The invention describes a floor stripper composition comprising 1 to 30 wt-% organic solvent having at least one C8 to C24 carbon chain and is made from plant oil or animal oil, 1 to 25 wt-% solubilizer made from plant oil or animal oil 0.5 to 12 wt-% non-ionic surfactant made from plant oil or animal oil 0.1 to 10 wt-% source of alkalinity, and made from plant oil or animal oil the rest up to 100 wt-% is water, wherein the composition contains less than 10 wt-% of organic compounds with C1 to C7 carbon atoms which are prepared from petrochemical sources.
FLOOR STRIPPER COMPOSITION BASED ON RENEWABLE RAW MATERIALS

The present invention relates to a floor stripper composition based on renewable raw materials and to a method of stripping a floor having a floor finish on the surface.

In times of environmental sustainable impact ecological cleaning products gain more and more importance. Currently only 10 to 15% of professional cleaning products are claimed as ecological which shows that their application is actually comparatively low. An increased demand is strongly signalized by professional customers especially in the European countries like for example France, Spain, Scandinavia and Belgium and also from big retail and hotel chain companies. A lot of producers furthermore decide to label their products with independent eco labels like SWAN and EU-flower to emphasise they protect the environment more intensively as required by law. Furthermore, many other eco labels exist which are awarded by the producer himself or by independent organisations or by inter-trade organisations. The responsibility of available resources and the environmental protection are key words which are very important for the chemical industry. However, until now there is no general definition of natural or renewable resources.

The present invention provides a new ecological "green" floor stripper.

Traditional floor finishes are mainly based on acrylate polymers with readily-disruptable crosslinking sites which may be removed for refinishing using an appropriate floor stripping agent. For example, acrylate floor finish polymers often employ metal ion crosslinking and are removed using alkaline strippers. For applications where the finish requires increased chemical resistance (e.g., hospitals and other locations where rubbing alcohol and other finish-discolouring solvents may be spilled), less readily disruptable cross-linking agents such as aziridines may be employed. This however can make it very difficult to remove the old finish when refinishing is desired. Finishes having especially high chemical resistance may have to be removed using mechanical means such as sanding. This can damage the underlying flooring substrate. Some underlying flooring substrates are also susceptible to damage from the chemicals employed in aggressive floor strippers. For example, linoleum may turn brown under high pH conditions. References relating to floor strippers include U.S. Patent Nos. 5,342,551, US 5,419,848, US 5,637,559, US 5,804,541, US 5,849,682, US 977,042, US 6,544,942, US 6,583, US 2002/0028621, US 2003/0125226, WO 2006/113144, US 2007/0087952, US 2007/0095003, WO 2004/090085 and WO 2009/007166.
Traditional floor stripper formulations normally have a very high pH value above 12 due to high alkalinity and contain sources of alkalinity like sodium or potassium hydroxide or organic amines. Furthermore, they contain high amounts of organic solvents like, for example, benzyl alcohol, mono phenyl glycol or propylene glycol ethers and surfactants.

Very often the floor stripper compositions are classified as corrosive due to their high pH value. Nearly all used raw materials which are used in traditional floor finishes are prepared from petrochemical sources which means that mineral oil is used as the basis of these compounds. The amount of organic solvent in such floor stripper products is very high and can be up to 80 or more than 80 wt-% of the total composition. These floor stripper formulations are perceived as typical non-ecological products, because they are used in comparatively high concentrations and contain hazardous or toxic organic solvents.

A typical floor stripper is described in the WO 2006/1 13144. This floor stripper composition comprises as a floor finish dissolver preferably ethylene glycol phenyl ether or benzyl alcohol in very high amounts. The amount of these solvents can be up to 98 %.

WO 2009/067120 describes a floor stripper for chemical resistant cross-linked floor finishes with a lower amount of organic solvent. In this document a solvent mixture of benzyl alcohol and propylene glycol mono phenyl ether is used in an amount of about 20 wt-%. Furthermore, also the pH value of this floor finish stripper composition is lower compared to the traditional floor strippers known before and lies around a pH between 9 and 10.

However, until now no floor stripper composition is known in which organic solvents are used which can be classified as ecological and are based on renewable raw materials. Such a green stripper comprises raw materials which have to be proved by their degree of biodegradability, their natural source and their classification. Of course, the cleaning performance, the film removal properties and the foaming behaviour of the composition has to be as good as for a conventional non-naturally sourced stripper.

Generally, in the cleaning industry the use of natural and renewable resources is very low compared to the use of petrochemical-based raw materials. However, the trend to "green products" is increasing. For daily consumer products like all purpose cleaner, manual dish washing detergents or slightly acid sanitary cleaners quite acceptable performing formulations are already on the market. However, for institutional heavy duty cleaning applications adequate products are still missing. If there are existing formulations of green products, they have a clear lack in performance due to limited raw material alternatives. Natural raw materials which are used for the production of such green products are plant oils, animal oils, fat, sugar and starch or derivatives thereof. However, these ingredients are
normally insufficient for stripping requirements. The main criteria for the conventional stripper product are the excellent film removal ability, the swelling property to remove old, crusted polymer dispersions from the floor and soils. A further important aspect is the wetting and cleaning performance so that the application solution can react fast without becoming dry and provides a satisfying cleaning result. High alkalinity in combination with strong organic solvents and surfactants in comparable high amounts is used today with the drawback that quite often the floor corrodes or specific sensitive floor types like linoleum cannot be treated with such a composition. Therefore, substitution of ingredients based on natural sources from a technical point of view is extremely difficult to find.

The focus of this invention is to provide a new green stripper formulation which has to be based mostly on naturally sourced raw materials to get less environmental impact. These naturally sourced raw materials like surfactants, solvents, fatty acids, are used and have to be proved on the on hand considering their quality in performance and on the other hand their environmental impact such as biodegradability and classification. Additionally, the source and the properties of the materials are important.

For such a new formulation several requirements have to be solved. The formulation has to remove old polymer dispersions easily from the floor. The formulation has to have a very good swelling property. The formulation has to have a high general cleaning performance and a low foam behaviour for use in floor cleaning machines. Furthermore, it must have a good wetting behaviour and a pH value which does not corrode the floor and ensures very good material compatibility. Furthermore, it should fulfil the SWAN criteria for floor strippers for eco label certification.

The technical object of the invention is to provide a floor stripper composition mainly based on renewable raw materials which do not come from petrochemical sources, and wherein the composition furthermore fulfils the criteria for a high quality floor stripper having excellent film-removing ability, good swelling property to remove old, crusted polymer dispersions and soils, low alkalinity, good wetting properties and cleaning properties and must be non-corrosive.

The technical object is solved by a floor stripper composition comprising

1 to 30 wt-% organic solvent having at least one C8 to C24 carbon chain and is made from plant oil or animal oil,
1 to 25 wt-% solubilizer made from plant oil or animal oil
0,5 to 12 wt-% non-ionic surfactant made from plant oil or animal oil
0,1 to 10 wt-% source of alkalinity, and

the rest up to 100 wt-% is water. The composition furthermore contains less than 10 wt-% of
organic compounds with C1 to C7 carbon atoms which are prepared from petrochemical sources.

In a preferred embodiment the first stripper composition comprises an organic solvent which has at least one linear or branched carbon chain with an even number of carbon atoms between C8 and C24.

In a further preferred embodiment the composition contains less than 10 wt-% of organic compounds with C1 to C7 carbon atoms and aromatic compounds and cycloaliphatic compounds which are prepared from petrochemical sources.

The invention relates to a floor stripper formulation having a very good material compatibility to remove old and resisting sticking salts and polymer films from floors. The components used for the floor stripper formulation are mostly naturally sourced components preferably from vegetable oils like, for example, coconut oil, corn oil, cottonseed oil, olive oil, palm oil, palm kernel oil, peanut oil, rapeseed oil, sunflower oil, sesame oil, soybean oil and sunflower oil.

Other oils or fats from plant or animal material can be used.

The floor stripper composition has preferably a pH of less than 10.5 measured at 20 °C to guarantee that the floor stripper formulation is alkaline and can build up saponification with fatty acids and on the other hand to ensure a very good material compatibility of the floor stripper composition.

In a preferred embodiment the floor stripper composition comprises 3 to 25 wt-% organic solvents, more preferably 5 to 20 wt-% and most preferably 5 to 15 wt-% of organic solvent. The organic solvent has the function to remove old, crusted polymer dispersions from the floor. It should also have a good swelling property so that the hard floor finishes, which can be, for example, of polyacrylate, are softened and it is easier to remove them.

In a preferred embodiment the organic solvent is selected from the group consisting of C8 to C10 alkoxylated or non-alkoxylated fatty acids, C8 to C24 alkoxylated or non-alkoxylated fatty alcohols, C8 to C24 amides and C8 to C24 alkyl amides and C8 to C24 dialkyl amides and amines. More preferred are Laurly N, N dimethylamid, C8 to C10 ethoxyilated fatty acids, amines, N,N dimethyldecanamide and mixtures thereof.

Most preferred is a mixture of Laurly N, N dimethylamid and C8 to C10 fatty acids and amines.

These solvents have an excellent swelling property and they are also readily biodegradable and less toxic compared to the usual organic solvent used in traditional floor finishes.
The floor stripper composition furthermore comprises a co-solvent in low amounts for enhancing of the floor finish removal properties. This co-solvent can be any organic solvent.

A variety of compounds can be used as co-solvent. Representative examples include phenyl-substituted alkyl alcohols include benzy alcohol; terpineols (e.g., alpha, beta, gamma, etc.; slight water solubility); ethylene glycol monobenzyl ether; alpha-phenylethyl alcohol, beta-phenylethyl alcohol, ethylene glycol phenyl ether, commercially available as DOWANOL(TM) EPh(TM) from Dow Chemical Co.), propylene glycol phenyl ether (commercially available as DOWANOL PPh(TM) from Dow Chemical Co.) and mixtures thereof. Benzy alcohol, ethylene glycol phenyl ether and propylene glycol phenyl ether are preferred phenyl-substituted alkyl alcohols.

Furthermore a variety of oxygenated swelling solvents may be employed as co-solvent in the disclosed compositions and methods. Representative oxygenated swelling solvents include alcohols, ethers, esters, aliphatic acids or anhydrides, and ketones, including 2-, 3- or 4-acetamidophenol (<1.4% water solubility); acetonilide (<1% water solubility); acetophenone (<1% water solubility); 2- acetyl-1-methylpyrrole; benzyl acetate (<1% water solubility); benzyl benzoate (<1% water solubility); oxygenated essential oils (e.g., benzaldehyde, carvone, cinnamealdehyde, borneol and its esters, citrals, linalool and its esters); dibasic esters such as dimethyl adipate, dimethyl succinate, dimethyl glutarate (often available in a mixture, including products available under the trade designations DBE(TM), DBE-3, DBE-4, DBE-5, DBE-6, DBE-9, DBE-IB, and DBE-ME from DuPont Nylon), dimethyl malonate, diethyl adipate, diethyl succinate, diethyl glutarate, dibutyl succinate, and dibutyl glutarate; dialkyl carbonates such as dimethyl carbonate, diethyl carbonate, dipropyl carbonate, diisopropyl carbonate, and dibutyl carbonate; CI-12 aliphatic acids such as acetic or succinic acid; CI-12 aliphatic anhydrides such as acetic anhydride or succin anhydride; organo-phosphates and phosphonates such as tributyl phosphate, tripropyl phosphate, 2-ethyl-1-hexyl phosphate; phthalate esters such as dibutyl phthalate, diethylhexyl phthalate, and diethyl phthalate; pyrrolidinones such as 1-methyl-2-pyrrolidinone (NMP) and 1- ethyl-2-pyrrolidinone (NEP); and mixtures thereof. Additional representative oxygenated solvents include amyl acetate, amyl alcohol, butanol, 3-butoxyethyl-2-propanol, butyl acetate, n-butyl propionate, cyclohexanone, diacetone alcohol, diethoxyethanol, diethylene glycol methyl ether, diisobutyl carbinol, diisobutyl ketone, dimethyl heptanol, dipropylene glycol tert-butyl ether, ethanol, ethyl acetate, 2-ethylhexanol, ethyl propionate, ethylene glycol methyl ether acetate, hexanol, isobutanol, isobutyl acetate, isobutyl heptyl ketone, isophorone, isopropanol, isopropyl acetate,
methanol, methyl amyl alcohol, methyl n-amyl ketone, 2-methyl-1-butanol, methyl ethyl ketone, methyl isobutyl ketone, 1-pentanol, n-pentyl propionate, 1-propanol, n-propyl acetate, n-propyl propionate, propylene glycol ethyl ether, tripropylene glycol methyl ether (commercially available as DOWANOL TPM from Dow Chemical Co.), dipropylene glycol dimethyl ether (commercially available as PROGL YDE(TM) DMM from Dow Chemical Co.), tripropylene glycol n-butyl ether (commercially available as DOWANOL TPNB from Dow Chemical Co.), diethylene glycol n-butyl ether acetate (commercially available as Butyl CARBITOL(TM) acetate from Dow Chemical Co.), diethylene glycol monobutyl ether (commercially available as Butyl CARBITOL from Dow Chemical Co.), ethylene glycol n-butyl ether acetate (commercially available as Butyl CELLOSOL VE(TM) acetate from Dow Chemical Co.), ethylene glycol monobutyl ether (commercially available as Butyl CELLOSOLVE from Dow Chemical Co.), propylene glycol monobutyl ether (commercially available as DOWANOL PnB from Dow Chemical Co.), ethyl 3-ethoxypropionate (commercially available as UCAR(TM) Ester EEP from Dow Chemical Co.), 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate (commercially available as UCAR FILMER(TM) IBT from Dow Chemical Co.), diethylene glycol monohexyl ether (commercially available as Hexyl CARBITOL from Dow Chemical Co.), ethylene glycol monohexyl ether (commercially available as Hexyl CELLOSOLVE from Dow Chemical Co.), diethylene glycol monomethyl ether (commercially available as Methyl CARBITOL from Dow Chemical Co.), diethylene glycol monooctyl ether (commercially available as CARBITOL from Dow Chemical Co.), ethylene glycol methyl ether acetate (commercially available as Methyl CELLOSOLVE acetate from Dow Chemical Co.), ethylene glycol monomethyl ether (commercially available as Methyl CELLOSOLVE from Dow Chemical Co.), dipropylene glycol monomethyl ether (commercially available as Methyl DIPROP ASOL from Dow Chemical Co.), propylene glycol methyl ether acetate (commercially available as Methyl PROPASOL acetate from Dow Chemical Co.), propylene glycol monomethyl ether (commercially available as Methyl PROPASOL from Dow Chemical Co.), diethylene glycol monopropyl ether (commercially available as Propyl CARBITOL from Dow Chemical Co.), ethylene glycol monopropyl ether (commercially available as Propyl CARBITOL from Dow Chemical Co.) and propylene glycol monopropyl ether (commercially available as Propyl PROPASOL from Dow Chemical Co.) and mixtures thereof. Preferred oxygenated swelling solvents include propylene glycol monobutyl ether, dipropylene glycol
dimethyl ether, ethylene glycol monobutyl ether, diethylene glycol monobutyl ether, NMP, NEP and mixtures thereof. Some oxygenated swelling solvents (e.g., NMP or NEP) may provide a synergistic improvement in stripping performance when combined with phenyl-substituted alkyl alcohols such as benzyl alcohol. If desired, minor amounts of low flash point oxygenated swelling solvents such as 1,3-dioxolanehose (flash point about -6[deg.] C), ethanol (flash point 12[deg.] C), isopropanol (flash point 12[deg.] C) and other solvents that will be known by persons having ordinary skill in the art may be included together with major amounts of a higher flash point oxygenated swelling solvent, to provide a composition with more acceptable flammability characteristics than one containing only the low flash point solvent.

The amount of co-solvent based on the total composition is less than 10 wt-%, preferably less than 5 wt-%, more preferably less than 2 wt-% and most preferably less than 0.1 wt-%.

The floor stripper composition according to the invention also comprises 1 to 25 wt-% of a solubilizer.

The solubilizer has emulsifying properties and is used to obtain a clear solution of all ingredients of the composition. A variety of solubilizers may be employed in the disclosed compositions and methods. The solubilizer desirably serves as a hydrotrope for one or more hydrophobic ingredients in the stripper composition, may contain carbon atoms, (e.g., from about 2 to about 11 carbon atoms) or heteroatoms (e.g., nitrogen or sulfur), and may be substituted with various moieties (e.g., hydroxyl, ester, aldehyde or alkyl groups), so long as such carbon atoms, heteroatoms and moieties do not prevent the composition from attaining a single phase and do not cause excessive foaming when employing the chosen application equipment. It may be noted in that regard that less foaming may occur and more latitude in solubilizer selection may be available when using a mop, sponge or other simple application device. Also, more foaming may occur and less latitude in solubilizer selection may be available when using a rotary floor machine or other motorized application device. Representative solubilizers include various aromatic acids, water-soluble alkali metal salts of aromatic acids, water-soluble organic amines, water-soluble salts of such amines, and mixtures thereof. Many such solubilizers are available, including sodium cumene sulfonate, potassium cumene sulfonate, hydroxyethane sulfonic acid, toluene sulfonic acid, xylene sulfonic acid, methyl naphthalene sulfonic acid, 1-hydroxyethylidene-1,1-diphosphonic acid, n-butyl acid phosphate, phenyl acid phosphate, dimethylypyrophosphoric acid, 2-phosphonobutane-1,2,4-tricarboxylic acid, benzoic acid, hydroxybenzoic acids (e.g., 2-hydroxybenzoic acid), dihydroxybenzoic acids (e.g., 3,5-
dihydroxybenzoic acid), pyridinecarboxylic acids (e.g., 2-pyridinecarboxylic acid), pyridinedicarboxylic acids (e.g., 2,6-pyridinedicarboxylic acid), sulfosuccinic acid, monoethanolamine (MEA), 2-aminomethylpropanol (AMPS), reaction products formed by combining an acid such as cumene sulfonic acid and an amine such as MEA, amino tri (methylene phosphonic acid) and mixtures thereof. The preferred solubilizer is selected from the group consisting of cumolsulfate, cumolsulfonate, C16 to C20 fatty acid ester, glycerine or mixtures thereof, more preferred is cumolsulfonate of sodium or potassium. Sufficient solubilizer should be employed so that the composition has a single phase. Thus the desired solubilizer amount will vary somewhat depending upon the water solubility of the chosen solvent. Normally however at least one and in some instances the solvent will be present in amounts above its water solubility limits in the absence of a solubilizer, and thus the solubilizer will be needed to provide a single phase stripper composition. When the disclosed compositions are formulated as a concentrate, the solubilizer may represent for example about 1 to 25 wt-% preferably 3 to 20 wt-% and more preferably 5 to 15 wt-% of the total composition weight.

The composition furthermore comprises 0.5 to 12 wt-% of a non-ionic surfactant.

The surfactant is used in the stripper composition for cleaning purposes by emulsifying the dirt. Furthermore the surfactant reduces the surface tension of water and allows a better wetting of the floor. Exemplary non-ionic surfactants include alkoxylated C8 to C 24 fatty alcohol, alkoxylated or non-alkoxylated C8 to C24 fatty acid ester, alkoxylated or non-alkoxylated C8 to C24 fatty acid ether, alklypolyglycoside, saccharose esters or mixtures thereof. Alkylpolyglycosides are preferred non-ionic surfactants.

The non-ionic surfactant is used in an amount of from 0.5 to 12 wt-%, preferably 0.8 to 10 wt-% and most preferred 1 to 8 wt-% of the total composition.

The floor stripper composition furthermore comprises 0.1 to 10 wt-% of a source of alkalinity.

The source of alkalinity is used to enhance the pH of the composition. Furthermore it can react with fatty acids to form the saponification agent.

A variety of hydroxide compounds may be combined with the fatty acid or fatty ester to form the saponification agent. Representative inorganic hydroxide compounds include metal hydroxides like lithium hydroxide, sodium hydroxide, potassium hydroxide and non-metal hydroxides like ammonium hydroxide. Sodium hydroxide and potassium hydroxide are preferred. Representative organic alkaline sources include amines, alkanolamines or mixtures thereof.

The amount of hydroxide compound may be determined based on the number of
fatty acid or fatty ester acid equivalents employed. Sufficient excess hydroxide compound
should be employed so that the stripper composition will have an alkaline pH, of less than
11 preferably less than 10.5 measured at 20° C.

The amount of source of alkalinity based on the total composition is 0.1 to 10 wt-%
preferably 0.3 to 6 wt-% and most preferred 0.5 to 4 wt-%.

The floor stripper composition furthermore comprises water up to 100 wt-% in the
composition.

Tap water, deionized water, distilled water or water in any other suitable form may
be used in the disclosed compositions and methods. The use of softened water or of water
having a low overall hardness level may facilitate application of the disclosed compositions
to a hardened floor finish and limit dewetting.

Water may represent for example at least 5 wt. %, at least 10 wt. %, at least 20 wt.
%, at least 25 wt. %, at least 30 wt. %, at least 40 wt. %, at least 50 wt. % or at least 60 wt.
% of the total stripper composition. Water may for example also represent less than 80 wt.
%, less than 70 wt. %, less than 60 wt. %, less than 55 wt. %, less than 50 wt. %, less than
40 wt. %, less than 30 wt. % or less than 20 wt. % of the total stripper composition. The
appropriate amount will typically vary somewhat depending on the other ingredients in the
 stripper composition and the characteristics of the floor finish whose stripping or deep
scrubbing is desired. The composition may be sold in ready to use form, or if desired may
be sold as a water-containing concentrate designed to be diluted with additional water, e.g.,
where deep scrubbing rather than stripping is desired. A preferred water amount for use in
ready to use compositions is about 10 to about 70 wt. %, and more preferably about 20 to
about 60 wt. % of the total stripper composition.

The floor stripping composition according to the invention is normally prepared as a
concentrate, but is usually used as a solution by delusion of a concentrate in volume
delusion ratio of concentrate to water in a range of 1:50 to 1:1, preferably 1:10 to 1:1.

The composition furthermore may contain 0 to 6 wt-% of a fatty acid.

A variety of fatty acids may be employed. The fatty acid may for example be
saturated or unsaturated and is a naturally-occurring produced. The fatty acid ester may
contain for example from about 8 to about 24 aliphatic carbon atoms. Representative
saturated fatty acids include caprylic acid, capric acid, lauric acid, myristic acid, palmitic
acid, stearic acid, arachidic acid, behenic acid and mixtures thereof. Representative
unsaturated fatty acids include myristoleic acid, palmitoleic acid, oleic acid, linoleic acid,
alpha-linolenic acid, arachidonic acid, eicosapentaenoic acid, erucic acid, docosahexaenoic
acid and mixtures thereof (e.g., coconut fatty acid).
The fatty acid reacts with the alkalinity source to the saponification agent. A variety of saponification agents may be employed in the disclosed compositions and methods. The saponification agent comprises the reaction product of a fatty acid with a stoichiometric excess of the alkaline source preferably the metal hydroxide or the ammonium hydroxide.

The fatty acid or fatty ester and the saponification agent made therefrom desirably have a low or at least not unpleasant odor.

The amount of fatty acid based on the total composition is 0 to 6 wt-%, preferably 0.3 to 5 wt-% and most preferred 0.5 to 3 wt-%.

The floor stripper composition according to the invention is prepared by mixing the ingredients until a clear single phase solution is formed.

The invention further relates to a method of stripping a floor having a floor finish on the surface comprising the steps of providing the concentrate according to the invention or a use solution of the concentrate, applying to a floor a composition, the concentrate composition or the use solution, allowing the applied composition or use solution to soften or dissolve at least some of the floor finish and removing the composition or the use solution and the softened or dissolved floor finish from the floor.

In a preferred embodiment the floor finish is a cross-linked floor finish.

A variety of hardened floor finishes may be stripped or deep scrubbed using the disclosed method. Representative commercially available floor finishes include PADLOCK(TM), GEMSTAR LASER(TM), GEMSTAR POLARIS(TM), RIVET(TM), and TAJ MAHAL(TM) acrylic floor finishes, GLOSSTEK 100(TM) and ORION(TM) polyurethane floor finishes and COURTMASTER II(TM), ISI STAR(TM), TUKLAR MEDICAL(TM), and LODAN STAR(TM) finishes, all from Ecolab Inc.; CORNERSTONE(TM) and TOPLINE(TM) acrylic floor finishes from 3M; BETCO BEST(TM) floor finish from Betco Corp.; HIGH NOON(TM) acrylic finish from Butchers; CITATION(TM) and CASTLEGU ARD(TM) acrylic finishes from Buckeye International, Inc.; THERMOHOSPITAL(TM) polish from Johannes Kiel KG; COMPLETE(TM), SIGNATURE(TM), TECHNIQUE(TM) and VECTRA(TM) acrylic floor finishes and OVER AND UNDER(TM) floor sealer from S. C. Johnson Professional Products; the TASKI JONTEC line of finishes (including ESD(TM), ETERNUM(TM), LINOS AFE(TM), LUNA(TM), MATT(TM), RESITOL(TM), TIMES AVER(TM) and TRAFFIC(TM) finishes) from JohnsonDiversey Inc.; SPLENDOR(TM), DECADE 90(TM), PRIME SHINE(TM) ULTRA and PREMIER(TM) acrylic finishes and FIRST ROUND and FORTRESS(TM) urethane acrylic finishes from Minuteman, International, Inc.; ACRYL-KOTE(TM) Seal and Finish and PREP Floor Seal from Minuteman,
International, Inc.; ULTRA TC(TM) and UV I-FINISH(TM) UV-curable finishes from Minuteman, International, Lie; ON TOP(TM) hard floor coating from Dr. Schnell Chemie GmbH; FLOORSTAR(TM) Premium 25 floor finish from ServiceMaster, Inc.; UPPER LIMITS(TM) acrylic finish and ISHINE(TM) optically brightened floor finish from Spartan Chemical Co. and LONGLIFE HOSPITAL(TM) finish from Tana- Chemie GmbH.

If in concentrated form, the stripper/cleaner should be diluted with water prior to use, e.g., at an intended use location. Ordinary tap water, softened water or process water may be employed. The concentrate: water dilution ratio usually will be at least 1:1 by volume, for example at least 1:2, at least 1:3, at least 1:4, at least 1:5, at least 1:6, at least 1:8, at least 1:10 or more. A variety of mixing methods may be employed. Mixing in a mop bucket is one such method and may be preferred. The stripper/cleaner may be applied using techniques that will be familiar to those skilled in the art (e.g., using a flat or string mop, squeegee, roller or towel). The applied stripper/cleaner should be allowed to stand for a suitable time (e.g., for at least 10, at least 20 or at least 30 minutes, and if need be up to one hour, up to two hours or longer) while it softens or deep scrubs the floor finish. The floor finish and stripper/cleaner may optionally be abraded using a rotary floor machine equipped with a suitably mild abrasive (e.g., a green or black SCOTCH-BRITE(TM) Floor Maintenance pad from 3M) using overlapping passes and taking care to maintain a wet surface. The composition (and, where stripping is intended, the softened finish) may be removed using a variety of techniques that will be familiar to those skilled in the art including vacuuming, mopping, scrubbing, wiping or scraping. The stripped floor or deep scrubbed floor finish may be rinsed using at least one and preferably two or more applications of water, allowed to dry and a layer or layers of floor finish applied thereto and caused or allowed to harden. More than one application of floor finish and extra drying time between coats may be needed to ensure that porous portions of the underlying floor or floor finish are adequately filled.

The invention is further illustrated in the following non-limiting examples, in which all parts and percentages are by weight unless otherwise indicated.

EXAMPLES

1. Test methods

With the composition of the invention several tests were made to evaluate the film removal properties, the cleaning performance and the foam behaviour of the composition according to the invention compared to standard products of the state of the art which
contain organic solvents like benzyl alcohol, alkylene glycol alkyl ether, glycol ether compounds. In the following the test methods are described.

1.1. Stripping-Ring Test - Film Removal Ability

The stripping-ring test is a test method to determine the film removal ability of stripper products on coated PVC-strips. A multi-layered and coloured film is produced by the application of different coloured floor finishes on a white PVC, to be able to remove the layers stepwise. The more layers can be removed, the better is the film removal ability of the stripper.

For the preparation of the coloured floor finish, 0.4 g of the colour are stirred in 200 ml Gliz Metallic® - a polymer dispersion - until colour and dispersion are mixed completely.

The colours that are used are: supranol yellow, astraphloxin red (producer: Bayer), luganil green (producer: BASF) and methylene blue (producer: Merck).

The PVC-strip has to be stripped before the different coloured floor finishes are applied by a manual applicator in the following sequence: three layers yellow, three layers green, three layers red and at last three layers blue. Each single colour layer has to dry for one to two hours at room temperature and before a colour-change, the film has to cure for two to five days and subsequently the coated PVC-strip is stored in a dark, dry and cool area until use. Different kinds of stripper application solutions are tested with the stripping-ring test in given time intervals. First 30 seconds, then 60 seconds and finally 90 seconds. The various application solutions obtain different results concerning the film removal ability. The performance of each stripper is evaluated by the film removal.

Furthermore, the one side self-adhesive stripping rings are affixed before starting the stripping-ring test. Afterwards, the stripping rings will be filled with the application solution to the top level of the stripping rings. Directly after the reaction time, the application solution is absorbed by a paper towel and the stripping rings are removed by a scoop. The evaluation of the film removal ability refers to the twelve assigned coatings and an evaluation scheme of the stripper is explained in the following:

layers colour evaluation
white excellent
yellow very good
green exceptionally well
red good
blue insufficient grades
1-4 insufficient film removal
5-9 good film removal
> 9 excellent film removal

1.2. Cleaning Performance

This test method, also called Gardner method, is used to determine the cleaning efficiency of different cleaning products.

Before testing several solutions, the PVC strips (white PVC-film Benova 4812080, 1,3 m / 50 m / 0,12 mm; producer: Benecke-Kaliko AG) have to be prepared. Seven paperboard strips (hard paperboard strips 40 mm x 554 mm x 1 mm; producer: Kappa packaging plant Neuss) are glued with a pressure-sensitive adhesive J 6251 (producer: Henkel) in a line next to each other on the rough side of the PVC foil without inducing blisters or folds between the paperboard strips and the PVC film. The result is to be found within an area of 280 cm x 554 cm which has to dry overnight.

One day before the measurement, polyester sponges have to soak in tap water overnight. Thereby, one sponge per strip is needed. One day after the preparations, 2 g of the test soil (standard test soil IPP 83/21, producer: WfK Krefeld) is weighed by a lab scale with a watch glass and is applied on the PVC-strips with a flat brush (55 mm wide) seven times in each direction with horizontal and vertical strokes. The last stroke has to be orthogonal to the previous movement and afterwards the soil has to dry for one hour.

After the drying time of the IPP-soil, the PVC film with the paperboard strips on it is cut along the edge with a carpet knife. Subsequently, one of the prepared PVC strips is placed on the guide rail on top of the Wet Abrasion Scrub Tester (model 494, DIN-ASTM-515, producer: Erichsen GmbH & Co. KG).

The sponge is taken out of the water and pressed out with F = 750 N for 10 seconds by a sponge press. In the next step, the sponge is placed in the holder of the Wet Abrasion Scrub Tester and laid on the surface with a weight of 400 g. The application solution is used with a concentration of 1 and 5 wt-% and tap water is used as reference.

According to each application solution and the tap water, three strips per application solution are necessary to guarantee the validity. The application solution is applied on the top of the soiled strip and also on the sponge by a measuring spoon. The volume of the measuring spoon is 12.5 ml, whereby 25 ml
of the application solution is used altogether. Afterwards, the sponge is positioned on the top of the soiled strip and the measuring is started - so the sponge holder begins to move forward and backward 10 times.

After the wipe cycle is completed, the test strip is taken off and rinsed under running deionized water which has to run during the whole test to make sure that the same water pressure is gained. The test strips have to dry overnight at room temperature and the measuring of the degree of whiteness (Y-value) is determined at the following day by a photometer sphere gloss (producer: Byk Gardner).

Seven different measuring points of each strip are measured and the average results give the percentage of the Y-value of the different test solutions. The formula is outlined below:

\[
\bar{Y} = \frac{1}{N} \sum_{i=1}^{N} y_i \\
\bar{Y} = \text{average Y-value} \\
N = \text{number of measuring spots} \\
y_i = \text{Y-value per measuring spot i}
\]

\[
S^2(x) := \frac{1}{N-1} \sum_{i=1}^{N} (x_i - \bar{Y})^2 \\
S = \text{standard deviation}
\]

Thus, the measurements are influenced by the quality of water and the environmental conditions in the lab as temperature and humidity for example. Therefore, only the results on the same day are comparable.

1.3. Foam Behaviour

The foam behaviour test provides information about the foam volume of all kinds of cleaners in general. As strippers have to have a low foam volume, foam behaviour is an important parameter concerning stripper products. Foam is hindering by aspirating the application solution from the floor. The wet vacuum cleaner is filling with foam quickly because of the air stream, so that it has to be cleared in short time intervals.

For the test four test solutions at maximum 50 ml of several dilutions, at most 1 wt-% and 5 wt-%, are filled in the measuring cylinder, which is locked with a stopper. For receiving comparable values of the foam volume, it is very important to test another stripper as reference or standard in use.

The measuring cylinder is clamped at the holder of the rotating foam generator, wherein three more cylinders can be used. After starting the rotating foam generator, it stops after 200 cycles, with a rotation of 360° for every cycle (27 rpm). Immediately after the last
tilt, the foam volume is read off, and also again after one and five minutes. The poured in solutions of 50 ml will be subtracted from the total foam volumes, which are determined at the end of the test. Generally, the less foam builds up and the quicker the foam breaks down, the better is the defoaming ability of the test product. This parameter is very important especially concerning auto scrubber cleaning.

2. Tested Compositions

The following compositions were tested. The compositions were prepared by mixing the components thoroughly until a clear solution is produced. The following table 1 shows the chemical composition of the tested stripper formulations.

Table 1

<table>
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<tr>
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<th>4</th>
<th>5</th>
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<td>Palm kernel fatty acid</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C8 to C10 fatty acid</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.78</td>
<td>0.78</td>
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<td>KOH 50 %</td>
<td>0.83</td>
<td>0.86</td>
<td>0.76</td>
<td>1</td>
<td>1</td>
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<td>Alkylpolysaccharid</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Lauryl N,N-dimethylamide and C8 to C10 fattyacid and amides with dimethylamin</td>
<td>7.5</td>
<td>7.5</td>
<td>0</td>
<td>0</td>
<td>7.5</td>
</tr>
<tr>
<td>Phenoxyethanol</td>
<td>7.5</td>
<td>7.5</td>
<td>15</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Fatty acid potassium salt</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Glycerol</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>The rest up to 100 wt-% is water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All components are described in wt-% active substance.

Examples 6 and 7 are comparative examples with products of the state of the art comprising organic solvents from petrochemical sources. Example 6 is STRIPPER from Tana Chemie GmbH and example 7 is Bendurol maxx from Ecolab.
3. Stripping-Ring Test - Film Removal Ability

The stripping ring test was carried out as described above with the compositions of table 1. The different formulations are tested in a concentration of 1:3 concentrate to water to measure the film removal ability. The following table 2 shows the results.

<table>
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<th>Time in s</th>
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<th>2</th>
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<th>4</th>
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<th>6</th>
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<td>30</td>
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<td>6</td>
<td>6.5</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
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<td>90</td>
<td>6</td>
<td>7</td>
<td>7.5</td>
<td>8</td>
<td>8.5</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

1-4 insufficient film removal
5-9 good film removal

The best film removal is presented by the standard stripper in example 7 which is a product already on the market containing organic solvents from petrochemical sources Bendurol maxx® (producer: Ecolab) that removes 9 out of 12 coatings. Generally, the more films are removed or the higher the value in the table is, the better is the film removal ability.

The results of the formulations 1 to 5 illustrate that the film removal ability of the green stripper formulations of the invention are good. The results of the formulations 1 to 5 are comparable to the quality of the example 7. In contrast the film removal of the second state of art product example 6 is absolutely insufficient because only five layers within 90 seconds are removed whereas more than five layers are removed after 30 seconds by the other formulations.

4. Cleaning Performance

The cleaning efficiency of the individual formulations are determined as described above by the Y-value as outlined in table 3. Generally, the higher the Y-values, the better is the result.

<table>
<thead>
<tr>
<th>Concentration</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>water</th>
</tr>
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<tbody>
<tr>
<td>wt-%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>42.57</td>
<td>44.08</td>
<td>45.93</td>
<td>47.79</td>
<td>47.54</td>
<td>32.11</td>
<td>43.01</td>
<td>32.82</td>
</tr>
<tr>
<td>5</td>
<td>56.17</td>
<td>54.77</td>
<td>58.85</td>
<td>62.51</td>
<td>63.08</td>
<td>32.33</td>
<td>56.55</td>
<td>32.82</td>
</tr>
</tbody>
</table>
The table shows that with the compositions according to the invention in examples 1 to 5 good cleaning results can be achieved. These cleaning results are similar to the cleaning result of the state of art product 7 which is a stripper formulation with organic solvents. The result of example 6 which is also a product of the state of art is not sufficient.

5 4. Foam test

In the foam test two solutions were tested according to the test procedure described above. On the one hand a 1 wt-% solution for auto scrubber cleaning, on the other hand a 5 wt-% solution for a standard stripping was tested. The following table 4 shows the foam volume in ml for 0 min/1 min/5 min and concentrations of 1 and 5 wt-%. The lower the volume increase the better the foaming behaviour of the composition.

Table 4

<table>
<thead>
<tr>
<th>Concentration wt-%</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60/20/0</td>
<td>40/3/0</td>
<td>-</td>
<td>-</td>
<td>40/0/0</td>
<td>-</td>
<td>140/130/120</td>
</tr>
<tr>
<td>5</td>
<td>40/0/0</td>
<td>5/0/0</td>
<td>10/0/0</td>
<td>-</td>
<td>40/0/0</td>
<td>200/200/4</td>
<td>60/0/0</td>
</tr>
</tbody>
</table>

The results show that the foam level of the compounds 1 to 5 of the invention is much lower compared of the state of art products 6 and 7. The compounds according to the invention thus fulfil the requirement of low foaming and meet the requirements of a stripper product as well.
Claims

1. Floor stripper composition comprising
   1 to 30 wt-% organic solvent having at least one C8 to C24 carbon chain and is made
   from plant oil or animal oil,
   1 to 25 wt-% solubilizer made from plant oil or animal oil
   0,5 to 12 wt-% non-ionic surfactant made from plant oil or animal oil
   0,1 to 10 wt-% source of alkalinity, and
   the rest up to 100 wt-% is water,
   wherein the composition contains less than 10 wt-% of organic compounds with C1 to
   C7 carbon atoms which are prepared from petrochemical sources.

2. Floor stripper composition according to claim 1 comprising 0 to 6 wt-% fatty acid

3. Floor stripper composition according to claims 1 or 2 having a pH of less than 10,5
   measured at 20°C.

4. Floor stripper according to claims 1 to 3 wherein the organic solvent is selected from the
   group consisting of Lauryl N,N dimethylamid, C8 to C10 alkoxylated or non-
   alkoxylated fatty acids, C8 to C24 ethoxylated or non-ethoxylated fatty alcohol, C8 to
   C24 amides, C8 to C24 dialkyl amides, C8 to C24 alkyl amides or mixtures thereof.

5. Floor stripper according to claims 1 to 4, wherein the solubilizer is selected from the
   group consisting of cumolsulfate, cumolsulfonate, C16 to C20
   fatty acid ester, glycerine or mixtures thereof.

6. Floor stripper according to claims 1 to 5, wherein the non-ionic surfactant is an
   alkoxylated C8 to C24 fatty alcohol, alkoxylated or non-alkoxylated C8 to C24 fatty
   acid ester, alkoxylated or non-alkoxylated C8 to C24 fatty acid ether,
   alklypolyglycoside, saccharose esters or mixtures thereof

7. Floor stripper according to claims 1 to 6, wherein the source of alkalinity is a metal
   hydroxide, ammonia, amines, alkanolamines or mixtures thereof.
8. Floor stripper according to claims 1 to 7, wherein the composition additionally contains less than 10 wt-% of a glycol, alkylene glycol, glycol ether, alkylene glycol ether as co-solvent.

9. Floor stripper according to claims 1 to 9, wherein the composition comprises 3 to 25 wt-% organic solvent.

10. Floor stripper according to claims 1 to 10, wherein the composition comprises 3 to 20 wt-% solubilizer.

11. Floor stripper according to claims 1 to 11, wherein the organic solvent has at least one linear or branched carbon chain with an even number of carbon atoms between C8 and C24.

12. Floor stripper according to claims 1 to 11, wherein the composition comprises less than 10 wt-% of organic compounds with C1 to C7 carbon atoms or aromatic compounds or cycloaliphatic compounds.

13. Floor stripper according to claims 1 to 12 wherein the organic solvent is selected from the group consisting of Laurly N, N dimethylamid, C8 to C10 ethoxylated fatty acids, amines, N,N dimethyldecanamide and mixtures thereof.

14. Use solution comprising the composition according to claims 1 to 13 which is diluted with water in a volume dilution ratio of concentrate to water in a range of 1:50 to 1:1.

15. A method of stripping a floor having a floor finish on the surface comprising the steps of
   a) providing the composition according to claims 1 to 13 or the use solution according to claim 14,
   b) applying to a floor the composition according to claims 1 to 13 or the use solution according to claim 14,
   c) allowing the applied composition to soften or dissolve at least some of the floor finish,
   d) removing the composition and the softened or dissolved floor finish from the floor.
INTERNATIONAL SEARCH REPORT

PCT/IB2010/050114

A. CLASSIFICATION OF SUBJECT MATTER

C09D 9/04(2006.01)i, CUD 1/66(2006.01)i, C11D 3/22(2006.01)i, E04B 5/00(2006.01)i

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)

C09D 9/04; CUD 7/50; C09D 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: stripper, organic solvent, solubilizer, surfactant, alkali, petrochemical

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<td>US 5011621 A1 (SULLIVAN; CARL J.) 30 April 1991 See Abstract, Claims</td>
<td>1-3</td>
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<tr>
<td>A</td>
<td>JP 05-156185 A (THE DOW CHEMICAL COMPANY) 22 June 1993 See Abstract, Claims</td>
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</table>

Further documents are listed in the continuation of Box C. 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 application or patent 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 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: 27 SEPTEMBER 2010 (27.09.2010)
Date of mailing of the international search report: 28 SEPTEMBER 2010 (28.09.2010)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
CHO, Ho Jung
Telephone No. 82-42-481-5587

Form PCT/ISA/210 (second sheet) (My 2009)
INTERNATIONAL SEARCH REPORT

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claims Nos.: 4-15
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☒ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.
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<td>US 501 1621 A1</td>
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<td>JP 05-156185 A</td>
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