and more preferably one or more of magnesium monoperoxyphthalate hexahydrate, the magnesium salt of meta-chloro perbenzoic acid, 4-nonylamino-4-oxoperoxybutyric
15 acid and diperoxydodecanedioic acid or combinations thereof. Preferably the halogen bleaching agents is one or more of hypohalite bleaching agents, such as trichloro isocyanuric acid and the sodium and potassium dichloroisocyanurates and N-chloro and N-bromo alkane sulphonamides. Preferably the bleaching agents are added in a total amount of from 0.5 to 10 wt.%, more preferably of from 1.0 to 5 wt.%.

20

Hydrogen peroxide releasing agents are preferably used in combination with a bleach activators. Preferably the hydrogen peroxide releasing agents is one or more of tetraacetylenediamine (TAED), nonanoyloxybenzene-sulfonate, 3, 5, - trimethylhexanoyloxybenzenesulfonate (ISONOBS), pentaacetylglucose (PAG), C8(6-octanamido-caproyl)oxybenzenesulfonate, C9(6-nonamido caproyl)
25 oxybenzenesulfonate and C10(6-decanamido caproyl)oxybenzene sulfonate.

Builder

Preferably the cleaning product, more preferably the liquid laundry product, according
30 to the invention comprises builder and more preferably comprises one or more of aluminosilicate materials, silicates, polycarboxylates and fatty acids, materials such as ethylenediamine tetraacetate, metal ion sequestrants such as aminopolyphosphonates. Even more preferably, the builder comprises zeolite A, citric acid or a combination thereof. The total amount of builder preferably is from 10 to 80 wt.%, more preferably
35 from 20 to 70 wt.% even more preferably from 30 to 60 wt.%.

Suds suppressor

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention comprises suds suppressor and more preferably a silica based suds suppressor, a silicon based suds suppressor or a mixture thereof. Even more preferably the suds suppressor comprises a mixture of silicone oils and 2-alkylalcanols. The silicones refer to alkylated polysiloxane materials. Silica is preferably used in finely divided forms exemplified by silica aerogels and xerogels and hydrophobic silicas of various types. Preferably the total amount of suds suppressors is from 0.001 to 2 wt. % and more preferably from 0.01 to 1 wt. %.

Polymers

Preferably the cleaning product, more preferably the liquid laundry composition, according to the invention, comprises one or more polymers. Anti-redeposition polymers can assist in the cleaning process by helping to retain soil in solution or suspension. Dye transfer inhibitors prevent the transfer of dyes in the wash. Soil release polymers can assist in the soil removal process. Conditioning polymers can provide conditioning benefits to fabric, and deposition enhancing polymers can aid the deposition of fabric care agents onto the fabric. Some polymers may have dual or multi functions. Anti-redeposition polymers are designed to suspend or disperse soil.

A typical anti-redeposition polymer is an ethoxylated and or propoxylated polyethylene imine or polycarboxylate material, for example, acrylic acid based homo or copolymers available under the trade mark ACUSOL from Dow Chemical, Alcosperse from Akzonobel or Sokolan from BASF. Other anti-redeposition polymers include methylcellulose, carboxymethylcellulose and hydroxyethylcellulose, and homo- or copolymeric polycarboxylic acids or their salts. Preferably the total amount of anti-redeposition agent is from 0.5 to 10 wt. %, more preferably from 0.75 to 8 wt. % and even more preferably from 1 to 6 wt. %. A particularly preferred class of anti-redeposition polymer for use in the product is polyethylene imine, preferably modified polyethylene imine. Polyethylene imines are materials composed of ethylene imine units $-\text{CH}_2\text{CH}_2\text{NH}-$ and, where branched, the hydrogen on the nitrogen is replaced by another chain of ethylene imine units. These polyethyleneimines can be prepared, for example, by polymerizing ethyleneimine in the presence of a catalyst for example carbon dioxide, sodium bisulphite, sulphuric acid, hydrogen peroxide, hydrochloric acid, acetic acid, and the like. Specific methods for preparing these polyamine backbones are disclosed in U.S. Pat. No. 2,182,306, Ulrich et al., issued Dec. 5, 1939; U.S. Pat.

No. 3,033,746, Mayle et al., issued May 8, 1962; U.S. Pat. No. 2,208,095, Esselmann et al., issued Jul. 16, 1940; U.S. Pat. No. 2,806,839, Crowther, issued Sep. 17, 1957; and U.S. Pat. No. 2,553,696, Wilson, issued May 21, 1951. Preferably, the EPEI comprises a polyethyleneimine backbone of about 300 to about 10000 weight average
5 molecular weight; wherein the modification of the polyethyleneimine backbone is intended to leave the polymer without quaternisation. Such nonionic EPEI may be represented as PEI(X)YEO where X represents the molecular weight of the unmodified PEI and Y represents the average moles of ethoxylation per nitrogen atom in the polyethyleneimine backbone. The ethoxylation may range from 9 to 40 ethoxy moieties
10 per modification, preferably it is in the range of 16 to 26, most preferably 18 to 22. If included, the polyethyleneimine polymer is present in the product preferably at a level of from 0.01 to 25 wt. %, more preferably of from 2 to 9.5 wt. %, even more preferably from 3 to 9 wt. %; and preferably with a ratio of non-soap surfactant to EPEI of from 2:1 to 7:1, more preferably from 3:1 to 6:1.

15

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention includes at least 0.5 wt. % of a soil release polymer which is substantive to polyester fabric. Such polymers typically have a fabric substantive midblock formed from propylene terephthalate repeat units and one or two end blocks
20 of capped polyalkylene oxide, typically PEG 750 to 2000 with methyl end capping.

Preferably the cleaning product, more preferably liquid laundry product, according to the invention, comprise 'dye-transfer inhibitor' polymers. These prevent migration of dyes, especially during long soak times. Generally, such dye-transfer inhibiting agents
25 include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, manganese phthalocyanine, peroxidases, and mixtures thereof, and are usually present at a level of from 0.01 to 10 wt. % based on total amount in the cleaning product. This type of polymer can provide conditioning and/or aid deposition of other fabric care agents to the fabric. If used, they are typically
30 present at a level of from 0.05 to 5 wt.%. Useful polymers of these types are commonly cationic polymers. Many useful cationic polymers are referred to as polyquateriums in INCI lists. Particularly useful are cationic polysaccharide based polymers, for example cationic guar or cationic cellulose.

35

Enzymes

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention comprise one or more enzymes, such as amylases, catalases, cellulases (e.g., endoglucanases), cutinases, haloperoxygenases, lipases, mannases, pectinases, pectin lyases, peroxidases, proteases, xanthanases, and xyloglucanases, or any mixture thereof. Preferably the total amount of enzyme is from 0.01 to 6 wt.%, more preferably from 0.1 to 5 wt.%, even more preferably from 0.2 to 4 wt.%, still even more preferably from 0.5 to 3 wt.% and still even more preferably from 0.7 to 2.0 wt.%.

10

The process according to the invention to provide cleaning products according to the invention is particularly suitable to provide products comprising enzymes (or shear-sensitive particles (see below)) as these can be sensitive to high shear mixing steps. For example, in prior art methods to make cleaning products comprising enzymes and defibrillated primary cell wall material, the enzymes need to be post-dosed (i.e. after incorporation of the defibrillated primary cell wall material under high-shear). In the current process, since the defibrillated primary cell wall material is dispersed under low shear, such a post-dosing step can be omitted. As such the process according to the invention has the additional benefit of providing process flexibility when further incorporating shear sensitive ingredients in a cleaning product.

20

Suspended particles

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention, comprises suspended particles and more preferably comprises suspended non-clay particles. The particles are preferably solid; that is to say they are neither liquid nor gas. However, within the term solid we include particles with either rigid or deformable solid shells, which may then contain fluids. For example, the solid particles may be microcapsules such as perfume encapsulates, or care additives in encapsulated form. The particles may take the form of insoluble ingredients such as silicones, quaternary ammonium materials, insoluble polymers, insoluble optical brighteners and other known benefit agents as described, for example, in EP1328616. Preferably the total amount of suspended particles is from 0.001 to 20 wt. %, more preferably from 0.01 to 10 wt. % and even more preferably from 0.1 to 5 wt. %. The suspended non-clay particles may be any type. This includes perfume encapsulates, care encapsulates and/ or visual cues or suspended solid opacifiers such as mica or other suspended pearlescent materials and mixtures of these materials.

30

35

Preferably the cleaning product, more preferably the liquid laundry product, according to the invention comprises at least 0.01 wt. % of microcapsules, more preferably with an anionic charge. Preferred microcapsules are particles termed core-in-shell microcapsules. As used herein, the term core-in-shell microcapsules refers to
5 encapsulates whereby a shell which is substantially or totally water-insoluble at 40 degrees Celsius and surrounds a core which comprises or consists of a benefit agent (which is either liquid or dispersed in a liquid carrier). Suitable microcapsules are those described in US-A-5 066 419 which have a friable coating, preferably an aminoplast polymer. Preferably, the coating is the reaction product of an amine selected from urea
10 and melamine, or mixtures thereof, and an aldehyde selected from formaldehyde, acetaldehyde, glutaraldehyde or mixtures thereof. Preferably, the coating is from 1 to 30 weight % of the particles.

Microcapsules preferably comprise a solid shell. The microcapsule may have a
15 melamine formaldehyde shell, and may have deposition aids decorating the shell such as polysaccharide or xyloglucan. Other suitable shell material may be selected from (poly)urea, (poly)urethane, starch, and hydroxyl propyl cellulose. However, it is preferred that the microcapsule comprises a melamine formaldehyde shell deposited on the outside with polysaccharides or xyloglucan. The preferred average particle
20 diameter of the microcapsules lies in the range from 1 to 100 micrometer and at least 90 wt. % of the microcapsules preferably has a diameter in this range. More preferably, 90 wt. % of the microcapsules have a diameter in the range 2 to 50 micrometers, even more preferably 5 to 50 micrometers. Most preferred are microcapsules with diameters less than 30 micrometers. It is advantageous to have a
25 very narrow particle size distribution, for instance 90 wt. % of microcapsules in the range 8 to 11 microns. Microcapsules in the range 2 to 5 microns cannot be dispersed so effectively due to the high surface area of the smaller particles.

Perfume encapsulates are a preferred type of microcapsule suitable for use in the
30 present invention.

A preferred class of core-in-shell perfume microcapsule comprises those disclosed in WO 2006/066654 A1. These comprise a core having from 5 to 50 wt. % of perfume dispersed in from 50 to 95 wt. % of a carrier material. This carrier material preferably is
35 a non-polymeric solid fatty alcohol or fatty ester carrier material, or mixtures thereof. Preferably, the esters or alcohols have a molecular weight of from about 100 to about

500 and a melting point from 37 to 80 degrees Celsius, and are substantially water-insoluble. The core comprising the perfume and the carrier material are coated in a substantially water-insoluble coating on their outer surfaces. Similar microcapsules are disclosed in US 5,154,842 and these are also suitable.

5

The microcapsules preferably attach to suitable substrates, more preferably fabrics, for example to provide persistent fragrance on fabrics that is desirably released after the cleaning process is complete.

- 10 Suspension of particles is achieved through providing a suitable yield stress. This can be provided by use of the process according to the invention in a flexible, cost-effective and energy-reduced manner.

Process for the manufacture of the cleaning product - step c)

- 15 At step c) in the process for the manufacture of a cleaning product according to the invention, the ingredients provided at step a) and step b) are mixed. The mixing at step c) can include one or more mixing steps. The mixing of ingredients can be done in any order and/or in parts. For example, first part of the total ingredients can be mixed and the remained mixed in subsequently. The mixing at step c) is done under low shear as
20 understood in the art.

- As mentioned, traditionally, exploitation of the properties of e.g. citrus fibers to prepare a cleaning product with excellent rheological properties requires the use of equipment that must be able to impart high to very high shear during the manufacture of the
25 product. Such equipment includes high-pressure homogenizers, cavitation equipment, micro-fluidizers, colloidal mills, extruders, ultrasonic treatment equipment. Such equipment is usually costly, and in operation uses a relatively large amount of energy and therefore preferably not used in step c) in the method to make a cleaning products, and more preferably are not used at all. Therefore, at step c) preferably no use is
30 made of one or more high-pressure homogenizers, cavitation equipment, micro-fluidizers, colloidal mills, extruders, ultrasonic treatment equipment or combinations thereof. Using the composition according to the present invention allows the manufacture of cleaning products under low shear to obtain the same or even better rheological properties when compared to use of prior art defibrillated fibers comprising
35 at most 20 wt. % of water (i.e. but without having liquid polyols distributed between the fibrils) prepared under high shear. Step c) is preferably performed by mixing the

ingredients under low-shear using a stirring rate of less than 10000 rpm, more preferably of from 1000 to 9000 rpm, even more preferably of from 5000 to 8500 rpm and still even more preferably of from 7000 to 8250 rpm.

5 Cleaning product format

Preferably the cleaning product or instant cleaning product composition according to the invention is in the form of a unit-dosed packaged product. Preferably the unit-dose package comprises from 5 to 1000 grams, more preferably from 10 to 100 grams of cleaning product or instant cleaning product composition.

10

Preferably for liquid laundry products and instant cleaning product compositions such unit-dosed packages comprise an (at least partly) water-dissolvable outer-packaging material, which substantially disintegrates to enable release of the unit-dosed packaged contents upon contact with sufficient amount of water. Preferably the

15

process to manufacture a cleaning product or instant cleaning product composition according to the invention comprises a final packaging step.

20

Preferred aspects disclosed in the context of the one aspect of the invention (e.g. the composition) are also applicable to another aspect (e.g. the process for the manufacture of the composition) *mutatis mutandis* (and visa versa); unless otherwise specified.

The invention is now illustrated by the following non-limiting examples.

25

Examples

Method for making a composition according to the invention (Examples 1 to 3)

30

Step (1) Water was added to de-pectinized citrus peel to obtain an aqueous slurry having a dry substance content of about 4 wt%. The slurry was one time charged to a pressure homogenizer (APV homogenizer, Rannie 15-20.56) at 600 bars. An aqueous slurry containing citrus fibers was obtained.

35

Step (2) A precipitation tank was filled with an aqueous isopropanol solution (about 82 wt% isopropanol in water). The aqueous slurry containing citrus fibers was brought under agitation into the precipitation tank by using a volumetric

pump and a precipitate in the form of granules having sizes between 5 mm and 50 mm was formed in the tank. The slurry:isopropanol ratio was 1:2. Agitation by stirring was provided while bringing said slurry into the tank and the precipitate was kept in the tank for about 30 minutes.

5 Step (3) The precipitate was charged to a centrifuge decanter (Flottweg centrifuge) operated at above 4000 rpm, to separate the liquid phase (i.e. water and isopropanol) from the citrus fibers.

10 Step (4) Steps (2) and (3) were repeated and the precipitate was subjected to an extraction step to increase the dry substance content. The extraction step was carried out by feeding the precipitate to a screw press. The speed and pressure of the press were adjusted to obtain a semi-dry cake having a dry substance content of about 22 wt. %.

15 Step (5) The semi-dry cake was comminuted using a Lodige type FM 300 DMZ mixer, for about 15 to 30 minutes, to obtain grains having sizes in the range of 1 millimeter. The comminuted semi-dry cake was mixed with commercial glycerol in a glycerol: fiber ratios of 0.4:1 (Example 1), 0.25:1 (Example 2) or 0.1:1 (Example 3).

20 Step (6) The comminuted cake was dried in a ventilated oven at 40 degrees Celsius for about 2 hours to reach a moisture content of about 8 wt. %.

Method for a composition not according to the invention (Comparatives A, B, and C)

25 The compositions were made according to Example 1, with the difference that at step 5 instead of glycerol, sucrose or sorbitol were used. In particular for Comparative A sucrose was used in a sucrose: fiber ratio of 0.4:1. For Comparative B sucrose was used in a sucrose: fiber ratio of 0.1:1. Before adding sucrose, the sucrose was milled to an average particle size of about 250 μm . For Comparative C sorbitol was used in a sorbitol: fiber ratio of 0.4:1.

Method for making liquid laundry products

30 Liquid laundry products were made having a formulation as set out in table 3. The process used to manufacture the liquid laundry products is further described below.

Table 3. Liquid laundry product formulations (amounts are based on wt.% unless otherwise indicated).

Component	
Composition*	0.15
Suspended particles	0.40
Glycerol	2.00
Nonionic surfactant	4.37
Acrylate co-polymer	0.70
Triethanolamine	8.82
Linear Alkylbenzene Sulphonic acid	5.82
Fatty acid	0.86
HEDP (1-hydroxyethane 1,1-diphosphonic acid)	1.50
Sodium laureth sulphate	4.37
Anti-redeposition polymer and/or soil release polymer	4.10
Preservative	0.04
Water	to balance

5

*Composition as according to Example 1-3 or Comparative A-C.

As a first step a pre-mix was prepared of the composition (as according to Example 1,2,3; Comparative A, B or C) in water comprising 0.5 wt. % of the composition (part of the water-phase was used for this purpose). The pre-mix was stirred using an agitator stirrer with overhead drive operated at 200 rpm for 15 minutes ensuring that clumping did not occur. This premix was passed through an in-line Silverson mill operating at between 0 and 3.8 kJ/Kg energy. The premix may also be prepared using powder induction equipment such as a conti-TDS (ex. Ystral).

15

The premix was mixed with the remainder of the ingredients by stirring rate of 200 for 30 minutes in total and a passage through an in-line Silverson mill operating at between 1.2 and 3.8 kJ/Kg energy to produce the final liquid laundry product.

20 The liquid laundry product made using the composition according to Example 1 is named Example 1-lp. The liquid laundry product made using the composition according to Example 2 is named Example 2-lp (and so on...).

Shear profile analysis of the liquid laundry products

25 Rheology flow curves were subsequently generated for the final liquid laundry products using the following two-step protocol: The instrument used is a Paar Physica, MCR300 with automatic sample changer (ASC). Geometry measurement performed with –

CC27, profiled DIN concentric cylinder. The measurements were taken at 25 degrees Celsius.

Step 1 - Controlled stress steps from 0.01 to 400 Pa; 40 steps logarithmically spaced in stress with 40 seconds being spent at each point to measure the shear rate (and hence viscosity); Step 1 is terminated once a shear rate of 0.1 s^{-1} is reached.

Step 2 – Controlled shear rate steps from 0.1 to 1200 s^{-1} ; 40 steps logarithmically spaced in shear rate with 6 seconds being spent at each point to determine the stress required to maintain the shear rate and hence the viscosity.

The yield stress in Pascals (Pa) is then taken to be the value of the stress at a shear rate of 0.1 s^{-1} , that is, the equivalent of the y-axis intercept in a Herschel-Buckley plot of shear stress versus shear rate. The yield stress was then taken as the point at which the data cut the viscosity = 10 Pa.s, and the pour viscosity recorded as the viscosity at 20 s^{-1} , both at 25°C . The results are given in Table 4.

Table 4. Yield Stress of Examples 1-lp, 2-lp, 3-lp and Comparatives A-lp, B-lp and C-lp

Product	Ex. 1-lp	Ex. 2-lp	Ex. 3-lp	Comp. A-lp	Comp. B-lp	Comp. C-lp
¹ Additive	glycerol			sucrose		sorbitol
² Ratio	0.4:1	0.25:1	0.1:1	0.4:1	0.1:1	0.4:1
Yield Stress (Pa)	1.130	0.696	0.507	0.984	0.155	0.855

¹The type of ingredient distributed between the fibrils of the used composition.

²The ratio of the ingredient to the dry weight of the primary cell wall material in the used composition.

The results of the Yield stress of the liquid laundry products clearly show that when prepared under similar low-shear conditions to make liquid laundry products, the use of compositions according to the invention provide the best results.

CLAIMS

1. A laundry composition comprising defibrillated primary cell wall material comprising cellulose microfibrils, wherein
 - the defibrillated primary cell wall material comprises at most 20 wt. % of water, based on the total weight of the fibrils; and wherein
 - the cellulose has an average degree of crystallinity of less than 50 %, and wherein
 - the defibrillated primary cell wall material comprises liquid polyols distributed between the fibrils.
2. A composition according to claim 1, wherein the defibrillated primary cell wall material comprises at most 15 wt. %, preferably at most 12 wt. %, more preferably at most 10 wt. % and even more preferably at most 8 wt. % of water, based on the total weight of the fibrils.
3. A composition according to claim 1 or claim 2, wherein the composition is a liquid laundry product.
4. A composition according to any one of claims 1 to 3, wherein the primary cell wall material comprises at least 50 wt. %, preferably at least 60 wt. %, more preferably at least 70 wt. %, even more preferably at least 80 wt. % and still even more preferably at least 90 wt. % of cellulose microfibrils, based on total the dry weight of the primary cell wall material.
5. A composition according to any one of claims 1 to 4, wherein the cellulose microfibrils have an average degree of crystallinity of at most 40%, preferably at most 35% and more preferably at most 30%.
6. A composition according to any one of claims 1 to 5, wherein the total amount of liquid polyols distributed between the fibrils is at least 15 wt. %, preferably is from 20 to 1000 wt. %, more preferably is from 25 to 500 wt. % and even more preferably is from 30 to 400 wt. %, based on the dry-weight of the primary cell wall material.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/051603

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D3/22
ADD.

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)
C11D

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 practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 824 170 A1 (PROCTER & GAMBLE [US]) 14 January 2015 (2015-01-14) claims 1-15 -----	1-6
X	WO 2013/160024 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; CONOPCO INC DBA UNILEVER [US]) 31 October 2013 (2013-10-31) claims 1-10; tables 3,4 -----	1-6
A	WO 2016/107793 A1 (UNILEVER NV [NL]; UNILEVER PLC [GB]; CONOPCO INC DBA UNILEVER [US]) 7 July 2016 (2016-07-07) claims 1-15 -----	1-6
A	EP 2 929 874 A1 (NISSAN CHEMICAL IND LTD [JP]) 14 October 2015 (2015-10-14) table 2 -----	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"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

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"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

Date of the actual completion of the international search

22 March 2018

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/051603

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			ZA 201407637 B 27-07-2016
WO 2016107793	A1	07-07-2016	AR 103327 A1 03-05-2017
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			WO 2014088034 A1 12-06-2014