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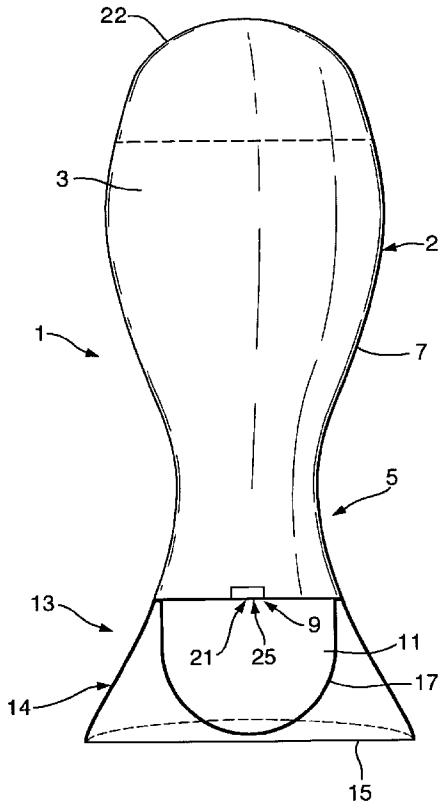
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(54) Title: A FLOWABLE LAUNDRY COMPOSITION AND PACKAGING THEREFOR



(57) Abstract: A bottom-dispensing package containing a flowable laundry composition wherein (a) the flowable laundry composition comprises at least one surfactant (b) the bottom-dispensing package comprises: (i) a compressible container in which the flowable laundry composition is stored; (ii) a dispensing device for dispensing the composition from the container, the dispensing device being located at the base of the compressable container; (iii) a measured dosing device enclosing the dispensing end and providing a supportive base of the package; and (iv) a convex top portion.

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A FLOWABLE LAUNDRY COMPOSITION AND PACKAGING THEREFOR

The present invention concerns a flowable laundry composition and packaging therefor.

An objective is to provide a device for the improved dosing of laundry products

Accordingly, in a first aspect, the present invention provides a packaged laundry product comprising a flowable laundry composition contained in a bottom-dispensing package, wherein

(a) the flowable laundry composition comprises at least one surfactant
(b) the bottom-dispensing package comprising:

(i) a compressible container in which the flowable laundry composition is stored and
(ii) a dispensing device for dispensing the composition from the container, the dispensing device being located at the base of the compressable container
(iii) a measured dosing device enclosing the dispensing end and providing a supportive base of the package.

Preferably the package comprises a convex top portion.
The advantage of the convex top is that it prevents users from storing the bottle top-down on a flat surface (which is the usual topography confronted by the consumer in their kitchen or utility room). In this way the package is more likely to be stored so that the flowable laundry composition accumulates by gravity in the base of the package. This means that when the container is squeezed, it is the liquid which is forced out, and not any air. This important as if the consumer is expecting to force a liquid by squeezing, the force applied would be quite substantial and force out the air at some speed. If forced out directly into a dosing

cup where product has already accumulated, then the ejected air can froth up the composition so causing spattering. This would interfere with correct dosing.

The convex top may be any suitable shape but preferably it is curved and more preferably it is hemispherical. It may however be asymmetrical providing prevents top-down storage on flat surfaces.

Non curved tops may be used, such as cones wedges, but these may be less safe if the apex is pointed. Multiple apexes may be used only if they prevent storage top down.

The dispensing device may comprise a channel or duct. It may comprise valve directly in contact with the stored composition.

The dosing device preferably provides a closure for the package.

In a second aspect the invention provides a method of dispensing a flowable laundry composition from a bottom-dispensing package according to any preceding claim, the method comprising the step of moving the compressible container upwardly relative to the measuring dosing device and then squeezing the compressible container to dispense an amount of the flowable laundry composition into the measured dosing device.

Advantageously the container is restricted (by the user) to move only upwardly or downwardly before/during dispensing. Lateral movement is not necessary due to the positioning of the dosing device at the base of the package. A snap-fit connection of the dosing device to the container is particularly preferred in this respect.

The invention is particularly advantage with flowable laundry compositions of high viscosity. This is because spattered high viscosity fluids (caused by erroneous

ejection of air) take time to flow back into the dosing device and so, in this case, the consumer would more like simply guess at the dosage, which is undesirable. Accordingly, the composition preferably has a viscosity of at least at least 100 Pa.s. and more preferably at least 500 Pa.s, when in rest or up to a shear stress of 10 Pa.

Preferably the flowable laundry composition is a shear thinning gel-type composition. The viscosity under shear stress may be less than 300 Pa.s, preferably less than 100 Pa.s and more preferably less than 5 Pa.s, even more preferably it is at most 1 Pa.s and most preferably it is at most 0.5 Pa.s.

Shear thinning compositions may comprise a polymer gum, e.g. Xanthan gum or other gum capable of forming stable continuous gum networks which can suspend particles.

Other external structurants e.g. hydrogenated castor oil, micro crystalline cellulose may be used.

Another method useful is to change a non-gelled formulation so as to form an internal structure therein where the structure gives the desired properties to the thus-formed gel-type detergent. The composition may comprise a soap or fatty acid in combination with sodium sulphate and one or more surfactants may be used to form a gelled structure by the formation of lamellar phases.

The composition may comprise a lamellar phase dispersions from a micellar surfactant systems, and additionally a structurant for establishing the lamellar phase, whereby said structurant may be a fatty alcohol.

The composition of invention contains one or more surfactants and/or optionally other ingredients such that the composition is fully functional as a laundry cleaning and/or care composition. A composition of the invention may be provided in solid

or liquid form. If in a solid form, the composition may be rehydrated and/or dissolved in a solvent, including water, before use. The composition may be provided in a concentrated form (to be diluted) or may be a ready-to-use composition.

The present invention is suitable for use in industrial or domestic fabric wash compositions. The present invention can also be applied to industrial or domestic non-detergent based fabric care compositions.

Other contemplated ingredients including hydrotropes, preservatives, fillers, builders, complexing agents, polymers, stabilizers, perfumes per se, other conventional detergent ingredients, or combinations of one or more thereof are discussed below.

Surfactants Fabric wash compositions according to the present invention comprise a fabric wash detergent material selected from non-soap anionic surfactant, nonionic surfactants, soap, amphoteric surfactants, zwitterionic surfactants and mixtures thereof.

Detergent compositions suitable for use in domestic or industrial automatic fabric washing machines generally contain anionic non-soap surfactant or nonionic surfactant, or combinations of the two in suitable ratio, as will be known to the person skilled in the art, optionally together with soap.

The surfactants may be present in the composition at a level of from 0.1% to 60% by weight.

Suitable anionic surfactants include alkyl benzene sulphonate, primary and secondary alkyl sulphates, particularly C_8-C_{15} primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates, dialkyl sulphosuccinates; ether carboxylates; isethionates; sarcosinates; fatty acid ester sulphonates and

mixtures thereof. The sodium salts are generally preferred. When included therein the composition usually contains from about 1% to about 50%, preferably 10 wt%-40 wt% based on the fabric treatment composition of an anionic surfactant such as linear alkylbenzenesulfonate, alpha-olefinsulfonate, alkyl sulfate (fatty alcohol sulfate), alcohol ethoxysulfate, secondary alkanesulfonate, alpha-sulfo fatty acid methyl ester, alkyl- or alkenylsuccinic acid or soap. Preferred surfactants are alkyl ether sulphates and blends of alkoxylated alkyl nonionic surfactants with either alkyl sulphonates or alkyl ether sulphates.
Preferred alkyl ether sulphates are C8-C15 alkyl and have 2-10 moles of ethoxlation. Preferred alkyl sulphates are alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates having an alkyl chain length of C_8-C_{15}. The counter ion for anionic surfactants is typically sodium, although other counter-ions such as TEA or ammonium can be used. Suitable anionic surfactant materials are available in the marketplace as the 'Genapol'™ range from Clariant.

Nonionic surfactants include primary and secondary alcohol ethoxylates, especially C_8-C_7 aliphatic alcohol ethoxylated with an average of from 1 to 7 moles of ethylene oxide per mole of alcohol, and more especially the C_{10}-C_{15} primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkyl polyglycosides, glycerol monoethers and polyhydroxy amides (glucamide). Mixtures of nonionic surfactant may be used. When included therein the composition usually contains from about 0.2% to about 40%, preferably 1 to 7 wt%, more preferably 5 to 15 wt% of a non-ionic surfactant such as alcohol ethoxylate, nonylphenol ethoxylate, alkylpolyglycoside, alkyldimethylamineoxide, ethoxylated fatty acid monoethanolamide, fatty acid monoethanolamide, polyhydroxy alkyl fatty acid amide, or N-acyl N-alkyl derivatives of glucosamine ("glucamides").

Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates, especially the C_8-C_7 aliphatic alcohols ethoxylated with an average of

from 1 to 35 moles of ethylene oxide per mole of alcohol, and more especially the C_{10}-C_{15} primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol.

The flowable laundry composition may contain one or more enzymes. It is to be understood that enzyme variants (produced, for example, by recombinant techniques) are included within the meaning of the term "enzyme". Examples of such enzyme variants are disclosed, e.g., in EP 251,446 (Genencor), WO 91/00345 (Novo Nordisk), EP 525,610 (Solvay) and WO 94/02618 (Gist-Brocades NV).

The types of enzymes which may appropriately be incorporated in granules of the invention include oxidoreductases, transferases hydrolases, lyases. isomerases and ligases, that is, respectively (EC 1.-.-.-), (EC 2.-.-.-), (EC 3.-.-.-), (EC 4.-.-.-), (EC 5.-.-.-), (EC 6.-.-.-), wherein such enzyme classification is in accordance with Recommendations (1992) of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology, Academic Press, Inc., 1992.

Especially contemplated enzymes include proteases, alpha-amylases, cellulases, lipases, peroxidases/oxidases, pectate lyases, and mannanases, or mixtures thereof. Most preferred enzymes are proteases.

Suitable proteases include those of animal, vegetable or microbial origin. Microbial origin is preferred. Chemically modified or protein engineered mutants are included. The protease may be a serine protease or a metallo protease, preferably an alkaline microbial protease or a trypsin-like protease. Examples of alkaline proteases are subtilisins, especially those derived from Bacillus, e.g., subtilisin Novo, subtilisin Carlsberg, subtilisin 309, subtilisin 147 and subtilisin 168 (described in WO 89/06279). Examples of trypsin-like proteases are trypsin (e.g.

of porcine or bovine origin) and the Fusarium protease described in WO 89/06270 and WO 94/25583.

Examples of useful proteases are the variants described in WO 92/19729, WO 98/20115, WO 98/20116, and WO 98/34946, especially the variants with substitutions in one or more of the following positions: 27, 36, 57, 76, 87, 97, 101, 104, 120, 123, 167, 170, 194, 206, 218, 222, 224, 235 and 274. Preferred commercially available protease enzymes include Alcalase™, Savinase™, Primase™, Duralase™, Dyrazym™, Esperase™, Everlase™, Polarzyme™, and Kannase™, (Novozymes A/S), Maxatase™, Maxacal™, Maxapem™, Properase™, Purafect™, Purafect OxP™, FN2™, and FN3™ (Genencor International Inc.).

Suitable lipases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful lipases include lipases from Humicola (synonym Thermomyces), e.g. from H. lanuginosa (T. lanuginosus) as described in EP 258 068 and EP 305 216 or from H. insolens as described in WO 96/13580, a Pseudomonas lipase, e.g. from P. alcaligenes or P. pseudoalcaligenes (EP 218 272), P. cepacia (EP 331 376), P. stutzeri (GB 1,372,034), P. fluorescens, Pseudomonas sp. strain SD 705 (WO 95/06720 and WO 96/27002), P. wisconsinensis (WO 96/12012), a Bacillus lipase, e.g. from B. subtilis (Dartois et al. (1993), Biochemica et Biophysica Acta, 1131, 253-360), B. stearothermophilus (JP 64/744992) or B. pumilus (WO 91/16422).

Other examples are lipase variants such as those described in WO 92/05249, WO 94/01541, EP 407 225, EP 260 105, WO 95/35381, WO 96/00292, WO 95/30744, WO 94/25578,WO 95/14783, WO 95/22615, WO 97/04079 and WO 97/07202.

Preferred commercially available lipase enzymes include Lipolase™ and Lipolase Ultra™, Lipex™ (Novozymes A/S).

The method of the invention may be carried out in the presence of cutinase. classified in EC 3.1.1.74. The cutinase used according to the invention may be of any origin. Preferably cutinases are of microbial origin, in particular of bacterial, of fungal or of yeast origin.

Cutinases are enzymes which are able to degrade cutin. In a preferred embodiment, the cutinase is derived from a strain of Aspergillus, in particular Aspergillus oryzae, a strain of Alternaria, in particular Alternaria brassiciola, a strain of Fusarium, in particular Fusarium solani, Fusarium solani pisi, Fusarium roseum culmorum, or Fusarium roseum sambucium, a strain of Helminthosporum, in particular Helminthosporum sativum, a strain of Humicola, in particular Humicola insolens, a strain of Pseudomonas, in particular Pseudomonas mendocina, or Pseudomonas putida, a strain of Rhizoctonia, in particular Rhizoctonia solani, a strain of Streptomyces, in particular Streptomyces scabies, or a strain of Ulocladium, in particular Ulocladium consortiale. In a most preferred embodiment the cutinase is derived from a strain of Humicola insolens, in particular the strain Humicola insolens DSM 1800. Humicola insolens cutinase is described in WO 96/13580 which is herby incorporated by reference. The cutinase may be a variant, such as one of the variants disclosed in WO 00/34450 and WO 01/92502, which are hereby incorporated by reference. Preferred cutinase variants include variants listed in Example 2 of WO 01/92502, which is hereby specifically incorporated by reference.

Preferred commercial cutinases include NOVOZYM™ 51032 (available from Novozymes A/S, Denmark).

The method of the invention may be carried out in the presence of phospholipase classified as EC 3.1.1.4 and/or EC 3.1.1.32. As used herein, the term phospholipase is an enzyme which has activity towards phospholipids. Phospholipids, such as lecithin or phosphatidylcholine, consist of glycerol esterified with two fatty acids in an outer (sn-1) and the middle (sn-2) positions

and esterified with phosphoric acid in the third position; the phosphoric acid, in turn, may be esterified to an amino-alcohol. Phospholipases are enzymes which participate in the hydrolysis of phospholipids. Several types of phospholipase activity can be distinguished, including phospholipases A_1 and A_2 which hydrolyze one fatty acyl group (in the sn-1 and sn-2 position, respectively) to form lysophospholipid; and lysophospholipase (or phospholipase B) which can hydrolyze the remaining fatty acyl group in lysophospholipid. Phospholipase C and phospholipase D (phosphodiesterases) release diacyl glycerol or phosphatidic acid respectively.

The term phospholipase includes enzymes with phospholipase activity, e.g., phospholipase A (A_1 or A_2), phospholipase B activity, phospholipase C activity or phospholipase D activity. The term “phospholipase A” used herein in connection with an enzyme of the invention is intended to cover an enzyme with Phospholipase A_1 and/or Phospholipase A_2 activity. The phospholipase activity may be provided by enzymes having other activities as well, such as, e.g., a lipase with phospholipase activity. The phospholipase activity may, e.g., be from a lipase with phospholipase side activity. In other embodiments of the invention the phospholipase enzyme activity is provided by an enzyme having essentially only phospholipase activity and wherein the phospholipase enzyme activity is not a side activity.

The phospholipase may be of any origin, e.g., of animal origin (such as, e.g., mammalian), e.g. from pancreas (e.g., bovine or porcine pancreas), or snake venom or bee venom. Preferably the phospholipase may be of microbial origin, e.g., from filamentous fungi, yeast or bacteria, such as the genus or species Aspergillus, e.g., A. niger; Dictyostelium, e.g., D. discoideum; Mucor, e.g. M. javanicus, M. mucedo, M. subtilissimus; Neurospora, e.g. N. crassa; Rhizomucor, e.g., R. pusillus; Rhizopus, e.g. R. arrhizus, R. japonicus, R. stolonifer; Sclerotinia, e.g., S. libertiana; Trichophyton, e.g. T. rubrum; Whetzelinia, e.g., W. sclerotiorum; Bacillus, e.g., B. megaterium, B. subtilis; Citrobacter, e.g., C. freundii;

Enterobacter, e.g., E. aerogenes, E. cloacae Edwardsiella, E. tarda; Erwinia, e.g., E. herbicola; Escherichia, e.g., E. coli; Klebsiella, e.g., K. pneumoniae; Proteus, e.g., P. vulgaris; Providencia, e.g., P. stuartii; Salmonella, e.g. S. typhimurium; Serratia, e.g., S. liquefasciens, S. marcescens; Shigella, e.g., S. flexneri; Streptomyces, e.g., S. violeceoruber; Yersinia, e.g., Y. enterocolitica. Thus, the phospholipase may be fungal, e.g., from the class Pyrenomycetes, such as the genus Fusarium, such as a strain of F. culmorum, F. heterosporum, F. solani, or a strain of F. oxysporum. The phospholipase may also be from a filamentous fungus strain within the genus Aspergillus, such as a strain of Aspergillus awamori, Aspergillus foetidus, Aspergillus japonicus, Aspergillus niger or Aspergillus oryzae.

Preferred phospholipases are derived from a strain of Humicola, especially Humicola lanuginosa. The phospholipase may be a variant, such as one of the variants disclosed in WO 00/32758, which are hereby incorporated by reference. Preferred phospholipase variants include variants listed in Example 5 of WO 00/32758, which is hereby specifically incorporated by reference. In another preferred embodiment the phospholipase is one described in WO 04/111216, especially the variants listed in the table in Example 1.

In another preferred embodiment the phospholipase is derived from a strain of Fusarium, especially Fusarium oxysporum. The phospholipase may be the one concerned in WO 98/026057 derived from Fusarium oxysporum DSM 2672, or variants thereof.

In a preferred embodiment of the invention the phospholipase is a phospholipase A_1 (EC. 3.1.1.32). In another preferred embodiment of the invention the phospholipase is a phospholipase A_2 (EC.3.1.1.4.).

Examples of commercial phospholipases include LECITASE™ and LECITASE™ ULTRA, YIELSMAX, or LIPOPAN F (available from Novozymes A/S, Denmark).

Suitable amylases (alpha and/or beta) include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Amylases include, for example, alpha-amylases obtained from Bacillus, e.g. a special strain of B. licheniformis, described in more detail in GB 1,296,839, or the Bacillus sp. strains disclosed in WO 95/026397 or WO 00/060060.

Examples of useful amylases are the variants described in WO 94/02597, WO 94/18314, WO 96/23873, WO 97/43424, WO 01/066712, WO 02/010355, WO 02/031124 and PCT/DK2005/000469 (which references all incorporated by reference.

Commercially available amylases are Duramyl™, Termamyl™, Termamyl Ultra™, Natalase™, Stainzyme™, Fungamyl™ and BAN™ (Novozymes A/S), Rapidase™ and Purastar™ (from Genencor International Inc.).

Suitable cellulases include those of bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Suitable cellulases include cellulases from the genera Bacillus, Pseudomonas, Humicola, Fusarium, Thielavia, Acremonium, e.g. the fungal cellulases produced from Humicola insolens, Thielavia terrestris, Myceliophthora thermophila, and Fusarium oxysporum disclosed in US 4,435,307, US 5,648,263, US 5,691,178, US 5,776,757, WO 89/09259, WO 96/029397, and WO 98/012307.

Especially suitable cellulases are the alkaline or neutral cellulases having color care benefits. Examples of such cellulases are cellulases described in EP 0 495 257, EP 0 531 372, WO 96/11262, WO 96/29397, WO 98/08940. Other examples are cellulase variants such as those described in WO 94/07998, EP 0 531 315, US 5,457,046, US 5,686,593, US 5,763,254, WO 95/24471, WO 98/12307 and PCT/DK98/00299.

Commercially available cellulases include Celluzyme™, Carezyme™, Endolase™, Renozyme™ (Novozymes A/S), Clazinase™ and Puradax HA™ (Genencor International Inc.), and KAC-500(B)™ (Kao Corporation).

Suitable peroxidases/oxidases include those of plant, bacterial or fungal origin. Chemically modified or protein engineered mutants are included. Examples of useful peroxidases include peroxidases from Coprinus, e.g. from C. cinereus, and variants thereof as those described in WO 93/24618, WO 95/10602, and WO 98/15257. Commercially available peroxidases include Guardzyme™ and Novozym™ 51004 (Novozymes A/S).

Examples of pectate lyases include pectate lyases that have been cloned from different bacterial genera such as Erwinia, Pseudomonas, Klebsiella and Xanthomonas, as well as from Bacillus subtilis (Nasser et al. (1993) FEBS Letts. 335:319-326) and Bacillus sp. YA-14 (Kim et al. (1994) Biosci. Biotech. Biochem. 58:947-949). Purification of pectate lyases with maximum activity in the pH range of 8-10 produced by Bacillus pumilus (Dave and Vaughn (1971) J. Bacteriol. 108:166-174), B. polymyxa (Nagel and Vaughn (1961) Arch. Biochem. Biophys. 93:344-352), B. stearothermophilus (Karbassi and Vaughn (1980) Can. J. Microbiol. 26:377-384), Bacillus sp. (Hasegawa and Nagel (1966) J. Food Sci. 31:838-845) and Bacillus sp. RK9 (Kelly and Fogarty (1978) Can. J. Microbiol. 24:1164-1172) have also been described. Any of the above, as well as divalent cation-independent and/or thermostable pectate lyases, may be used in practicing the invention. In preferred embodiments, the pectate lyase comprises the amino acid sequence of a pectate lyase disclosed in Heffron et al., (1995) Mol. Plant-Microbe Interact. 8: 331-334 and Henrissat et al., (1995) Plant Physiol. 107: 963-976. Specifically contemplated pectatel lyases are disclosed in WO 99/27083 and WO 99/27084. Other specifically contemplates pectate lyases derived from Bacillus licheniformis is disclosed in US patent no. 6,284,524 (which document is hereby incorporated by reference). Specifically contemplated pectate lyase variants are disclosed in WO 02/006442, especially the variants disclosed in the

Examples in WO 02/006442 (which document is hereby incorporated by reference).

Examples of commercially available alkaline pectate lyases include BIOPREP™ and SCOURZYME™ L from Novozymes A/S, Denmark.

Examples of mannanases (EC 3.2.1.78) include mannanases of bacterial and fungal origin. In a specific embodiment the mannanase is derived from a strain of the filamentous fungus genus Aspergillus, preferably Aspergillus niger or Aspergillus aculeatus (WO 94/25576). WO 93/24622 discloses a mannanase isolated from Trichoderma reseei. Mannanases have also been isolated from several bacteria, including Bacillus organisms. For example, Talbot et al., Appl. Environ. Microbiol., Vol.56, No. 11, pp. 3505-3510 (1990) describes a beta-mannanase derived from Bacillus stearothermophilus. Mendoza et al., World J. Microbiol. Biotech., Vol. 10, No. 5, pp. 551-555 (1994) describes a beta-mannanase derived from Bacillus subtilis. JP-A-03047076 discloses a beta-mannanase derived from Bacillus sp. JP-A-63056289 describes the production of an alkaline, thermostable beta-mannanase. JP-A-63036775 relates to the Bacillus microorganism FERM P-8856 which produces beta-mannanase and beta-mannosidase. JP-A-08051975 discloses alkaline beta-mannanases from alkalophilic Bacillus sp. AM-001. A purified mannanase from Bacillus amyloliquefaciens is disclosed in WO 97/11164. WO 91/18974 describes a hemicellulase such as a glucanase, xylanase or mannanase active. Contemplated are the alkaline family 5 and 26 mannanases derived from Bacillus agaradhaerens, Bacillus licheniformis, Bacillus halodurans, Bacillus clausii, Bacillus sp., and Humicola insolens disclosed in WO 99/64619. Especially contemplated are the Bacillus sp. mannanases concerned in the Examples in WO 99/64619 which document is hereby incorporated by reference.

Examples of commercially available mannanases include Mannaway™ available from Novozymes A/S Denmark.

Any enzyme present in the composition may be stabilized using conventional stabilizing agents, e.g., a polyol such as propylene glycol or glycerol, a sugar or sugar alcohol, lactic acid, boric acid, or a boric acid derivative, e.g., an aromatic borate ester, or a phenyl boronic acid derivative such as 4-formylphenyl boronic acid, and the composition may be formulated as described in e.g. WO 92/19709 and WO 92/19708.

The composition may comprise a hydrotrope.
The term "hydrotrope" generally means a compound with the ability to increase the solubilities, preferably aqueous solubilities, of certain slightly soluble organic compounds. Examples of hydrotropes include sodium xylene sulfonate, SCM.

The composition may comprise a solvent such as water or an organic solvent such as isopropyl alcohol or glycol ethers. Solvents may be present in liquid or gel compositions.

The composition may contain a metal chelating agent such as carbonates, bicarbonates, and sesquicarbonates. The metal chelating agent can be a bleach stabiliser (i.e. heavy metal sequestrant). Suitable bleach stabilisers include ethylenediamine tetraacetate (EDTA), diethylenetriamine pentaacetate (DTPA), ethylenediamine disuccinate (EDDS), and the polyphosphonates such as the Dequests (Trade Mark), ethylenediamine tetramethylene phosphonate (EDTMP) and diethylenetriamine pentamethylene phosphate (DETPMP). In general metal chelating agents will not be present in the part (a) of the composition as microbial function may be impaired if metal ions are made unavailable.

The composition may contain
Builder materials which may be selected from 1) calcium sequestrant materials, 2) precipitating materials, 3) calcium ion-exchange materials and 4) mixtures thereof.

Examples of calcium sequestrant builder materials include alkali metal polyphosphates, such as sodium tripolyphosphate and organic sequestrants, such as ethylene diamine tetra-acetic acid.

Examples of precipitating builder materials include sodium orthophosphate and sodium carbonate.

Examples of calcium ion-exchange builder materials include the various types of water-insoluble crystalline or amorphous aluminosilicates, of which zeolites are the best known representatives, e.g. zeolite A, zeolite B (also known as zeolite P), zeolite C, zeolite X, zeolite Y and also the zeolite P-type as described in EP-A-0,384,070.

The composition may also contain 0-65 % of a builder or complexing agent such as ethylenediaminetetraacetic acid, diethylenetriamine-pentaacetic acid, alkyl- or alkenylsuccinic acid, nitrilotriacetic acid or the other builders mentioned below. Many builders are bleach-stabilising agents by virtue of their ability to complex metal ions.

Where builder is present, the compositions may suitably contain less than 7%wt, preferably less than 10% by weight, and most preferably less than 10%wt of detergency builder.

The composition may contain as builder a crystalline aluminosilicate, preferably an alkali metal aluminosilicate, more preferably a sodium aluminosilicate. This is typically present at a level of less than 15%w. Aluminosilicates are materials having the general formula:

$$0.8\text{-}1.5\ M_2O.\ Al_2O_3.\ 0.8\text{-}6\ SiO_2$$

where M is a monovalent cation, preferably sodium. These materials contain some bound water and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5 SiO_2 units in the formula above. They can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature. The ratio of surfactants to alumuminosilicate (where present) is preferably greater than 5:2, more preferably greater than 3:1.

Alternatively, or additionally to the aluminosilicate builders, phosphate builders may be used. In this art the term 'phosphate' embraces diphosphate, triphosphate, and phosphonate species. Other forms of builder include silicates, such as soluble silicates, metasilicates, layered silicates (e.g. SKS-6 from Hoechst).

For low cost formulations carbonate (including bicarbonate and sesquicarbonate) and/or citrate may be employed as builders.

The composition may comprise one or more polymers. Examples are carboxymethylcellulose, poly(vinylpyrrolidone), poly (ethylene glycol), poly(vinyl alcohol), poly(vinylpyridine-N-oxide), poly(vinylimidazole), polycarboxylates such as polyacrylates, maleic/acrylic acid copolymers and lauryl methacrylate/acrylic acid copolymers.

Modern detergent compositions typically employ polymers as so-called 'dye-transfer inhibitors'. These prevent migration of dyes, especially during long soak times. Any suitable dye-transfer inhibition agents may be used in accordance with the present invention. Generally, such dye-transfer inhibiting agents include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, manganese pthalocyanine, peroxidases, and mixtures thereof.

Nitrogen-containing, dye binding, DTI polymers are preferred. Of these polymers and co-polymers of cyclic amines such as vinyl pyrrolidone, and/or vinyl imidazole are preferred.

Polyamine N-oxide polymers suitable for use herein contain units having the following structural formula: R-A_X-P; wherein P is a polymerizable unit to which an N-O group can be attached or the N-O group can form part of the polymerizable unit; A is one of the following structures: -NC(O)-, -C(O)O-, -S-, -O-, -N=; x is 0 or 1; and R is an aliphatic, ethoxylated aliphatic, aromatic, heterocyclic or alicyclic group or combination thereof to which the nitrogen of the N-O group can be attached or the N-O group is part of these groups, or the N-O group can be attached to both units. Preferred polyamine N-oxides are those wherein R is a heterocyclic group such as pyridine, pyrrole, imidazole, pyrrolidine, piperidine and derivatives thereof. The N-O group can be represented by the following general structures: $N(O)(R')_{0-3}$, or $=N(O)(R')_{0-1}$, wherein each R′ independently represents an aliphatic, aromatic, heterocyclic or alicylic group or combination thereof; and the nitrogen of the N-O group can be attached or form part of any of the aforementioned groups. The amine oxide unit of the polyamine N-oxides has a pKa<10, preferably pKa<7, more preferably pKa<6.

Any polymer backbone can be used provided the amine oxide polymer formed is water-soluble and has dye transfer inhibiting properties. Examples of suitable polymeric backbones are polyvinyls, polyalkylenes, polyesters, polyethers, polyamides, polyimides, polyacrylates and mixtures thereof. These polymers include random or block copolymers where one monomer type is an amine N-oxide and the other monomer type is an N-oxide. The amine N-oxide polymers typically have a ratio of amine to the amine N-oxide of 10:1 to 1:1,000,000. However, the number of amine oxide groups present in the polyamine oxide polymer can be varied by appropriate copolymerization or by an appropriate degree of N-oxidation. The polyamine oxides can be obtained in almost any degree of polymerization. Typically, the average molecular weight is within the

range of 500 to 1,000,000; more preferably 1,000 to 500,000; most preferably 5,000 to 100,000. This preferred class of materials is referred to herein as "PVNO". A preferred polyamine N-oxide is poly(4-vinylpyridine-N-oxide) which as an average molecular weight of about 50,000 and an amine to amine N-oxide ratio of about 1:4.

Copolymers of N-vinylpyrrolidone and N-vinylimidazole polymers (as a class, referred to as "PVPVI") are also preferred. Preferably the PVPVI has an average molecular weight range from 5,000 to 1,000,000, more preferably from 5,000 to 70,000, and most preferably from 10,000 to 7,000, as determined by light scattering as described in Barth, et al., Chemical Analysis, Vol. 113. "Modern Methods of Polymer Characterization". The preferred PVPVI copolymers typically have a molar ratio of N-vinylimidazole to N-vinylpyrrolidone from 1:1 to 0.2:1, more preferably from 0.8:1 to 0.3:1, most preferably from 0.6:1 to 0.4:1. These copolymers can be either linear or branched. Suitable PVPVI polymers include Sokalan$^{(TM)}$ HP56, available commercially from BASF, Ludwigshafen, Germany.

Also preferred as dye transfer inhibition agents are polyvinylpyrrolidone polymers ("PVP") having an average molecular weight of from about 5,000 to about 400,000, preferably from about 5,000 to about 700,000, and more preferably from about 5,000 to about 50,000. PVP's are disclosed for example in EP-A-262,897 and EP-A-256,696. Suitable PVP polymers include Sokalan$^{(TM)}$ HP50, available commercially from BASF. Compositions containing PVP can also contain polyethylene glycol ("PEG") having an average molecular weight from about 500 to about 100,000, preferably from about 1,000 to about 10,000. Preferably, the ratio of PEG to PVP on a ppm basis delivered in wash solutions is from about 2:1 to about 50:1, and more preferably from about 3:1 to about 10:1.

Also suitable as dye transfer inhibiting agents are those from the class of modified polyethyleneimine polymers, as disclosed for example in WO-A-0005334. These modified polyethyleneimine polymers are water-soluble or dispersible, modified

polyamines. Modified polyamines are further disclosed in US-A-4,548,744; US-A-4,597,898; US-A- 4,877,896; US-A- 4,891, 160; US-A- 4,976,879; US-A-5,415,807; GB-A-1,537,288; GB-A-1,498,57; DE-A-28 29022; and JP-A-06313271.

Preferably the composition according to the present invention comprises a dye transfer inhibition agent selected from polyvinylpyrridine N-oxide (PVNO), polyvinyl pyrrolidone (PVP), polyvinyl imidazole, N-vinylpyrrolidone and N-vinylimidazole copolymers (PVPVI), copolymers thereof, and mixtures thereof.

The amount of dye transfer inhibition agent in the composition according to the present invention will be from 0.01 to 10 %, preferably from 0.02 to 5 %, more preferably from 0.03 to 2 %, by weight of the composition.

The composition may also contain other conventional detergent ingredients such as e.g. fabric conditioners including clays, foam boosters, suds suppressors (anti-foams), anti-corrosion agents, soil-suspending agents, anti-soil redeposition agents, further dyes, anti-microbials, optical brighteners, tarnish inhibitors, or perfumes.

Various non-limiting embodiments of the invention will now be more particularly described with reference to the following figure in which:

Figure 1 shows a packaged laundry product according to one embodiment of the invention.

Referring to the drawing, a packaged laundry product 1 is shown. The product 1 comprises a flowable laundry composition 3 contained in a package 5, the high viscosity laundry composition 3 according to Example A or B detailed below.

The package 5 comprises a squeeze-operated compressible container, in this example a plastic bottle 7 storing the flowable, high viscosity laundry gel 3 and a dispensing device 9. The dispensing device 9 is located at the base 13 of the container 7 and is enclosed by a dosing device 14 which also acts as a closure 14. The closure 14 acts as a supportive base 13 for the package 5, such that it is stored supported on the base with the dispensing device 9 located at the base/bottom of the container.

The bottle 7 and dispensing device 9 are attached to each other by threaded connection. The closure 14 is attached to the bottle by a snap-fit connection which negates the requirement to rotate the bottle/closure to open shut. In a separate embodiment the closure 14 is connected to the bottle 7 using a threaded connection. (Threaded connections not shown).

The bottle 7 is fabricated from a flexible plastic material comprising polyethylene terephthalate.

The top 22 of the bottle is curved and convex to prevent storage top-down on flat surfaces, such as those commonly met in kitchens, utility rooms.

The closure 14 includes an enlarged (with respect to at least the neck region of the bottle) flat, generally planar bottom surface 15. By providing an enlarged flat top surface 15, the surface allows the closure 14 to function as a supportive base 13 with the bottle 7 in an inverted position thereby allowing the high viscosity gel 3 to accumulate (under gravity) during storage at the dispensing device 9.

The closure 14 is taped outwardly toward the surface 15 to provide a stable base. The area of the surface 15 is greater than that of the top 22 of the device.

The dispensing device 9 comprises an orifice through which dispensing may occur. The orifice includes a valve 21 in fluid communication via duct 23.

The valve 21 comprises a membrane extending across an orifice 25 in the dispensing part 9.

In one embodiment, the membrane has an arcuate portion (not shown) directed toward the container 7. The arcuate portion of the membrane is provided with a intersecting slits to define a plurality of generally triangular leaves. When contents of the container are pressurized for dispensing, the triangular leaves bend toward the open end of the orifice 25 allowing product to pass through the orifice 25. When the dispensing pressure is released, the triangular leaves spring back to their original position and operate to block passage of product through the orifice 25. The leaves of the valve are sufficiently resilient that they do not bend open unless the applied pressure exceeds the hydraulic static head pressure generated by a full of condiment. In use, the fluid is pressurised to flow past and partially collect in the dosing part 13, ready for using in a washing process, such as one in an automatic washing machine.

In use of the contain 7 is grasped in one hand whilst the other hand holds the dosing closure 14. The container 7 is pulled upwards from the dosing closure to disengage the snap-fit connection. The container is then squeezed to dose the gel into the dosing closure which is then placed into the washing machine with the laundry.

Exemplary Laundry Formulation A

The following gel laundry detergent compositions were prepared, of which composition A is according to the invention.

Component:	Wt %
Propylene glycol	8.0
sodium citrate	3.9
Borax	3.0

NaOH (50%)	1.1
Monoethanolamine	1.0
LAS-acid	4.4
Coconut fatty acid	1.5
Nonionic surfactant	11.1
Oleic acid	2.3
1-Dodecanol	5.0
Protease enzyme	0.3
Lipase enzyme	0.5
Perfume	0.2
Water	balance to 100

wherein:

Borax : Sodium tetraborate (10aq)

nonionic surfactant: ethoxylated alcohol with on average 9 ethylene oxide groups.

The gel detergent composition exemplified by composition A was found to be shear thinning and stable. Furthermore, typical detergent particles of density between 0.8 and 0.9 g/cm3 and having a diameter up to 5000 microns could be stable suspended in this composition for more than 2 weeks without any observable net movement of the particles.

Sample	Viscosity / Pa.s		Eta 0	Critical Stress	Tan Delta
	20s-1	100s-1	Pa.s	Pa	at 1 Hz
A	2.11	0.61	3.00E+05	15	0.04

For obtaining the values shown in the above table, all rheological measurements were carried out at 25 °C using a Carrimed CSL100 rheometer with a cone and plate geometry specially roughed to prevent slip.

Viscosity was measured at varying shear rates from very low shear up to a shear regime in excess of 100 s^{-1}. Two situations are shown: the viscosity measured at relatively low shear (20 s^{-1}) and that measured at much higher shear (100 s^{-1}). It can be seen that the viscosity of composition A at high shear is much lower than that obtained at low shear, whereas composition B shows almost equal viscosity's for high and low shear. In other words composition A is clearly shear thinning, whereas composition B is not.

In addition, the critical stress is shown. This parameter represents the stress at which the material leaves the upper Newtonian plateau and thins under increasing shear.

Also, "Eta 0"-values are shown, referring to the viscosity calculated for zero shear from creep flow measurements.

Finally, "Tan delta" values are shown, referring to the ratio of loss over storage moduli (G"/G') and reflecting the dominance of viscous over elastic properties such that materials giving very low "Tan delta"-values (tending to zero, such as composition A in the above table), will be much more elastic than those giving higher "Tan delta" values (tending to 90).

Exemplary Laundry Formulation B

The following gel laundry detergent compositions were prepared of which composition C is according to the invention and composition D is a comparative composition according to the prior art:

Component:	Wt %
Propylene glycol	4.75
sodium citrate	2.8
Borax	2.3

NaOH (50%)	0.43
Monoethanolamine	0.23
LAS-acid	6.0
Coconut fatty acid	0.77
Sodium alcohol EO sulphate	10.5
Nonionic surfactant	6.6
1-Decanol	6.0
Protease enzyme	0.45
Lipase enzyme	0.25
Perfume	0.2
Water	balance to 100

wherein:

Borax : Sodium tetraborate (10aq)

nonionic surfactant: ethoxylated alcohol with on average 9 ethylene oxide groups

Sodium alcohol EO sulphate: ethoxylated alcohol sulphate with on average 3 ethylene oxide groups.

Composition B was is a stable, transparent, pourable shear thinning liquid, capable of stable suspending typical detergent particles having a density of between 0.8 and 0.9 g/cm3 and a diameter of up to 5000 microns, for more than 2 weeks without any observable net movement of the particles.

Critical rheological parameters for the two compositions are shown below.

Sample	Viscosity / Pa.s		Eta 0	Critical Stress	Tan Delta
	20s-1	100s-1	Pa.s	Pa	at 1 Hz
B	1.33	0.48	9.85E+05	10	0.07

For clarification of the rheological values shown in this table, reference is made to the description concerning the similar table shown in above example A.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example only.

CLAIMS

1. A bottom-dispensing package containing a flowable laundry composition wherein

(a) the flowable laundry composition comprises at least one surfactant; and
(b) the bottom-dispensing package comprises:

(i) a compressible container in which the flowable laundry composition is stored;
(ii) a dispensing device for dispensing the composition from the container, the dispensing device being located at the base of the compressable container; and
(iii) a measured dosing device enclosing the dispensing end and providing a supportive base of the package.

2. A bottom-dispensing package containing a flowable laundry composition according to claim 1 wherein the bottom-dispensing package comprises a convex top portion.

3. A bottom-dispensing package containing a flowable laundry composition according to claim 2 wherein the top portion is curved.

4. A bottom-dispensing package containing a flowable laundry composition according to any of claims 2 or 3 wherein the top portion is hemispherical.

5. A bottom-dispensing package containing a flowable laundry composition according to any preceding claim wherein the composition is a high viscosity composition.

6. A bottom-dispensing package containing a flowable laundry composition contained according to any preceding claim wherein the composition has a viscosity of at least at least 100 Pa.s. when in rest or up to a shear stress of 10 Pa.

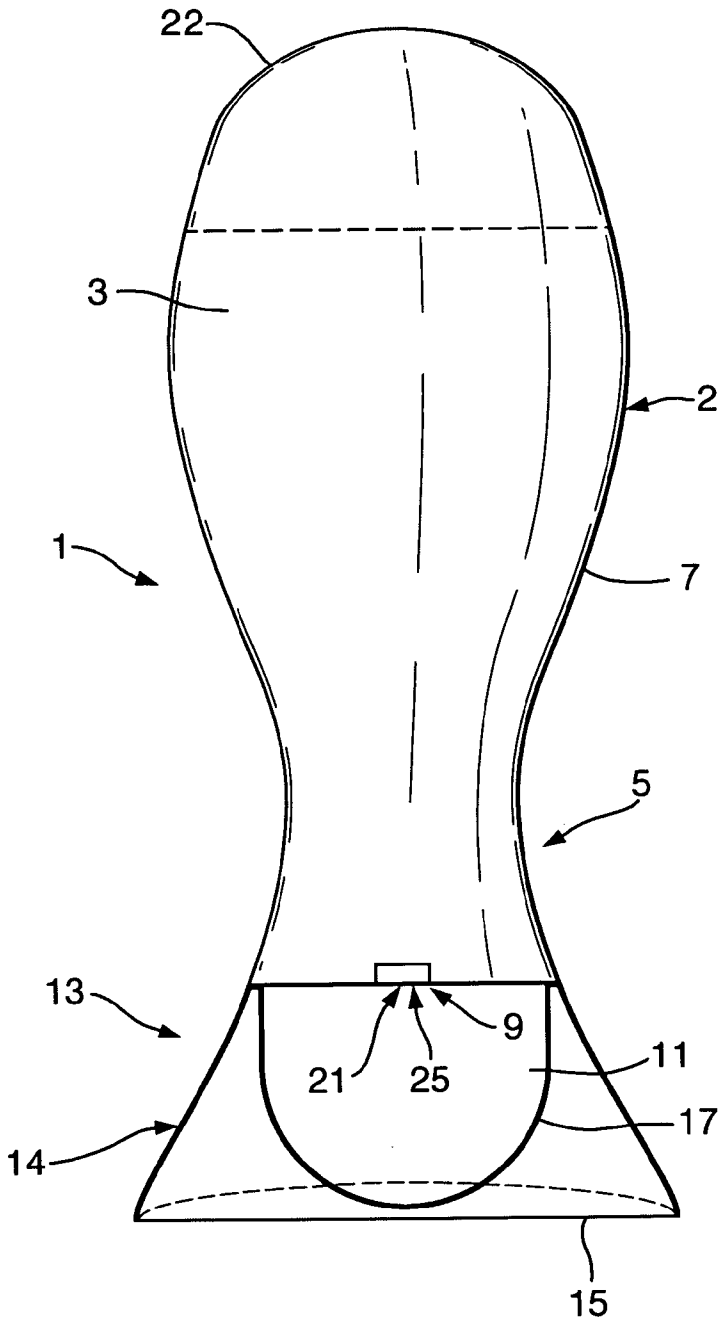
7. A bottom-dispensing package containing a flowable laundry composition according to any preceding claim wherein the composition is a shear thinning gel-type composition having viscosity under shear stress less than 300 Pa.s.

8. A packaged laundry product according to claim 7 wherein the composition is shear thinning with viscosity under stress less than 100 Pa.s, preferably less than 5 Pa.s.

9. A packaged laundry product substantially as hereinbefore described with reference to and/or as illustrated in the accompanying drawings.

10. A method of dispensing a flowable laundry composition from a bottom-dispensing package according to any preceding claim, the method comprising the step of moving the compressible container upwardly relative to the measuring dosing device and then squeezing the compressible container to dispense an amount of the flowable laundry composition into the measured dosing device.

11. A method of dispensing a flowable laundry composition according to claim 10 wherein the container is restricted to move upwardly or downwardly before or during dispensing.


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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/066503

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D17/04 B65D1/02 B65D47/20 B65D51/24

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)
B65D 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 practical, 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	WO 2007/130569 A (PROCTER & GAMBLE [US]; DE BUZZACCARINI FRANCESCO [BE]; DE WREE ANN [BE) 15 November 2007 (2007-11-15) page 13, line 18 - line 21; claims 1-10; figures 3-9	1-11
X	WO 2007/130568 A (PROCTER & GAMBLE [US]; DE WREE ANN [BE]; ERGELEN MEHMET TUGRUL [US]; V) 15 November 2007 (2007-11-15) page 13, line 20 - line 23; claims 1-10; figures 3-9	1-11
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2010	03/03/2010

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/066503

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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International application No
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