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(54) **Wrapped detergent compositions and manufacture process**

(57) The present invention relates to a packaged detergent and/or additive composition e.g. for the dish washing machine wrapped in a water dissolvable material comprising a polyvinyl alcohol copolymer and a process of manufacturing thereof.

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Description

[0001] The present invention relates to a packaged detergent and/or additive composition e.g. for the dish washing machine wrapped in a water dissolvable material comprising a polyvinyl alcohol copolymer and a process of manufacturing thereof.

[0002] The traditional form of detergent and/or additive compositions for use in dish washing is granules or non particulate solids such as bars or tablets or briquettes. In the following, the term tablet will refer to any form of non particulate solids. For automatic dish washing machines, said detergent and/or additive tablets or granules are respectively placed or poured in the dispenser located in said dish washing machine or in an adequate dispensing device which is then placed in said washing machine.

[0003] Water soluble packages comprising an agent to be dispensed in an aqueous medium are well known. Polyvinyl alcohol (PVOH) is known as a watersoluble packaging material. Examples of such containers comprising PVOH as a packaging material include detergent pouch packages suitable for automatic dishwashers and washing machines. CA-A-1,112,534 discloses a packet made of a water-soluble material in film form enclosing within it a paste of automatic dishwasher-compatible detergent composition.

[0004] In order to simplify the dosing of detergents for a washing cycle in a machine and to avoid wasting through spillage during the dosing action, EP-A 700 989 describes a unit packaged detergent. Said unit packaged detergent is a detergent packaged in a water soluble polymer film or sheet in such a form that it is suitable for one wash. This unit packaged detergent is placed in the detergent disperser of the machine without unwrapping the contained detergent from the packaging.

[0005] To avoid the unwrapping of the detergent from the packaging has several advantages. First, said unit packaged detergent prevents wasting through spillage of the detergent and/or additive composition. Second, said unit packaged detergent eliminates the need for the user to estimate the dosage of said composition required and ensures that the correct dosage of said composition per wash cycle is used by the user. Third, the fingers of a user do not come in contact with the wrapped detergent composition.

[0006] WO 04/20509 describes a water soluble non-homogenous polymer containing water soluble fillers for wrapping detergent compositions. The polymer is used in an injection moulding process using a water soluble resin comprising a water soluble polymer and a water soluble filler.

[0007] DE-A 199 34 983 describes the use of polyvinyl alcohol as a soil release ingredient of a detergent composition, particularly in detergent compositions for laundry.

[0008] The object of the present invention was to provide a detergent composition wrapped in a water soluble foil providing excellent cleaning results. A further object of the invention is to provide a fast and easy production process for said wrapped composition.

[0009] These objects are met by a unit packaged detergent composition, wherein the detergent composition is wrapped in a water dissolvable material comprising a polyvinyl alcohol copolymer and having a water content of 7% or less and a process of manufacturing such a packaged detergent composition.

[0010] In the following any detergent and/or additive compositions will be encompassed by the term "detergent". This detergent composition may be in the form of granules or of any non particulate solids such as bars or tablets or briquettes. The word "tablet" encompasses in the following any form of non particulate solids. Said tablet may have any shape. Preferably, said solid non particulate detergent tablet is formed in a shape to ensure the uniform dissolution of the tablet in the wash liquor. According to the present invention the detergent and/or additive composition may comprise any ingredients known in the art for dish washing or laundry. Such ingredients may include for example surfactants, suds suppressers, bleach systems, chelating agents, builders, enzymes, fillers and perfumes, however, is not limited to these.

[0011] According to the present invention, a predosed quantity of detergent is wrapped in a packaging to form a unit packaged detergent. The wording "unit packaged detergent" means a packaged amount of detergent suitable for one wash. Nevertheless, two or more unit packaged detergents according to the present invention may be used in a single wash to meet different washing conditions, like dirtiness of washing, amount of washing, volume of washing machine, hardness of water, temperature of water and type of detergent. Said packaging is made of a water dissolvable material. The unit packaged detergent according to the present invention may contain between 5 grams and 30grams of detergent.

[0012] This unit packaged detergent of the present invention is placed in the machine without unwrapping the contained detergent from the packaging. This is possible, since said packaging is made of a water dissolvable material, as described above. To avoid the unwrapping the detergent from the packaging has several advantages. First, said unit packaged detergent prevents wasting through spillage of the detergent and/or additive composition. Spillage may occur during the measuring and/or dispensing into the dispenser of the washing machine or into a dispensing device. Second, said unit packaged detergent eliminates the need for the user to estimate the dosage of said composition required and ensures that the correct dosage of said composition per wash cycle is used by the user. Therefore, separate measuring and/or dosing devices are superfluous.Third, the fingers of a user do not come in contact with the detergent composition, which means that the user avoids to soil its fingers and/or hands.

[0013] As one feature of the present invention, the packaging of the unit packaged detergent is made of a material which dissolves in water, however, outside of water has a stiffness high enough to be processed at high speed during packaging of the detergent compositions. Preferably the material is made essentially from a polymer compound and might include several additives. The preferred stiffness of the polymeric material can obtained for example by reducing the water content of the material to a water content of below 7.5%, preferably 7% or less, particularly preferred 5% or less.

[0014] When used as a material for the formation of a water soluble / dispersible article the water soluble polymer has been found to be particularly suitable, specifically by displaying a very short dissolution/dispersion time and also by producing a low amount of residue in use. It will be appreciated that the resin is not a heterogeneous admixture of components but instead is homogenous.

[0015] When referring to the polymer, water-soluble is herein defined when greater than 99% of such material dissolves within 15 minutes in a beaker containing 1 L of deionised water at 40° C which is stirred with a stirrer revolving at 200 r. p.m.

[0016] The water soluble polymer is preferably a film forming polymer.

[0017] It will be appreciated that the water soluble polymer may comprise a homopolymer or a copolymer. Where the water soluble polymer comprises a copolymer the copolymer may be a random or block copolymer.

[0018] The water soluble polymer may comprise polyvinyl alcohol, polyvinyl pyrrolidone, partially hydrolysed polyvinyl acetate, polyvinyl acetate, a cellulose polymer (such as a cellulose ether e.g. hydroxypropyl cellulose), modified acrylic, fumaric, maleic, itaconic, aconitic, mesaconic, citraconic and methylenemalonic acid or their salts, maleic anhydride, acrylamide, alkylene, vinylmethyl ether, styrene. Preferred are copolymers of polyvinylalcohol, preferably copolymers of polyvinylalcohol and polycarboxylates, most preferred are copolymers of polyvinylalcohol with maleic acid.

[0019] The water soluble polymer preferably has dispersant, anti-redeposition, soil releasing or other detergency properties.

[0020] The water soluble polymer may comprise a sulphonated polymer.

[0021] The water soluble polymer may comprise a polyamine or a modified polyamide compound. Preferred examples include those derived from aspartic acid.

[0022] The water soluble polymer system (foil) may comprise a weakener, like for example glycerine.

[0023] The water soluble polymer system may comprise a soil release agent.

[0024] Examples of polymeric soil release agents include those having: (a) one or more nonionic hydrophile components consisting essentially of (i) polyoxyethylene segments with a degree of polymerization of at least 2, or (ii) oxypropylene or polyoxypropylene segments with a degree of polymerization of from 2 to 10, wherein said hydrophile segment does not encompass any oxypropylene unit unless it is bonded to adjacent moieties at each end by ether linkages, or (iii) a mixture of oxyalkylene units comprising oxyethylene and from 1 to 30 oxypropylene units, said hydrophile segments preferably comprising at least 25% oxyethylene units and more preferably, especially for such components having 20 to 30 oxypropylene units, at least 50% oxyethylene units; or (b) one or more hydrophobe components comprising (i) C3 oxyalkylene terephthalate segments, wherein, if said hydrophobe components also comprise oxyethylene terephthalate, the ratio of oxyethylene terephthalate:C3 oxyalkylene terephthalate units is 2:1 or lower, (ii) C4-C6 alkylene or oxy C4-C6 alkylene segments, or mixtures therein, (iii) poly(vinyl ester) segments, preferably polyvinyl acetate, having a degree of polymerization of at least 2, or (iv) C'-C4 alkyl ether or C4 hydroxyalkyl ether substituents, or mixtures therein, wherein said substituents are present in the form of Cj-C4 alkyl ether or C4 hydroxyalkyl ether cellulose derivatives, or mixtures therein, or a combination of (a) and (b). Typically, the polyoxyethylene segments of (a)(i) will have a degree of polymerization of from 1 to 200, although higher levels can be used, preferably from 3 to 150, more preferably from 6 to 100. Suitable oxy C4-C6 alkylene hydrophobe segments include, but are not limited to, end-caps of polymeric soil release agents such as $MO_3S(CH:)nOCH:CH_2O-$, where M is sodium and n is an integer from 4-6. Other soil release agents useful herein also include cellulosic derivatives such as hydroxyether cellulosic polymers, copolymeric blocks of ethylene terephthalate or propylene terephthalate with polyethylene oxide or polypropylene oxide terephthalate, and the like. Such agents are commercially available and include hydroxyethers of cellulose such as METHOCEL (Dow). Cellulosic soil release agents for use herein also include those selected from the group consisting of Ct-C4 alkyl and C4 hydroxyalkyl cellulose. Further suitable surfactants include water-soluble cationic ethoxylated amine compounds with particulate soil/claysoil removal and/or anti-redeposition properties. Particularly preferred of these cationic compounds are ethoxylated cationic monoamines, diamines or triamines.

[0025] Although less preferred the water soluble polymer system may also further comprise partially water soluble or insoluble builder compounds, i.e. in addition to a water soluble / water dispersible builder. Partially soluble and insoluble builder compounds are particularly suitable for disruption of the resin upon dissolution. Examples of partially water soluble builders include the crystalline layered silicates. Preferred are the crystalline layered sodium silicates. Crystalline layered sodium silicates of this type preferably have a two dimensional 'sheet' structure, such as the so cabled 8-layered structure. Further examples of largely water insoluble builders include the sodium aluminosilicates. Suitable aluminosilicates include the aluminosilicate zeolites. The filler may comprise a crystal growth inhibitor. Suitable types of crystal growth inhibitors include organodiphosphonic acids. The organo diphosphonic acid is preferably a CICJ, diphosphonic acid, more preferably a C2 diphosphonic acid, such as ethylene diphosphonic acid, or most preferably ethane 1-hydroxy-1,1-diphos-

phonic acid (HEDP) and may be present in partially or fully ionized form, particularly as a salt or complex.

[0026] A preferred polymer system in accordance with the invention meets one or more of the following physical parameters:

a) High suitability for packaged materials (e.g. detergents) such as providing an effective barrier to the materials packaged therein and displaying compatibility with hydroscopic and caustic materials.

b) High solubility in water, for example a 3-5g foil comprising the resin of the invention dissolves within 20 minutes in a 1L beaker of water at 40° C when stirred at 200 r.p.m and within 30 minutes at 20° C under the same conditions. To meet these properties the resin may include a rheology modifying additive. Preferred examples of such additives include lubricants and plasticizers.

[0027] In this regard it will be appreciated that the additives are substantially water soluble so that the overall system retains its water solubility / water dispersibility.

[0028] The water soluble polymer system may contain a plasticizer with a content of less than 10 wt %, most preferably less than 5%.

[0029] Suitable types of plasticizers include solvents.

[0030] Preferred examples of solvents include alkylene glycol mono lower alkyl ethers, glycerol, propylene glycols, ethoxylated or propoxylated ethylene or propylene, glycerol esters, glycerol triacetate, lower molecular weight polyethylene glycols, lower molecular weight methyl esters and amides. A preferred type of surfactant for use herein comprises the mono-, di-, trim, or tetra-C_2-C_3 alkylene glycol mono C_2-C_6 alkyl ethers. Specific examples of such compounds include diethylene glycol monobutyl ether, tetraethylene glycol monobutyl ether, dipropylene glycol mono ethyl ether, and dipropylene glycol monobutyl ether. Diethylene glycol mono butyl ether and dipropylene glycol monobutyl ether are especially preferred.

[0031] Compounds of the type have been commercially marketed under the tradenames Dowanol, Carbitol, and Cellosolve. Another preferred type of surfactant comprises the lower molecular weight polyethylene glycols (PEGs). Such materials preferrably have molecular weights of at least 150. PEGs ofmolecular weight ranging from 200 to 600 are most preferred. Yet another preferred type of surfactant comprises lower molecular weight methyl esters. Such materials are those of the general formula: R-C(0)- OCH_3 wherein R ranges from 1 to 18. Examples of suitable lower molecular weight methyl esters include methyl acetate, methyl propionate, methyl octanoate, and methyl dodecancate.

[0032] Suitable types of plasticisers also include nonionic surfactants.

[0033] Preferred nonionic surfactants incorporated into the resin provide a suds suppression benefit. The alkyl ethoxylate condensation products of an alcohol with from 1 to 80 moles of an alkylene (liner/branched aliphatic / aromatic optionally subsituted C_2 to C_{20} alkylene) oxide are suitable for this use. The alkyl chain of the alcohol can either be straight or branched, primary or secondary, and generally contains from 6 to 22 carbon atoms. Particularly preferred are the condensation products of alcohols having an alkyl group containing from 8 to 20 carbon atoms with from 2 to 10 moles of ethylene oxide per mole of alcohol. In this regard Suitable surfactants include POLY-TERGENT(R) SLF-18B nonionic surfactants by Olin Corporation.

[0034] Ethoxylated C_6-C_{18} fatty alcohols and C_6-C_{18} mixed ethoxylated/propoxylated fatty alcohols are suitable surfactants for use herein. Preferably the ethoxylated fatty alcohols are the C_{10}-C_{18} ethoxylated fatty alcohols with a degree of ethoxylation of from 3 to 50, most preferably these are the C_{12}-C_{18} ethoxylated fatty alcohols with a degree of ethoxylation from 3 to 40. Preferably the mixed ethoxylated/propoxylated fatty alcohols have an alkyl chain length of from 10 to 18 carbon atoms, a degree of ethoxylation of from 3 to 30 and a degree of propoxylation of from 1 to 10.

[0035] The condensation products of ethylene oxide with a hydrophobic base formed by the condensation of propylene oxide with propylene glycol are suitable for use herein. The hydrophobic portion of these compounds preferably has a molecular weight of from 1500 to 1800 and exhibits water insolubility. Examples of compounds of this type include certain of the commercially-available Pluronic (TM) surfactants, marketed by BASF.

[0036] The condensation products of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylenediamine are suitable for use herein. The hydrophobic moiety of these products consists of the reaction product of ethylenediamine and excess propylene oxide, and generally has a molecular weight of from 2500 to 3000. Examples of this type of nonionic surfactant include certain of the commercially available Tetronic(TM) compounds, marketed by BASF.

[0037] In a preferred embodiment of the present invention the polymer system may comprises a mixed nonionic surfactant system.

[0038] Suitable lubricants include fatty esters of mono- or polyhydric alcohols having from 1 to 40 carbon atoms in the hydrocarbon chain. The fatty acid portion of the fatty ester can be obtained from mono- or poly-carboxylic acids having from 1 to 40 carbon atoms in the hydrocarbon chain. Suitable examples of monocarboxylic fatty acids include behenic acid, stearic acid, oleic acid, palmitic acid, myristic acid, lauric acid, acetic acid, propionic acid, butyric acid, isobutyric

acid, Valerie acid, lactic acid, glycolic acid and beta,beta'-dihydroxyisobutyric acid. Examples of suitable polycarboxylic acids include: n-butyl-malonic acid, isocitric acid, citric acid, maleic acid, malic acid and succinic acid. The fatty alcohol radical in the fatty ester can be represented by mono- or polyhydric alcohols having from 1 to 40 carbon atoms in the hydrocarbon chain. Examples of suitable fatty alcohols include; behenyl, arachidyl, cocoyl, oleyl and lauryl alcohol, ethylene glycol, glycerol, ethanol, isopropanol, vinyl alcohol, diglycerol, xylitol, sucrose, erythritol, pentaerythritol, sorbitol or sorbitan. Preferably, the fatty acid and/or fatty alcohol group of the fatty ester adjunct material has from 1 to 24 carbon atoms in the alkyl chain. Preferred fatty esters herein are ethylene glycol, glycerol and sorbitan esters wherein the fatty acid portion of the ester normally comprises a species selected from behenic acid, stearic acid, oleic acid, palmitic acid or myristic acid. The glycerol esters are also highly preferred. Specific examples of fatty alcohol esters for use herein include: stearyl acetate, palmityl all-lactate, cocoyl isobutyrate, oleyl maleate, oleyl dimaleate, and tallowyl proprionate. Fatty acid esters useful herein include: xylitol monopalmitate, pentaerythritol monostearate, sucrose monostearate, glycerol mono stearate, ethylene glycol mono stearate, sorbitan esters. Suitable sorbitan esters include sorbitan monostearate, sorbitan palmitate, sorbitan monolaurate, sorbitan monomyristate, sorbitan monobehenate, sorbitan monooleate, sorbitan dilaurate, sorbitan distearate, sorbitan dibehenate, sorbitan dioleate, and also mixed tallow alkyl sorbitan mono- and all-esters. Glycerol monostearate, glycerol mono-oleate, glycerol monopalmitate, glycerol monobehenate, and glycerol distearate are preferred glycerol esters herein. Further suitable agents include triglycerides, mono or diglycerides, and wholly or partially hydrogenated derivatives thereof, and any mixtures thereof. Suitable sources of fatty acid esters include vegetable and fish oils and animal fats. Suitable vegetable oils include soy bean oil, cotton seed oil, castor oil, olive oil, peanut oil, safflower oil, sunflower oil, rapeseed oil, grapeseed oil, palm oil and corn oil.

[0039] Waxes, including microcrystalline waxes are possible lubricants, although much less preferred in the present invention due to their poor solubility in water. Preferred waxes have a melting point in the range from 35° C to 110° C and comprise generally from 12 to 70 carbon atoms. Preferred are petroleum waxes of the paraffin and microcrystalline type which are composed of long-chain saturated hydrocarbon compounds.

[0040] The resin may include a colourant. Colourant when present as a component in the resin is preferably present at a level of from 0.001wt % to 1.5wt %, preferably from 0.01 wt % to 1.0wt %, most preferably from 0.1 wt % to 0.3wt %.

[0041] The colourant may comprise a dye or a pigment. Examples of suitable dyes include reactive dyes, direct dyes, azo dyes. Preferred dyes include phthalocyanine dyes, anthraquinone dye, quinoline dyes, monoazo, disazo and polyazo. More preferred dyes include anthraquinone, quinoline and monoazo dyes. Preferred dyes include SANDOLAN E-HRL 180% (tradename), SANDOLAN MILLING BLUE (tradename), TURQUOISE ACID BLUE (tradename) and SANDOLAN BRILLIANT GREEN (tradename) all available from Clariant UK, HEXACOL QUINOLINE YELLOW (tradename) and HEXACOL BRILLIANT BLUE (tradename) both available from Paintings, UK, ULTRA MARINE BLUE (tradename) available from Holliday or LEVAFIX TURQUISE BLUE EBA (tradename) available from Bayer, USA.

[0042] The article preferably comprises a cleaning composition. The cleaning composition may be an automatic dishwashing detergent or additive, a laundry detergent or additive, a hard surface cleaning composition (such as an all-purpose cleaner) or a toilet reservoir cleaner.

[0043] When used in a dishwasher application the article has been found to be particularly suitable since the packaging resin is formed of highly water soluble components; in use the article has been found to overcome the problem of residue formation on items being cleaned, said residue being formed of packaging material having poor solubility.

[0044] The cleaning composition may be a powder, a tablet or a liquid, but if a liquid, is preferably a low water formulation, preferably having a maximum water content of 5 wt%, in order to maintain the integrity of the article. It will be appreciated that a higher water content may be present where the water is chemically or physically bound (i.e. by a high ionic strength solution).

[0045] The cleaning composition may consist of among others a builder system, a bleach system, an enzyme system, a viscosity modifier, a perfume or odor control system, one or more colourants, an acidity modifier, a bactericide / fungicide, a surfactant system, an enzyme system and a polymer system.

[0046] The composition may be formulated having regard to the fact that the user will not come into contact with the composition, whether by inhalation or by skin contact. For example, the composition may include an enzyme, without concern about physical contact between the composition containing the enzyme, and the user.

[0047] A fast dissolving rate is achieved by decreasing the thickness of said water dissolvable material and/or increasing the temperature of the water. Preferably, the present invention uses water dissolvable polymeric materials of thicknesses between 10 μm and 80 μm, more preferably between 20 μm and 60 μm.

[0048] As options, said unit packaged detergent may be provided in a bag which contains substantially in a loose manner the detergent or as an additional layer on the outer surface of a detergent tablet (tablet is wrapped). Preferably, said unit packaged detergents are delivered in a container made of any material, like carton, plastic or metal if required supplied with a coating. As a preferred option, said unit packaged detergents may be packed and sold as individually packed units separated from each other or in a string, each unit packaged detergents being individually separable by a perforation line. Therefore, each unit packaged detergent can be individually torn off from said string and placed without unwrapping the contained detergent in the washing machine. As other options, said packaging material of the unit

packaged detergent may be translucent, opaque or having a printed side.

[0049] As a further option, said unit packaged detergent may comprise an additive which provides an unbearable bitter taste. This additive may be coated onto said unit packaged detergent. This improves the prevention that children may accidentally ingest the complete packaging detergent.

[0050] The unit packaged detergent according to the present invention may be manufactured in the following way:

the detergent composition is prepared in its granular or particulate form;
if appropriate, the granular or particulate detergent composition may be formed into a tablet of the desired shape and size by any of the methods known in the art, for example selected from the group of: compression, extrusion and casting, whereas said detergent composition is homogeneously distributed throughout the tablet or comprises different layers of certain detergent ingredients;
a water dissolvable material is prepared in form of a film;
then said detergent in granular or tablet form is wrapped into said water dissolvable film to form the unit packaged detergent;
the water dissolvable film is sealed around said detergent so that said film forms a layer directly attached to the outer surface of said tablet, or so that said film forms a bag containing said detergent;
each unit packaged detergent is cut from each other, or a perforation line is added between each unit packaged detergent in a string of unit packaged detergents.

[0051] Since the water dissolvable film used according to the invention has a low water content and therefore an increased stiffness compared to standard PVOH films used in the prior art the wrapping / packaging speed, for example on a high speed horizontal form fill seal flowwrapper system (for example from Theegarten, SIG, Fuji, Bosch) is higher and therefore the manufacturing process has a higher output while remaining the stability of the packing process. Packaging output raises from about 550 tablets per minute to about 725 tablets per minute. Thickness of the foil in this packaging process was 40 μm.

[0052] The unit packaged detergent according to the present invention may be used in the following manner:

a unit packaged detergent necessary for a dish wash cycle in an automatic washing machine is taken from a container, if needed by tearing off a unit packaged detergent along the perforation line in a string of several unit packaged detergents;
said unit packaged detergent is placed into a dish washing machine without unwrapping said detergent.

Examples:

Example 1

[0053] Effect of water soluble foil on primary cleaning performance of an automatic dishwashing detergent.

[0054] A boron free automatic dishwashing detergent with a 4-in-1 formulation known in the art with and without a water soluble foil is tested on the performance of primary cleaning. The detergent is tablet shaped, consisting of three layers and has a weight of 20.0 grams. The water soluble foil has a weight of about 0.3 grams. The water soluble foil consists mainly of polyvinylalcohol - maleic acid (PVOH/MA) copolymer.

[0055] The cleaning performance test is carried out according to the Fresenius test method 0406 vers 1 with a water hardness of 21°GH. The selected cleaning program is '50°C normal' on a 'Miele G651SC' dishwashing machine.

[0056] Soiling of oat flakes, minced meat, milk, tea, tomato/cheese, egg yolk and rice starch on various soil carriers are prepared and toughened. These soilings are cleaned in a dishwashing machine. The soiling left behind after washing is judged gravimetrically (in % removal) or visually on a scale were 1 is no removal and 10 is complete removal of the soil. This test is repeated five times.

[0057] The average results of the five tests are listed below.

	Oat Flakes	Minced Meat	Milk	Tea	Tomato/Cheese	Egg Yolk	Rice Starch
Detergent with PVOH/MA foil	8,8	7,5	6,8	5,4	30%	47%	94%
Detergent without PVOH/MA foil	8,7	7,3	6,9	4,5	30%	43%	95%

On the tea soiling the detergent with the water soluble PVOH/MA foil gives a significant improvement on the cleaning result.

Example 2

[0058] Effect of water soluble foil on rinse aid performance of an automatic dishwashing detergent.

[0059] A boron free automatic dishwashing detergent with a 4-in-1 formulation known in the art with and without an water soluble foil is tested on the performance of the rinse aid function. The detergent is tablet shaped, consisting of three layers and has a weight of 20.0 grams. The water soluble foil has a weight of about 0.3 grams. The water soluble foil consists mainly of PVOH/MA copolymer.

[0060] The rinse aid performance test is carried out according to the Fresenius Standardmethode 10_2000 vers. 02, with a water hardness of 21°GH. The selected cleaning program is '55°C universal' on a 'Miele G666SC turbothermic plus' dishwashing machine.

[0061] The dishwashing machine is loaded with crystal glasses, china plates, glass plates, SAN plates and stainless steel knives. These items are washed in an dishwashing machine were 50 grams additional soil is added. After each cleaning cycle the items are judged visually on spots and streaks on a scale where 0 is very large stripes and/or very numerous large spots and 8 is free of spots and stripes. The test is repeated three times the results are cumulative.

[0062] The average results on spots and stripes of the three tests are listed below.

	Plates blue SAN	Plates Black Glass	Plates black China	Drinking glass longdrink	Knives Stainless steel
Detergent with PVOH/MA foil	4,2	5,4	6,4	5,6	4,8
Detergent without PVOH/MA foil	3,9	4,8	5,9	5,0	3,9

On all of the items the detergent with the water soluble foil gives a better result than the detergent without the foil.

Claims

1. A unit packaged detergent composition, wherein the detergent composition is wrapped in a water dissolvable material comprising a polyvinyl alcohol copolymer and having a water content of 7% or less.

2. Use of a water dissolvable material comprising a polyvinyl alcohol copolymer and having a water content of 7% or less for wrapping a detergent composition.

3. A process of manufacturing a packaged detergent composition of claim 1 using a polyvinyl alcohol- maleic acid copolymer comprising material with a water content of 7% or less.

4. A unit packaged detergent composition according to claim 1, use according to claim 2 or process according to claim 3, wherein the water dissolvable material has a water content of 5% or less.

5. Composition, use or process according to any of claims 1 to 4, wherein the copolymer is a copolymer of polyvinyl alcohol and maleic acid.

6. Composition, use or process according to any of claims 1 to 5, wherein the detergent composition is a dish washing composition.

7. Composition, use or process according to claim 6, wherein the dish washing composition is boron free.

8. Composition, use or process according to claims 6 or 7, wherein the dish washing composition is tablet shaped.

9. Process according to any of claims 3 to 8, where a high speed horizontal form fill seal flowwrapper system is used.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 00 0790

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 102 23 266 C1 (HENKEL KGAA) 20 November 2003 (2003-11-20) * paragraphs [0036], [0040] - [0046]; claims 1,3-6,10 * -----	1-4,6-9	INV. C11D17/04
A	EP 0 291 198 A (THE CLOROX COMPANY) 17 November 1988 (1988-11-17) * claims 1-23; tables 1-6 * -----	1-8	
A	US 2004/186034 A1 (VERRALL ANDREW P ET AL) 23 September 2004 (2004-09-23) * claims 1-29 * -----	1-8	
			TECHNICAL FIELDS SEARCHED (IPC) C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 May 2006	Klier, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 00 0790

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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