

Improvements in or relating to organic compounds

Field of the Invention

This disclosure is concerned with household cleaning compositions comprising a malodour-controlling component, as well as methods of deodorizing a site, or a location proximate to
5 a site, treated with said compositions.

Background of the Invention

Household cleaning compositions are known in the art. They are useful to clean soils and residues, for example mineral and fatty soils or residues, from all manner of household surfaces including floors, bathroom and kitchen surfaces, as well as surfaces of household
10 appliances, such as laundry washers or dryers, and automatic dish washing machines.

Household cleaning compositions can contain many functional ingredients known in the art. Many of these compositions contain ingredients known as “builders”. Builders are used to prevent the build-up of sediments (such as lime scale) on surfaces as well as to enhance a composition’s cleaning performance. Until relatively the builders of choice were based on
15 phosphate chemistry. Phosphate builders possess the advantages of being inexpensive, being widely compatible with many other common components employed in household cleaning compositions, as well as being both cheap to source and widely available. In more recent times, however, their use has been legislated against in certain jurisdictions owing to perceived negative effects related to environmental pollution.

20 Consequently, more environmentally acceptable alternatives to phosphate builders have been proposed in the art. By way of example, amino carboxylates are useful builders and can be used as a replacement for phosphates, and indeed, household cleaning compositions containing amino carboxylates are known in the art.

However, whilst conducting research with amino carboxylate-containing household cleaning
25 compositions the applicant discovered that the use of such compositions in cleaning operations resulted in the development of undesirable malodour. The malodour was found to be particularly noticeable when a cleaning compositions was removed from its packaging or when the compositions were used in cleaning operations carried out in enclosed spaces,

such as household appliances, and more particularly automatic dishwasher machines. In such enclosed spaces an appreciable headspace concentration of the malodour can build-up to levels, which become noticeable to consumers in use. The malodour was observed to be particularly noticeable when the door of a household appliance, such as a dishwasher
5 machine, is opened at the end of a cleaning cycle.

There remains a need to provide household cleaning compositions that are phosphate-free, which are effective at removing residues and soils from household surfaces, and which in storage or in use are not associated with undesirable developments of malodour.

Summary of the Invention

10 The applicant found in a surprising manner that certain household cleaning compositions were associated with undesirable malodour during storage or during use, particularly when used in cleaning operations in enclosed spaces. Upon further investigation by the applicant, it appeared that the use of amino carboxylate builders was implicated in the generation of the malodour. Particularly problematic was the amino carboxylate methylglycine-N,N-
15 diacetic acid (MGDA). Furthermore, applicant found that the incorporation of a malodour-controlling component comprising zinc neodecanoate into household cleaning composition containing one or more ingredients susceptible of causing the generation of undesirable malodour, can provide a malodour-controlling effect, preventing or substantially reducing or eliminating the malodour.

20 Accordingly, the present invention is directed in a first aspect to a household cleaning composition comprising one or more ingredients susceptible of causing the generation of an undesirable malodour, and a malodour-controlling component comprising zinc neodecanoate.

In a second aspect the invention is directed to a method of delivering a malodour reduction
25 benefit to a site, or to a location proximate to a site, containing a source of malodour, said method comprising the step of applying to the site, a composition according to the first aspect of the invention.

The details, examples and preferences provided in relation to any one or more of the stated aspects or embodiments of the present invention will be further described herein and apply

equally to all aspects and embodiments of the present invention. Any combination of embodiments, examples and preferences described herein in all possible variations thereof are encompassed by the present invention unless otherwise indicated herein, or otherwise clearly contradicted by context.

5 Detailed Description

The present invention was based on the surprising discoveries that household cleaning compositions can contain ingredients that can be the source of undesirable malodours, which are particularly noticeable and particularly disturbing to consumers when the compositions are stored in enclosed spaces, such as packaging, or are used in cleaning
10 operations carried out in enclosed spaces, such as dishwashing operations in automatic dishwashing machines, or indeed laundry operations carried out in washing machines.

The household cleaning composition can be any composition that is intended to be applied to a household surface in a cleaning operation, such as a fabric, bathroom or kitchen surfaces, as well as the surface of household appliances, including the surfaces of kitchen
15 appliances such as an automatic dish washer, which composition contains at least one ingredient that is susceptible of generating a malodour during its storage or use.

Amino carboxylate builders such as MGDA, were discovered to be particularly susceptible of causing malodour. By way of example, in an automatic dishwasher composition containing MGDA a clearly perceptible malodour was observed when opening and removing
20 the dishwasher composition from packaging, and when a dish washer machine containing the composition was opened after a wash cycle. Unfortunately, the emanation of malodour at these moments in time corresponds with important touch-points for consumers, who according to consumer research are particularly sensitive to scent signals at precisely these time points.

25 In accordance with the first aspect of the invention the malodour controlling component of the household cleaning composition contains zinc neodecanoate. Zinc neodecanoate is a zinc carboxylate, but unlike the water-soluble zinc carboxylates zinc acetate and zinc sulphate that have been employed in dish washing compositions, zinc neodecanoate is unusual in that it alone is capable of delivering malodour control. Without intending to be

bound by any particular theory, the applicant believes that owing to zinc neodecanoate being a water-insoluble, viscous liquid, unlike the water-soluble carboxylates referred to above, in use it is able to form a film on surfaces that resists removal at least as long if not longer than the other water-soluble or water-dispersible components of the cleaning compositions according to the invention. As such, it is able to more effectively counteract any malodour generated.

Zinc neodecanoate can be obtained from commercial sources, or can be prepared according to procedures well known in the art. By way of example, suitable preparatory and purification methods are disclosed in WO2018/087147.

The amount of zinc neodecanoate employed in a household cleaning composition according to the invention may vary depending upon the nature of the composition and its intended uses. Suitable levels can be determined by a person skilled in the art using only routine experimentation. In particular embodiments of the invention, however, zinc neodecanoate can be employed in amounts ranging from about 0.05 to about 5 wt % based on the total weight of the household cleaning composition.

Owing to the viscosity of zinc neodecanoate, it can be difficult to incorporate into consumer product formulations in neat form. Accordingly, in embodiments of the invention the zinc neodecanoate may be used in admixture with a suitable diluent in which the zinc neodecanoate is soluble or miscible. Suitable diluents for this purpose should have a high clogP, for example a clogP of 1.5 or greater, and can include perfume ingredients, solvents used in perfumery, or mixtures thereof. Particularly suitable perfumery ingredients and solvents include those referred to in standard perfumery reference works of the perfume industry, for example in Arctander, Perfume and Flavour Chemicals (Aroma Chemicals), vol. I and II (1969), and any later volumes and editions of that work, which are hereby incorporated by reference. However, particularly preferred solvents include isopropyl myristate or any other oily liquids that may be compatible with the household cleaning composition, such as silicones or the like.

The malodour-controlling component may further comprise one or more fragrance ingredients.

Any fragrance ingredients may be employed in the malodour-controlling component, and including those ingredients described in the Arctander reference works referred to above.

It is particularly preferred if the fragrance ingredients employed can exert a malodour-counteracting effect. Such perfumes include, but are not limited to aldehydes that are

5 capable of exerting a malodour-reducing effect in either the liquid or gaseous phase by chemical reaction with malodorous ingredients. Exemplary aldehyde perfume ingredients include but are not limited to Adoxal (2,6,10-Trimethyl-9-undecenal), Bourgeonal (4-t-butylbenzenepropionaldehyde), Lilestralis 33 (2-methyl-4-t-butylphenyl)propanal), Cinnamic aldehyde, cinnamaldehyde (phenyl propenal, 3-phenyl-2-propenal), Citral,

10 Geranial, Neral (dimethyloctadienal, 3,7-dimethyl-2,6-octadien-1-al), Cyclal C (2,4-dimethyl-3-cyclohexen-1-carbaldehyde), Florhydral (3-(3-Isopropyl-phenyl)-butyraldehyde), Citronellal (3,7-dimethyl 6-octenal), Cymal, cyclamen aldehyde, Cyclosal, Lime aldehyde (Alpha-methyl-p-isopropyl phenyl propyl aldehyde), Methyl Nonyl Acetaldehyde, aldehyde C12 MNA (2-methyl-1-undecanal), Hydroxycitronellal, citronellal hydrate (7-hydroxy-3,7-

15 dimethyl octan-1-al), Helional (alpha-methyl-3,4-(methylenedioxy)-hydrocinnamaldehyde, hydrocinnamaldehyde (3-phenylpropanal, 3-phenylpropionaldehyde), Intreleven aldehyde (undec-10-en-1-al), Ligustral, Trivertal (2,4-dimethyl-3-cyclohexene-1-carboxaldehyde), Jasmorange, satinaldehyde (2-methyl-3-tolylpropionaldehyde, 4-dimethylbenzenepropanal), Lyrall (4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-1-carboxaldehyde), Melonal (2,6-

20 Dimethyl-5-Heptenal), Methoxy Melonal (6-methoxy-2,6-dimethylheptanal), methoxycinnamaldehyde (trans-4-methoxycinnamaldehyde), Myrac aldehyde isohexenyl cyclohexenyl-carboxaldehyde, trifernal ((3-methyl-4-phenyl propanal, 3-phenyl butanal), lilial, P.T. Bucinal, lysmeral, benzenepropanal (4-tert-butyl-alpha-methyl-hydrocinnamaldehyde), Dupical, tricyclodecylidenebutanal (4-Tricyclo5210-2,6decylidene-

25 8butanal), Melafleur (1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-naphthaldehyde), Methyl Octyl Acetaldehyde, aldehyde C-11 MOA (2-methyl deca-1-al), Onicidal (2,6,10-trimethyl-5,9-undecadien-1-al), Citronellyl oxyacetaldehyde, Muguet aldehyde 50 (3,7-dimethyl-6-octenyl)oxyacetaldehyde, phenylacetaldehyde, Mefranal (3-methyl-5-phenyl pentanal), Triplal, Vertocitral dimethyl tetrahydrobenzene aldehyde (2,4-dimethyl-3-cyclohexene-1-

30 carboxaldehyde), 2-phenylpropionaldehyde, Hydrotropaldehyde, Canthoxal, anisylpropanal 4-methoxy-alpha-methyl benzenepropanal (2-anisylidene propanal),

Cylcemone A (1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-naphthaldehyde), and Precylcemone B (1-cyclohexene-1-carboxaldehyde).

Still other exemplary aldehydes include, but are not limited to, acetaldehyde (ethanal), pentanal, valeraldehyde, amylaldehyde, Scentenal (octahydro-5-methoxy-4,7-Methano-1H-indene-2-carboxaldehyde), propionaldehyde (propanal), Cyclocitral, beta-cyclocitral, (2,6,6-trimethyl-1-cyclohexene-1-acetaldehyde), Iso Cyclocitral (2,4,6-trimethyl-3-cyclohexene-1-carboxaldehyde), isobutyraldehyde, butyraldehyde, isovaleraldehyde (3-methyl butyraldehyde), methylbutyraldehyde (2-methyl butyraldehyde, 2-methyl butanal), Dihydrocitronellal (3,7-dimethyl octan-1-al), 2-Ethylbutyraldehyde, 3-Methyl-2-butenal, 2-Methylpentanal, 2-Methyl Valeraldehyde, Hexenal (2-hexenal, trans-2-hexenal), Heptanal, Octanal, Nonanal, Decanal, Lauric aldehyde, Tridecanal, 2-Dodecanal, Methylthiobutanal, Glutaraldehyde, Pentanedial, Glutaric aldehyde, Heptenal, cis or trans-Heptenal, Undecenal (2-, 10-), 2,4-octadienal, Nonenal (2-, 6-), Decenal (2-, 4-), 2,4-hexadienal, 2,4-Decadienal, 2,6-Nonadienal, Octenal, 2,6-dimethyl 5-heptenal, 2-isopropyl-5-methyl-2-hexenal, 15 Trifernal, beta methyl Benzenepropanal, 2,6,6-Trimethyl-1-cyclohexene-1-acetaldehyde, phenyl Butenal (2-phenyl 2-butenal), 2-Methyl-3(p-isopropylphenyl)-propionaldehyde, 3-(p-isopropylphenyl)-propionaldehyde, p-Tolylacetaldehyde (4-methylphenylacetaldehyde), Anisaldehyde (p-methoxybenzene aldehyde), Benzaldehyde, Vernaldehyde (1-Methyl-4-(4-methylpentyl)-3-cyclohexenecarb aldehyde), Heliotropin (piperonal) 3,4-Methylene dioxy 20 benzaldehyde, alpha-Amylcinnamic aldehyde, 2-pentyl-3-phenylpropenoic aldehyde, Vanillin (4-methoxy 3-hydroxy benzaldehyde), Ethyl vanillin (3-ethoxy 4-hydroxybenzaldehyde), Hexyl Cinnamic aldehyde, Jasmonal H (alpha-n-hexylcinnamaldehyde), Floralozone, (para-ethyl-alpha,alpha-dimethyl Hydrocinnamaldehyde), Acalea (p-methyl-alpha-pentylcinnamaldehyde), methylcinnamaldehyde, alpha- 25 Methylcinnamaldehyde (2-methyl 3-phenyl propenal), alpha-hexylcinnamaldehyde (2-hexyl 3-phenyl propenal), Salicylaldehyde (2-hydroxy benzaldehyde), 4-ethyl benzaldehyde, Cuminaldehyde (4-isopropyl benzaldehyde), Ethoxybenzaldehyde, 2,4-dimethylbenzaldehyde, Veratraldehyde (3,4-dimethoxybenz aldehyde), Syringaldehyde (3,5-dimethoxy 4-hydroxybenzaldehyde), Catechaldehyde (3,4-dihydroxybenzaldehyde), 30 Safranal (2,6,6-trimethyl-1,3-diene methanal), Myrten al (pin-2-ene-1-carbaldehyde), Perillaldehyde L-4(1-methylethenyl)-1-cyclohexene-1-carboxaldehyde, 2,4-Dimethyl-3-cyclohexene carboxaldehyde, 2-Methyl-2-pentenal, 2-methylpentenal, pyruvaldehyde,

formyl Tricyclodecan, Mandarin aldehyde, Cyclemax, Pino acetaldehyde, Corps Iris, Maceal, and Corps 4322.

The malodour-controlling component, or any part of it may be presented in free form or in an encapsulated form. Suitable encapsulated media include matrices of water soluble,
5 modified starch.

Starches suitable for encapsulating fragrances are modified starches, which can be made from, raw starch, pre-gelatinized starch, modified starch derived from tubers, legumes, cereal and grains, for example corn starch, wheat starch, rice starch, waxy corn starch, oat starch, cassava starch, waxy barley, waxy rice starch, sweet rice starch, amioca, potato
10 starch, tapioca starch and mixtures thereof.

Modified starches suitable for use as the encapsulating matrix include starches that are modified chemically, physically, e.g. through heat or pressure, or enzymatically. They include hydrolyzed starch, acid thinned starch, starch esters of long chain hydrocarbons, starch acetates, starch octenyl succinate, and mixtures thereof. Starch esters having a degree of
15 substitution in the range of from about 0.01% to about 10.0% may be used to encapsulate the fragrance ingredients. The hydrocarbon part of the modifying ester should be from a C5 to C16 carbon chain.

Suitable amino carboxylates for use in the household cleaning compositions according to the first aspect of the invention include but are not limited to ethylene diamine tetra
20 acetates, diethylene triamine pentaacetates, diethylene triamine pentaacetate (DTPA), N-hydroxyethylethylenediamine triacetates, nitrilotriacetates, ethylenediamine tetrapropionates, triethylenetetraaminehexa-acetates, ethanol-diglycines, propylene diamine tetracetic acid (PDTA) and methyl glycine di-acetic acid (MGDA), both in their acid form, or in their alkali metal, ammonium, and substituted ammonium salt forms. A
25 particularly suitable amino carboxylate to be used herein is MGDA.

In household cleaning compositions according to the invention, the amino carboxylate can be employed in amounts ranging from about 5 to about 95 wt % based on the total weight of the cleaning composition.

In particular embodiments of the invention, the household cleaning composition is a hard surface cleaning composition. Hard-surface cleaning compositions are generally known in the art. They contain a number of conventional ingredients that can vary depending upon their particular format, and their intended purpose. Conventional ingredients include, but are not limited to acidic components useful for lime scale removal; alkaline components, useful to adjust the pH of the composition; surfactants; surface-modifying polymers; radical scavengers; solvents, and the like.

Examples of acidic components include but are not limited to formic acid, citric acid, acetic acid or oxalic acid.

Typically, the amounts of acidic components employed are from 0.1 to 5 wt % based on the total weight of the composition.

Examples of alkaline components include but are not limited to sodium hydroxide, potassium hydroxide, lithium hydroxide, the alkali metal oxides such as sodium or potassium oxide, monoethanolamine, triethanolamine, ammonia, ammonium carbonate, choline base, and the like.

Typically, the amounts of alkaline components employed are from 0.001 to 20 wt % based on the total weight of the composition.

Examples of surfactants include but are not limited to anionic and non-ionic surfactants.

Anionic surfactants include but are not limited to alkyl sulphonates, alkyl aryl sulphonates, sodium, potassium, ammonium, and substituted ammonium salts such as mono-, di- and triethanolamine salts of soap, alkyl sulphates, alkyl aryl sulphates, alkyl alkoxylated sulphates, C8-C24 olefinsulfonates, sulphonated polycarboxylic acids, alkyl ester sulphonates, acyl glycerol sulphonates, alkyl phosphates, isethionates, N-acyl taurates, alkyl succinamates, acyl sarcosinates, sulphates of alkylpolysaccharides, alkyl polyethoxy carboxylates, or mixtures thereof.

Non-ionic surfactants include but are not limited to alkoxylated alcohols, especially ethoxylated and/or propoxylated alcohols, the condensation products of ethylene oxide

and/or propylene oxide with alcohols having a straight or branched alkyl chain, having from 6 to 22 carbon atoms, or mixtures thereof.

Typically, the amounts of surfactants employed are from 0.1 to 15 wt % based on the total weight of the cleaning composition.

- 5 Examples of surface-modifying polymers include but are not limited to vinylpyrrolidone homopolymers or copolymers, zwitterionic copolymers consisting of carboxylate and permanent cationic-moieties; zwitterionic polysulphobetaine copolymers; zwitterionic polybetaine copolymers; silicone glycol polymers, or mixtures thereof.

Typically, the amounts of surface-modifying polymers employed are from 0.01 to 5 wt%
10 based on the total weight of the cleaning composition.

Examples of radical scavengers include but are not limited to well-known substituted mono and dihydroxy benzenes and their analogues, alkyl and aryl carboxylates and mixtures thereof. Particular radical scavengers include di-tert-butyl hydroxy toluene (BHT), hydroquinone, di-tert-butyl hydroquinone, mono-tert-butyl hydroquinone, tert-butyl-
15 hydroxy anisole, benzoic acid, toluic acid, catechol, t-butyl catechol, benzylamine, 1,1,3-tris(2-methyl-4-hydroxy-5-t-butylphenyl) butane, n-propyl-gallate or mixtures thereof, and di-tert-butyl hydroxy toluene.

Typically, the amounts of radical scavengers employed are from 0.001 to 10.0 wt% based on the total weight of the cleaning composition.

- 20 Examples of solvents include but are not limited to all those known to those skilled in the art of hard-surfaces cleaner compositions. Particular solvents include alkoxylated glycol ethers, such as n-Butoxy Propoxy Propanol (n-BPP) or mixtures thereof.

Typically, the amounts of solvents employed are from 0.1 to 5 wt% based on the total weight of the cleaning composition.

- 25 Hard-surface cleaning compositions according to the invention may be presented in various formats, including powder, tablet or liquid formats.

The second aspect of the invention relates to a method of delivering a malodour reduction benefit to a site, or to a location proximate to a site, containing a source of malodour, said method comprising the step of applying to the site, a composition according to the first aspect of the invention.

5 As state hereinabove, the applicant found that amino carboxylates, such as MGDA, can be the source of malodour. More specifically, the applicant found that particularly in the presence of moisture compositions containing said amino carboxylates, and MGDA in particular, can liberate an undesirable malodour that was identified sensorially as being pyrazine-like. The mechanism of pyrazine formation from compositions according to the
10 invention is not known as it will depend upon the nature of the household cleaning composition and its constituent ingredients, as well as its conditions of use. However, with regard to amino carboxylates and MGDA in particular, and without wishing to be bound by theory it is possible to form pyrazines by a sequence of cyclocondensation/reduction/decarboxylation or dealkylation of MGDA in the presence of
15 reducing agents. MGDA can also play the role of a catalytic agent in the presence of alpha-diketones and diamines or alpha-amino ketones which condense to form pyrazines.

Alternatively, non-ionic surfactants or other ingredients derived from sugars, amino acids or their derivatives, (poly-)ethylene diamines or ethanol- or propanolamines can oxidize and lead to the formation of pyrazines.

20 Analysis of a developing malodour provided insight into a number of its constituents.

In particular embodiments of the invention, the malodour comprises one or more of the pyrazine compounds 2,5-dimethyl pyrazine, 2-ethyl-6-methyl pyrazine, 2,3,5-trimethyl pyrazine and 2-ethyl-3,5-dimethyl pyrazine.

The use of zinc neodecanoate to reduce or eliminate a malodour caused by the emanation
25 of a pyrazine compound, in particular when the source of that malodour is a household care product, more particularly a hard-surface cleaning composition, and more particularly still an automatic dishwashing composition, is not known in the art, and thus forms an additional aspect of the invention.

The invention also provides in yet another of its aspects a method of reducing or eliminating a malodour caused by the emanation of a pyrazine compound, the method comprising the step of applying to the source of the malodour zinc neodecanoate.

5 The source of the malodour can be a household cleaning composition as herein above described and so, accordingly, the invention provides in still another of its aspects a method of reducing or eliminating a malodour caused by the emanation of a pyrazine from a household cleaning composition, or from a site treated with said composition, the method comprising the step of incorporating a malodour-controlling component comprising zinc neodecanoate as herein above describe into said household cleaning composition.

10 In particular embodiments of the invention, the pyrazine is selected from the group consisting of 2,5-dimethyl pyrazine, 2-ethyl-6-methyl pyrazine, 2,3,5-trimethyl pyrazine and 2-ethyl-3,5-dimethyl pyrazine, or a mixture thereof.

In particular embodiments of the invention, the source of the malodour is an amino carboxylate, and more particularly MGDA.

15 In particular embodiments of the invention, the source of the malodour is a household cleaning composition, more particularly a hard-surface cleaning composition, and more particularly still an automatic dishwashing detergent composition, comprising at least one ingredient susceptible of generating a malodour, such as an amino carboxylate, and more particularly MGDA.

20 There now follows a series of examples that serve to illustrate the invention.

Example 1:

(Preparation of a powder dishwasher detergent composition comprising a malodour-controlling component)

25 Zinc neodecanoate is a viscous ingredient and for a better handling, a solution at 81% in isopropyl myristate is employed in the following preparation.

A 100g sample of automatic dishwashing powder containing MGDA is poured into a glass container. The solution of zinc neodecanoate in isopropyl myristate is added on top of the

powder and the mixture stirred with a glass rod for at least 2 minutes. The container is covered and the mix is left for overnight to macerate in the container. After 24h the powder is stirred again to produce a homogeneous, dry powder.

- 5 The amount of zinc neodecanoate solution added to the dishwashing powder can be varied to provide several test samples in order to study the effect of zinc neodecanoate concentration on the suppression of malodour.

Example 2:

- 10 (Effect of zinc neodecanoate on the emanation of malodour from an MGDA dishwashing powder base)

The dishwashing powder base used in the present Example and described in the preparation of Example 1 contains MGDA. The base has a strong malodour that can be described as earthy, roasted nuts, cocoa, coffee, caramel and baked potato-like.

- 15 Glass jars containing two test samples prepared according to Example 1 and containing 0.4 wt % and 1.2 wt % of zinc neodecanoate, together with third glass jar containing a comparative sample of the powder that is free of zinc neodecanoate were placed randomly in front of a test panel consisting of 5 expert analysts. The panellists were instructed to open each glass jar, smell the headspace and score the malodour on a 6-point scale (0 for no
20 odour and 5 for strong odour). The results, which are presented in Figure 1, clearly show the malodour-reducing effect of zinc neodecanoate.

- The same experiment was carried out with a powder base that does not contain MGDA, but nevertheless has a malodour associated with it. The results are shown in Figure 2. Interestingly, use of zinc neodecanoate in this test does not bring any malodour-reducing
25 effect, and so it appears that the malodour-reducing effect is specific for the pyrazine-like malodour associated, for example, with the use of MGDA-like compounds.

Example 3:

(Comparison of the malodour-reducing effects of zinc neodecanoate and water-soluble zinc salts commonly found in dishwashing compositions)

MGDA-containing dishwashing powder samples were dosed with zinc neodecanoate, zinc ricinoleate and zinc acetate dehydrate in accordance with the method of Example 1. A first sample contained 0.4 wt % zinc neodecanoate; a second sample contained 0.66 wt % zinc ricinoleate; and a third sample contained 0.22 wt % zinc acetate dehydrate. All three samples contained substantially the same amount of zinc ions.

50 grams of each sample is placed in a Petri dish and each dish is placed inside a plastic bag in fluid communication with a Tenax tube. A pump (low flow Gillian pump) draws the headspace constituents in the bag through the Tenax tube at a rate of 50 ml/min, whereupon the constituents are trapped on an absorbent material in the tube (2,6 diphenylene oxide sorbent material). Headspace sampling lasts 60 min with 60 min of saturation. The Tenax tubes are afterwards desorbed in a TDS/GC/MS.

The GC analysis confirms that the peak areas of the identified pyrazines are not reduced in presence of zinc acetate nor with zinc ricinoleate whereas the areas of the peaks in the headspace decrease by half when zinc neodecanoate is used (Table 1).

Headspace Components identified in 3 replicates	Base GC intensity major ions	Base + 0.22% zinc Acetate dihydrate GC intensity major ions	Base + 0.66% zinc ricinoleate GC intensity major ions	Base + 0.4% zinc neodecanoate GC intensity major ions
2,5- DIMETHYL PYRAZINE	250,000	250,000	225,000	120,000
2-ETHYL -6 METHYL PYRAZINE	45,000	50,000	50,000	20,000
2,3,5-TRIMETHYL PYRAZINE	100,000	120,000	120,000	60,000
2 ETHYL 3,5 DIMETHYL PYRAZINE	150,000	150,000	150,000	60,000

Table 1 : evolution of GC peak areas of the identified pyrazines

Claims:

1. A household cleaning composition comprising one or more ingredients susceptible of causing the generation of an undesirable malodour, and a malodour-controlling component comprising zinc neodecanoate
2. A composition according to claim 1 wherein the composition is an automatic dish washing composition.
3. A composition according to claim 1 or claim 2 wherein the ingredient susceptible of generating a malodour is an amino carboxylate, and more particularly is methylglycine-N,N-diacetic acid (MGDA) or a salt thereof.
4. A composition according to any of the preceding claims wherein the at least one ingredient susceptible of generating a malodour is present in an amount of 5 to about 95 wt % based on the total weight of the composition.
5. A composition according to any of the preceding claims, wherein zinc neodecanoate is present in an amount of 0.05 to about 5 wt % based on the total weight of the composition.
6. A composition according to any of the preceding claims wherein the malodour controlling component additionally comprises at least one perfume ingredient.
7. A composition according to claim 7 wherein the perfume ingredient is an aldehyde.
8. A composition according to claim 8 wherein the aldehyde is selected from the group consisting of Adoxal (2,6,10-Trimethyl-9-undecenal), Bourgeonal (4-t-butylbenzenepropionaldehyde), Lilestralis 33 (2-methyl-4-t-butylphenyl)propanal, Cinnamic aldehyde, cinnamaldehyde (phenyl propenal, 3-phenyl-2-propenal), Citral, Geranial, Neral (dimethyloctadienal, 3,7-dimethyl-2,6-octadien-1-al), Cyclal C (2,4-dimethyl-3-cyclohexen-1-carbaldehyde), Florhydral (3-(3-Isopropyl-phenyl)-butyraldehyde), Citronellal (3,7-dimethyl 6-octenal), Cymal, cyclamen aldehyde, Cyclosal, Lime aldehyde (Alpha-methyl-p-isopropyl phenyl propyl aldehyde), Methyl Nonyl Acetaldehyde, aldehyde C12 MNA (2-methyl-1-undecanal), Hydroxycitronellal,

citronellal hydrate (7-hydroxy-3,7-dimethyl octan-1-al), Helional (alpha-methyl-3,4-
 (methylenedioxy)-hydrocinnamaldehyde, hydrocinnamaldehyde (3-phenylpropanal,
 3-phenylpropionaldehyde), Intreleven aldehyde (undec-10-en-1-al), Ligustral, Trivertal
 (2,4-dimethyl-3-cyclohexene-1-carboxaldehyde), Jasmorange, satinaldehyde (2-
 5 methyl-3-tolylproionaldehyde, 4-dimethylbenzenepropanal), Lyril (4-(4-hydroxy-4-
 methyl pentyl)-3-cyclohexene-1-carboxaldehyde), Melonal (2,6-Dimethyl-5-
 Heptenal), Methoxy Melonal (6-methoxy-2,6-dimethylheptanal),
 methoxycinnamaldehyde (trans-4-methoxycinnamaldehyde), Myrac aldehyde
 isohexenyl cyclohexenyl-carboxaldehyde, trifernal ((3-methyl-4-phenyl propanal, 3-
 10 phenyl butanal), lillal, P.T. Bucinal, lysmeral, benzenepropanal (4-tert-butyl-alpha-
 methyl-hydrocinnamaldehyde), Dupical, tricyclodecylidenebutanal (4-Tricyclo5210-
 2,6decylidene-8butanal), Melafleur (1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-
 naphthaldehyde), Methyl Octyl Acetaldehyde, aldehyde C-11 MOA (2-methyl deca-1-
 al), Onicidal (2,6,10-trimethyl-5,9-undecadien-1-al), Citronellyl oxyacetaldehyde,
 15 Muguet aldehyde 50 (3,7-dimethyl-6-octenyl)oxyacetaldehyde), phenylacetaldehyde,
 Mefranal (3-methyl-5-phenyl pentanal), Triplal, Vertocitral dimethyl
 tetrahydrobenzene aldehyde (2,4-dimethyl-3-cyclohexene-1-carboxaldehyde), 2-
 phenylpropionaldehyde, Hydrotropaldehyde, Canthoxal, anisylpropanal 4-methoxy-
 alpha-methyl benzenepropanal (2-anisylidene propanal), Cyclemone A
 (1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-naphthaldehyde), Precyclemone B (1-
 20 cyclohexene-1-carboxaldehyde), acetaldehyde (ethanal), pentanal, valeraldehyde,
 amylaldehyde, Scentenal (octahydro-5-methoxy-4,7-Methano-1H-indene-2-
 carboxaldehyde), propionaldehyde (propanal), Cyclocitral, beta-cyclocitral, (2,6,6-
 trimethyl-1-cyclohexene-1-acetaldehyde), Iso Cyclocitral (2,4,6-trimethyl-3-
 25 cyclohexene-1-carboxaldehyde), isobutyraldehyde, butyraldehyde, isovaleraldehyde
 (3-methyl butyraldehyde), methylbutyraldehyde (2-methyl butyraldehyde, 2-methyl
 butanal), Dihydrocitronellal (3,7-dimethyl octan-1-al), 2-Ethylbutyraldehyde, 3-
 Methyl-2-butenal, 2-Methylpentanal, 2-Methyl Valeraldehyde, Hexenal (2-hexenal,
 trans-2-hexenal), Heptanal, Octanal, Nonanal, Decanal, Lauric aldehyde, Tridecanal, 2-
 30 Dodecanal, Methylthiobutanal, Glutaraldehyde, Pentanedial, Glutaric aldehyde,
 Heptenal, cis or trans-Heptenal, Undecenal (2-, 10-), 2,4-octadienal, Nonenal (2-, 6-),
 Decenal (2-, 4-), 2,4-hexadienal, 2,4-Decadienal, 2,6-Nonadienal, Octenal, 2,6-

dimethyl 5-heptenal, 2-isopropyl-5-methyl-2-hexenal, Trifernal, beta methyl Benzenepropanal, 2,6,6-Trimethyl-1-cyclohexene-1-acetaldehyde, phenyl Butenal (2-phenyl 2-butenal), 2-Methyl-3(p-isopropylphenyl)-propionaldehyde, 3-(p-isopropylphenyl)-propionaldehyde, p-Tolylacetaldehyde (4-methylphenylacetaldehyde), Anisaldehyde (p-methoxybenzene aldehyde), Benzaldehyde, Vernaldehyde (1-Methyl-4-(4-methylpentyl)-3-cyclohexenecarb aldehyde), Heliotropin (piperonal) 3,4-Methylene dioxy benzaldehyde, alpha-Amylcinnamic aldehyde, 2-pentyl-3-phenylpropenoic aldehyde, Vanillin (4-methoxy 3-hydroxy benzaldehyde), Ethyl vanillin (3-ethoxy 4-hydroxybenzaldehyde), Hexyl Cinnamic aldehyde, Jasmonal H (alpha-n-hexyl-cinnamaldehyde), Floralozone, (para-ethyl-alpha,alpha-dimethyl Hydrocinnamaldehyde), Acalea (p-methyl-alpha-pentylcinnamaldehyde), methylcinnamaldehyde, alpha-Methylcinnamaldehyde (2-methyl 3-phenyl propenal), alpha-hexylcinnamaldehyde (2-hexyl 3-phenyl propenal), Salicylaldehyde (2-hydroxy benzaldehyde), 4-ethyl benzaldehyde, Cuminaldehyde (4-isopropyl benzaldehyde), Ethoxybenzaldehyde, 2,4-dimethylbenzaldehyde, Veratraldehyde (3,4-dimethoxybenz aldehyde), Syringaldehyde (3,5-dimethoxy 4-hydroxybenzaldehyde), Catechaldehyde (3,4-dihydroxybenzaldehyde), Safranal (2,6,6-trimethyl-1,3-diene methanal), Myrten al (pin-2-ene-1-carbaldehyde), Perillaldehyde L-4(1-methylethenyl)-1-cyclohexene-1-carboxaldehyde, 2,4-Dimethyl-3-cyclohexene carboxaldehyde, 2-Methyl-2-pentenal, 2-methylpentenal, pyruvaldehyde, formyl Tricyclodecan, Mandarin aldehyde, Cyclemax, Pino acetaldehyde, Corps Iris, Maceal, and Corps 4322.

9. A method of delivering a malodour reduction benefit to a site, or to a location proximate to a site, containing a source of malodour, said method comprising the step of applying to the site, a composition according to a composition defined in any one of claims 1 through 8.
10. A method according to claim 9, comprising the step of applying the composition in an automatic dish washer machine.
11. A method according claim 10 wherein the malodour is a pyrazine compound.

12. A method according to claim 11, wherein the pyrazine is selected from the group consisting of 2,5-dimethyl pyrazine, 2-ethyl-6-methyl pyrazine, 2,3,5-trimethyl pyrazine and 2-ethyl-3,5-dimethyl pyrazine, or mixtures thereof.
13. The use of zinc neodecanoate to reduce or eliminating a malodour caused by the emanation of a pyrazine compound from a household cleaning composition, the method comprising the step of applying to the source of the malodour zinc neodecanoate