

METHODS, COMPOSITIONS AND USES RELATING THERETO

The present invention relates to a method of treating a dyed material, to compositions for use in such methods and to uses relating thereto. In particular the present invention relates to a method of treating a dyed keratinous material, especially hair. The method is especially useful for reducing, inhibiting or preventing the loss of colour from dyed materials, especially dyed hair.

Procedures for dyeing materials, especially hair and other keratinous materials, have been in existence for many years. However the dyed materials lose colour intensity and vibrancy after dyeing. One cause of this loss of colour is believed to be leaching of dye molecules from the materials when in contact with water or other solvents which can dissolve/solubilise the dyes and cause them to diffuse out of the material. This colour loss can thus occur during processes such as washing of the material (or shampooing in the case of hair) or during other processes where the material comes into contact with water or other solvents that can leach dyes from the material. The problem is greater in the case of small dye molecules as these are more mobile and can thus be leached from the material at a faster rate than larger dye molecules. As a result, repeated washing of materials can lead to colour loss over time. This can also cause a colour shift, for example whereby one or more dye compounds present in a mixture used to colour a material are leached from the material to a greater extent than the others during washing.

For textile materials and fabrics colour loss can occur during washing of the material, either in a hand washing process or in an automatic washing machine.

One effective means by which colour loss can be prevented or inhibited is by treatment with formaldehyde. However formaldehyde is a suspected carcinogen and thus its use in cosmetic compositions is strictly regulated and highly undesirable. There have been numerous attempts to provide alternative means for combatting colour loss from hair. However to date none of these have been completely satisfactory and there therefore exists a need to develop further improved strategies.

It is an aim of the present invention to provide means for reducing, inhibiting or preventing colour loss from dyed materials.

Summary

In one aspect, there is provided a method of combatting colour loss from a dyed material, the method comprising contacting the material with a composition comprising a polycarboxylic acid derived chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.

In another aspect, there is provided a method of colouring hair, the method comprising:

- (a) contacting the hair with a colouring composition; and
- (b) contacting the hair with a composition comprising a polycarboxylic acid derived chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof and wherein step (b) is carried out after step (a) or step (b) is carried out before step (a).

In yet another aspect there is provided the use of a polycarboxylic acid derived chelating agent to combat colour loss from dyed hair ; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.

In a further aspect, there is provided a packaged hair colouring product comprising one or more compositions wherein the one or more compositions together comprise at least one dye compound and/or one dye precursor compound and a polycarboxylic acid chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.

Detailed Description

According to a first aspect of the present invention there is provided a method of combatting colour loss from a dyed material, the method comprising contacting the material with a composition comprising a polycarboxylic acid derived chelating agent.

The present invention relates to a method of combating colour loss from a dyed material. The method may involve treating a material which has been dyed and/or it may involve treating a material which is going to be dyed and/or it may involve treating a material as part of the dyeing process. The method may be used to treat any material which has been
5 dyed/is being dyed by any means.

Preferably the method is a method of combatting colour loss from a material that has been dyed.

10 Suitably in such embodiments the method is not part of the dyeing process. Rather it is a separate unrelated process that may be carried out any time after, and much later than the dyeing process.

In some preferred embodiments the method of the present invention is carried out at
15 least 12 hours after the material has been dyed, preferably at least 24 hours.

In some embodiments the method of the present invention may be used to combat colour loss from a dyed textile material. In such embodiments the dyed textile material suitably comprises wool and preferably comprises wool as a major proportion thereof.

20 In preferred embodiments the material is a keratinous material. More preferably the material comprises keratinous fibres. Preferably the material is hair. The hair may be human or animal hair. In especially preferred embodiments the method of the present invention is a method treating human hair. Most preferably it is a method of treating human hair growing on
25 the head.

However it will be appreciated that the method of the present invention can also be used to combat colour loss from hair that is not still growing (i.e. has been removed), such as a wig or animal hair, for example wool.

30 In especially preferred embodiments the present invention relates to a method of treating dyed hair to combat colour loss. The method may be used to combat colour loss, from hair that has been dyed by any means. For example the invention may be used to combat colour loss from hair that has been dyed using direct dyes. The types of compounds that are
35 classified as direct dyes for hair will be known to the person skilled in the art and include nitrophenylenediamine compounds (eg, 2-nitro-o-phenylenediamine, HC Yellow 10, HC Red 14, N,N'-bis-(2-hydroxyethyl)-2-nitro-p-phenylenediamine, HC Violet 2 and HC Blue 2); nitroaminophenol compounds (eg, HC Yellow 4, 2-amino-3-nitrophenol, HC Orange 3, 4-hydroxypropylamino-3-nitrophenol and 3-nitro-p-hydroxyethylaminophenol); and

anthraquinone compounds (eg, Disperse Red 11, Disperse Violet 4, Disperse Blue 3 and HC Blue 14). However the method of the present invention is particularly effective at preventing colour loss from hair that has been dyed using oxidative dyes.

5 Oxidative dyeing of hair is commonly used for permanent, semi-permanent or demi-permanent colouration of the hair. It involves treatment of the hair with small substituted aromatic compounds (for example phenols, naphthols, phenylene diamines and amino phenols (known as intermediates)) which are oxidised to produce the active dye molecules *in situ*. Hair colouring methods of this type will be very well known to persons skilled in the art.

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 The method of the present invention involves contacting the dyed material, preferably hair, with a composition comprising a polycarboxylic acid-derived chelating agent.

 The method of the first aspect of the present invention is not a method of dyeing a
15 material, such as hair. Rather it is a method of treating a dyed material.

 In preferred embodiments the method of the first aspect the present invention relates to a method of combatting colour loss from hair that has already been dyed, preferably hair that has been dyed more than 24 hours ago.

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 In some embodiments the method may be carried out any time prior to, during or shortly after dyeing the material, as part of the dyeing process.

 In embodiments in which the method of the first aspect is carried out any time prior to,
25 during or shortly after dyeing the hair, the present invention may further provide an improved hair colouring method. By shortly before or after dyeing we mean preferably within 2 hours, more preferably within 1 hour, suitably within 30 minutes.

 According to a second aspect of the present invention there is provided a method of
30 colouring hair, the method comprising:

- (a) contacting the hair with a colouring composition; and
- (b) contacting the hair with a composition comprising a polycarboxylic acid derived chelating agent.

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 The present invention relates to a method of colouring hair using a colouring composition. This may also be referred to herein as a method of dyeing hair using a dyeing composition.

The method of the second aspect is a method of colouring hair. By this we mean to include colouring human hair or colouring animal hair, including wool. Preferably the method of the second aspect is a method of colouring human hair. More preferably it is a method of colouring human hair growing on the head.

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Steps (a) and (b) may be carried out separately in any order or they may be carried out simultaneously.

10 In some embodiments step (b) is carried out before step (a) and thus the method involves a step of pre-treating hair with a composition comprising a polycarboxylic acid derived chelating agent prior to dyeing.

15 In some embodiments steps (a) and (b) may be carried out simultaneously and the method involves contacting the hair with a colouring composition comprising a polycarboxylic acid derived chelating agent.

In some preferred embodiments step (b) is carried out after step (a). Suitably the hair is rinsed and optionally dried between step (a) and step (b).

20 Step (a) may involve contacting the hair with any suitable colouring composition. Such compositions will be known to the person skilled in the art.

25 In some preferred embodiments step (a) may involve forming the colouring composition in the hair *in situ* by applying dye precursor compounds and an oxidising composition (a developer) in an oxidative dyeing method.

In some embodiments step (a) may involve contacting the hair with a colouring composition comprising one or more direct dyes.

30 In some embodiments the method of the first aspect of the present invention is not carried out as part of the dyeing process and the composition contacted with the hair may be in the form of a shampoo composition, a conditioning composition, a hair styling composition, a hair permanent waving composition, a hair permanent straightening composition, a hair relaxing composition or a subsequent hair colouring/hair dyeing composition.

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Compositions which perform multiple functions, for example combined shampoo and conditioning compositions are also within the scope of the invention.

The first and second aspects of the present invention involve the use of a composition comprising a polycarboxylic acid derived chelating agent.

Preferred features of this composition will now be described. Any feature may apply to the first and/or second aspect and to any other aspect as appropriate.

The composition used in the present invention comprises a chelating agent. In some preferred embodiments the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA), imido disuccinic acid (IDS), L-aspartic acid diacetic acid (ASDA), ethylene diamine tetraacetic acid (EDTA), ethylene diamine disuccinic acid (EDDS), hydroxyethyl ethylenediaminetriacetic acid (HEDTA), citric acid and mixtures thereof.

The chelating agents used in the present invention are derivatives of polycarboxylic acids. By this we mean that the chelating agent includes two or more carboxylic acid moieties or salts thereof. Suitably chelating agents for use therein may include 3, 4 or 5 carboxylic acid moieties.

Glutamic acid N,N-diacetic acid (GLDA) has the structure shown in figure 1:

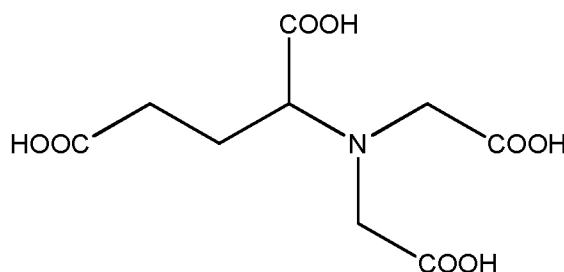


Figure 1

In the compositions of the present invention GLDA, may be present having the structure shown in figure 1 and/or the same structure in which a number of the acidic protons have been replaced, i.e. in which 1, 2, 3 or 4 of the acid groups have been neutralised or partially neutralised. It may be present as a free acid or a salt or complex thereof.

GLDA may be present as either enantiomer or a mixture thereof. Preferably at least 50% is present as [S]-GLDA, preferably at least 70%, more preferably at least 90%, most preferably at least 95 wt%, for example about 98 wt%. In some preferred embodiments the GLDA consists essentially of the S enantiomer.

GLDA is commercially available as a solution comprising 38 wt% of the tetrasodium salt and is sold under the trade mark Dissolvine GL-38.

Diethylene triamine pentaacetic acid (DTPA) has the structure shown in figure 2:

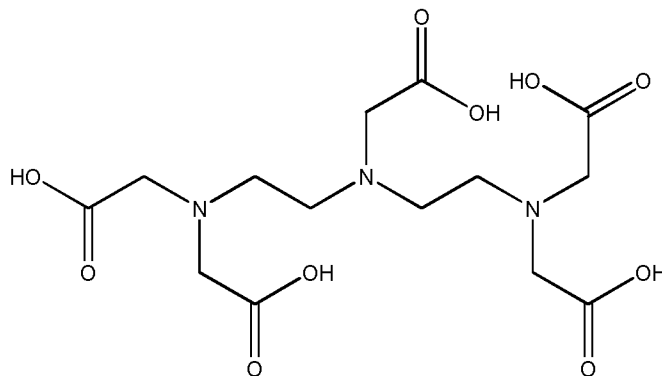


Figure 2

When component (b) comprises DTPA, this may be provided in a form having the structure shown in figure 2 or in a form having the same structure in which a number of the hydrogen atoms have been replaced. Thus component (b) may comprise salts in which 1, 2, 3, 4 or 5 of the acid groups have been neutralised or partially neutralised.

When a salt of DTPA is included, this may be the salt of an alkali metal, an alkaline earth metal, ammonia or a suitable amine.

When a monovalent counterion is used the salt may be the monosalt, the disalt, the trisalt, the tetra salt or the pentasalt. For a divalent cation the monosalt or disalt may be present. Mixed salts may also exist, for example, the disodium magnesium salt or the sodium magnesium salt may be present. Preferably the counterion(s) to the DTPA residue is/are selected from one or more of sodium, magnesium, calcium, potassium, lithium, ammonium, and a quaternary ammonium ion.

Preferably DTPA when present is included as the pentasodium salt.

Iminodisuccinic acid (IDS) has the structure shown in figure 3:

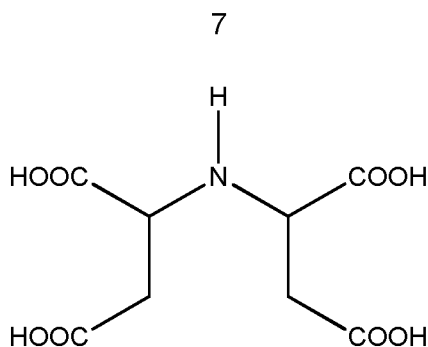


Figure 3

In the compositions of the present invention IDS may be present having the structure shown in figure 3 and/or the same structure in which a number of the acidic protons have been replaced, i.e. in which 1, 2, 3 or 4 of the acid groups have been neutralised or partially neutralised. It may be present as a free acid or a salt or complex thereof.

IDS or a salt thereof may be present as either enantiomer or a mixture thereof. Preferably it is present as a racemic mixture.

IDS is commercially available as a solution comprising 34 wt% of the tetrasodium salt and is sold under the trade mark Baypure CX100.

ASDA is a structural isomer of IDS and has the structure shown in figure 4:

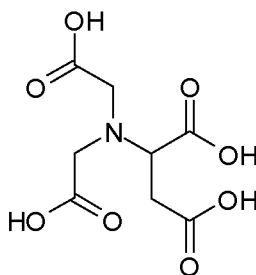


Figure 4

In the compositions of the present invention ASDA may be present having the structure shown in figure 4 and/or the same structure in which a number of the acidic protons have been replaced, i.e. in which 1, 2, 3 or 4 of the acid groups have been neutralised or partially neutralised. It may be present as a free acid or a salt or complex thereof.

EDTA has the structure shown in figure 5:

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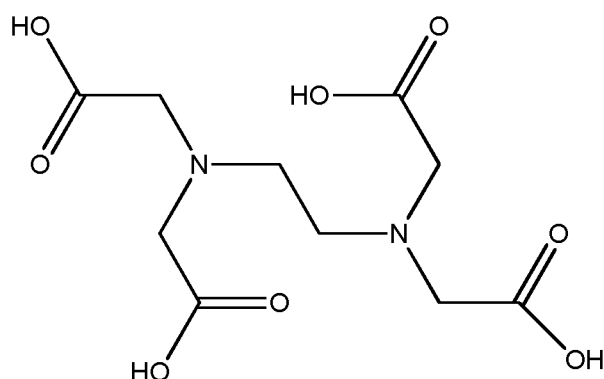


Figure 5

When component (b) comprises EDTA, this may be provided in a form having the structure shown in figure 5 or in a form having the same structure in which a number of the hydrogen atoms have been replaced. Thus component (b) may comprise salts in which 1, 2, 3 or 4 of the acid groups have been neutralised or partially neutralised.

When a salt of EDTA is included, this may be the salt of an alkali metal, an alkaline earth metal, ammonia or a suitable amine.

When a monovalent counterion is used the salt may be the monosalt, the disalt, the trisalt or the tetrasalt. For a divalent cation the monosalt or disalt may be present. Mixed salts may also exist, for example, the disodium magnesium salt or the sodium magnesium salt may be present. Preferably the counterion(s) to the EDTA residue is/are selected from one or more of sodium, magnesium, calcium, potassium, lithium, ammonium, and a quaternary ammonium ion.

Preferably EDTA when present is present as the tetrasodium salt.

Ethylenediamine disuccinic acid (EDDS) which has the structure shown in figure 6:

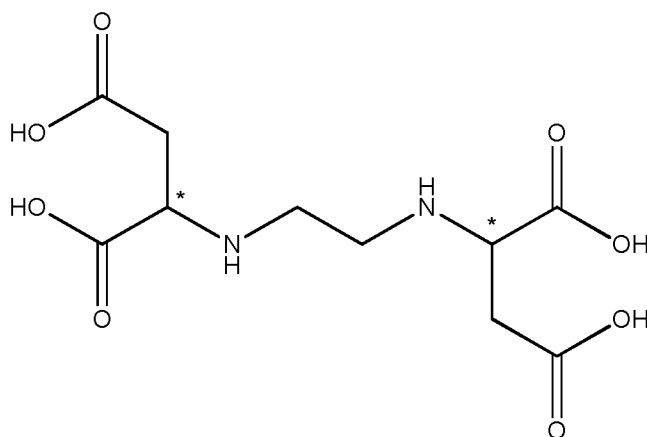


Figure 6

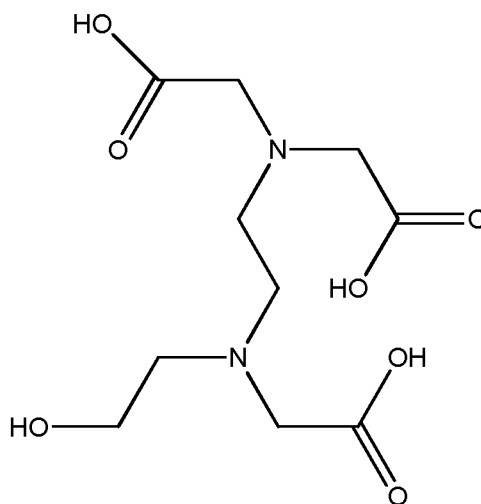
EDDS includes two stereogenic centres and there are three possible stereoisomers. A particularly preferred configuration is [S,S]-ethylenediamine disuccinic acid which is readily biodegradable.

In the compositions of the present invention "EDDS" may be present having the structure shown in figure 6 and/or the same structure in which a number of the hydrogen atoms have been replaced. Thus EDDS may also contain succinate salts in which 1, 2, 3 or 4 of the acid groups have been neutralised or partially neutralised. It may be present as a free acid or a salt or complex thereof.

One commercially available material is trisodium ethylenediamine disuccinate. The commercial product (Natrquest E30 (RTM)) is supplied as an aqueous solution comprising 30% by weight EDDS (expressed as free acid), or 37 wt% of the trisodium salt (including the counterion).

Another commercially available form of EDDS is the tetra acid, sold under the trade mark Natrquest E80. This is provided as a powder which contains 80 wt% solid [S,S] EDDS as an acid and water of crystallisation.

Hydroxyethylethylenediaminetriacetic acid (known as HEEDTA or HEDTA) has the structure shown in figure 7:

**Figure 7**

In the compositions of the present invention HEDTA may be present having the structure shown in figure 7 and/or the same structure in which a number of the acidic protons have been

replaced, i.e. in which 1, 2 or 3 of the acid groups have been neutralised or partially neutralised. It may be present as a free acid or a salt or complex thereof.

5 HEDTA is commercially available from Akzo Nobel as the trisodium salt under the trade mark Dissolvine H40.

Citric acid may be included as the free acid or as an alkali metal or ammonium salt.

10 In some preferred embodiments the chelating agent is selected from DTPA, GLDA, IDS and mixtures thereof.

In some especially preferred embodiments the chelating agent is selected from DTPA, GLDA and mixtures thereof.

15 In embodiments in which the chelating agent comprises DTPA, the method of the first aspect is preferably carried out on a material which has previously been dyed.

20 Preferably when the chelating agent comprises DTPA in the method of the second aspect step (b) is carried out after step (a).

In some embodiments the composition comprises a polycarboxylic acid derived chelating agent in an amount of at least 0.1 wt%, suitably at least 1 wt%, preferably at least 3 wt%, for example at least 5 wt%, at least 6 wt%, at least 7 wt%, or at least 8 wt%.

25 The composition may comprise a polycarboxylic acid derived chelating agent in an amount of up to 100 wt%, suitably up to 50 wt%, preferably up to 40 wt%, suitably up to 30 wt%, for example up to 20 wt%, up to 15 wt% or up to 12 wt%.

30 In some embodiments the composition may comprise the carboxylic acid derived chelating agent in an amount of from 0.1 to 15 wt%, suitably 0.25 to 10 wt%, preferably 0.5 to 5 wt%, for example from 1 to 3 wt%.

35 The composition may comprise a mixture of polycarboxylic acid derived chelating agents. In such embodiments the above amounts refer to the total amount of all such chelating agents present in the composition.

In some embodiments the composition comprises GLDA. In some embodiments the composition comprises DTPA. In some embodiments the composition comprises a mixture of

GLDA and DTPA. In such embodiments the ratio of GLDA to DTPA is preferably from 1:10 to 10:1, preferably from 1:5 to 5:1, for example from 1:2 to 2:1.

5 The composition used in the present invention may be provided in any suitable form. It may be in the form of a gel, paste, cream or wax. It may be in the form of a liquid composition. Such compositions may be in the form of a solution, dispersion or emulsion. It may be provided as a solid composition, for example as a powder or as a bar. In some embodiments a concentrate composition to be diluted prior to use may be provided. In some embodiments the composition may be part of precursor composition to be mixed with one or more further
10 components prior to contact with the material.

The form and nature of the composition will depend on the intended use thereof.

15 In some embodiments the composition is a laundry detergent composition. In such embodiments the composition suitably comprises one or more further ingredients selected from builders, surfactants, chelating agents, bleaches, optical brighteners, enzymes, fragrances and other such ingredients commonly found in laundry detergent compositions. The composition may be a hand washing laundry detergent composition or an automatic laundry detergent composition.

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In especially preferred embodiments the composition is a hair care composition.

Suitably the composition comprises one or more diluents or carriers. Preferred diluents and carriers are cosmetically approved compounds and suitable examples of these will be
25 known to the person skilled in the art. Examples of suitable carriers include organic solvents (eg, hydrocarbon solvents (eg, isododecane), alcohols (eg, ethanol, propanol and butanol), propylene carbonate, benzyl alcohol, aliphatic or aromatic esters (eg, vegetable oils, isopropyl myristate, C12-15 alkyl benzoate), perfluorocarbon solvents, and silicone fluids.

30 In some embodiments the composition is an aqueous composition. Suitably water is the major solvent present in the composition. In some embodiments water provides for at least 50 wt% of all solvents present in the composition, preferably at least 60 wt%, more preferably at least 70 wt%, suitably at least 80 wt%, for example at least 90 wt% or at least 95 wt%. In some
35 embodiments one or more further water miscible solvents may be present. Examples of suitable water miscible solvents include monohydric and polyhydric alcohols, for example ethanol, glycerol and isopropanol.

In some embodiments the composition used in the present invention is not aqueous and the major diluent or carrier is an oleophilic material. In such embodiments the composition may

comprise as a major solvent one or more higher fatty alcohols, a mineral oil and/or a vegetable oil.

5 In some embodiments the composition is substantially aqueous but the chelating agent is dispersed within an oleophilic phase in which it is soluble.

10 In some embodiments the composition may consist essentially of one or more polycarboxylic acid-derived chelating agents and one more diluents or carriers. In preferred embodiments the composition comprises one or more further components. Suitable components are those typically used in personal care compositions and are known to the person skilled in the art.

15 As detailed above the compositions used in the present invention may comprise different components depending on the intended use thereof. In some embodiments the composition may be used immediately after dyeing the hair. Alternatively the composition may be used one or more times as a hair treatment composition. In some embodiments it may be provided as a colour-loss prevention composition. Alternatively the composition may be in the form of shampoo, conditioner or hair styling product, for example a serum, wax, mousse, gel or spray or any other hair treatment form that could be used to provide general hair care benefits. 20 Compositions which perform multiple functions, for example combined shampoo and conditioning compositions are also within the scope of the invention.

25 Suitably the composition comprises one or more additional components selected from surfactants, (including anionic, amphoteric, nonionic and cationic surfactants); conditioning agents (including quaternary ammonium compounds, cationic polymers, silicones, synthetic or natural oils or resins, etc), fatty alcohols, electrolytes or other rheology modifiers, opacifying/pearlising agents, scalp benefit agents, fragrances, dyes, UV filters, penetration enhancers (eg, propylene carbonate, benzyl alcohol, etc), preservatives, antioxidants, emulsifiers, pH adjusting agents and buffers and styling polymers (eg, polyvinylpyrrolidone, 30 etc).

In some embodiments the composition comprises a pH adjusting agent.

35 Suitable pH adjusting agents for use herein may include lactic acid, sodium hydroxide, sodium phosphate and salts and buffers thereof.

The pH of the composition will depend on the intended use thereof. In some embodiments the composition has a pH of between 3 and 9, preferably between 3.5 and 8, more preferably

between 4 and 7, preferably between 4 and 6. In some embodiments the composition has a pH between 8 and 13.

5 In some preferred embodiments the composition is a hair care composition. Suitable hair care compositions include shampoo compositions, conditioning compositions, hair styling compositions and hair permanent waving, relaxing or permanent straightening compositions, or hair colouring compositions.

10 Suitable further ingredients and amounts thereof to be used in hair care compositions will be known to the person skilled in the art. The relative ratios of the components and the formulation of such compositions would be within the competence of the skilled person.

15 Compositions for use in the method of the first aspect are suitable for treating hair that has already been dyed. Preferred compositions comprise less than 1 wt% of an oxidising agent, preferably less than 0.1 wt%, more preferably less than 0.01 wt%. Most preferably the compositions are substantially free of oxidising agents.

20 Preferred compositions comprise less than 1 wt% of peroxide compounds, preferably less than 0.1 wt%, more preferably less than 0.01 wt%. Most preferably the compositions are substantially free of peroxide compounds.

25 Preferred compositions comprise less than 1 wt% of hydrogen peroxide, preferably less than 0.1 wt%, more preferably less than 0.01 wt%. Most preferably the compositions are substantially free of hydrogen peroxide.

Suitably the composition is a substantially aqueous composition, suitably comprising at least 50 wt% water, preferably at least 60 wt%, more preferably at least 70 wt%.

30 Suitably the composition comprises one or more surfactants. For example the composition may comprise from 0.1 to 60 wt% surfactants, preferably 0.1 to 30 wt%, suitably from 5 to 25 wt%.

35 Suitably the composition comprises one or more anionic surfactants. For example the composition may comprise from 0.1 to 60 wt% anionic surfactants, preferably 0.1 to 30 wt%, suitably from 5 to 25 wt%.

In some embodiments the composition may comprise a quaternary ammonium salt, suitably in an amount of from 0.1 to 20 wt%, preferably 0.1 to 10 wt%.

In some embodiments the composition further comprises an aldehyde. Suitable aldehydes include hydroxy-substituted aldehydes and alpha-substituted aldehydes.

Thus the present invention may provide a hair care composition comprising a polycarboxylic acid derived chelating agent and an aldehyde which is an alpha-substituted aldehyde and/or a hydroxyaldehyde.

In such embodiments the polycarboxylic acid derived chelating agent is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt% and the aldehyde is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt%.

Some preferred aldehydes for use herein have from 3 to 20 carbon atoms, for example 3 to 16 carbon atoms.

Suitable aldehydes for use herein include 2-hydroxydecanal, 2-hydroxydodecanal, 2-hydroxytetradecanal, 2-hydroxyhexanal, 2-hydroxyoctanal, 2-hydroxypropanal, glyceraldehyde, 2-hydroxybutanal, 3-hydroxybutanal, 4-hydroxybutanal, bromomalonaldehyde, 2-(2-hydroxyethoxy)acetaldehyde, 2-chloro octanal, 2-fluoro octanal, 2-bromo octanal, 6-hydroxyhexanal, 3-hydroxypropanal and 4-hydroxy-but-2-enal.

In some embodiments the composition may comprise a first aldehyde having 3 to 9 carbon atoms, preferably 3 to 8 carbon atoms and a second aldehyde having 10 to 18 carbon atoms, preferably 10 to 16 carbon atoms, more preferably 10 to 14 carbon atoms.

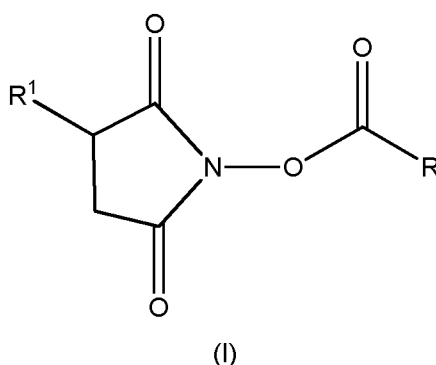
Especially preferred aldehydes are α -hydroxy aldehydes. Suitable aldehydes include 2-hydroxypropanal, 2-hydroxyhexanal, 2-hydroxyoctanal and glyceraldehyde.

In some embodiments the composition further comprises a succinimidyl ester. Suitable compounds of this type are described in FR2937543.

Thus the present invention may provide a hair care composition comprising polycarboxylic acid derived chelating agent and a succinimidyl ester.

In such embodiments the polycarboxylic acid derived chelating agent is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt% and the succinimidyl ester is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt%.

Preferably the succinimidyl ester is a compound of formula (I):



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wherein R is an optionally substituted hydrocarbyl group having 5 to 36 carbon atoms; and R¹ is hydrogen or a solubilising group.

10 Preferably R is an optionally substituted alkyl, alkenyl or aryl group having 5 to 20 carbon atoms. More preferably R is selected from phenyl and CH₃(CH₂)_n wherein n is 4 to 10.

R¹ is suitably hydrogen or a sulfonate moiety, preferably hydrogen.

15 In some embodiments the composition further comprises an amine salt of a carboxylic acid. Preferred compounds of this type are amine salts of a carboxylic acid wherein the carboxylic acid has 4 to 10 carbon atoms.

20 In such embodiments the polycarboxylic acid derived chelating agent is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt% and the amine salt is suitably present in an amount of from 0.1 to 50 wt%, preferably 0.1 to 10 wt%, more preferably 0.5 to 5 wt%.

25 Thus the present invention may provide a hair care composition comprising a polycarboxylic acid-derived chelating agent and an amine salt of a carboxylic acid.

Suitably the carboxylic acid has 4 to 10 carbon atoms, preferably 6 to 8 carbon atoms.

30 Preferably the salt is of a secondary or tertiary alkylamine and/or alkanolamine or a substituted alkylene diamine. Triethanolamine and diethanolamine are especially preferred.

Most preferably the salt is the triethanolamine or diethanolamine salt of n-hexanoic acid or n-octanoic acid.

In some embodiments the composition further comprises an aldehyde that is an alpha-substituted aldehyde and/or a hydroxy aldehyde, and a succinimidyl ester.

5 In some embodiments the composition further comprises an aldehyde that is an alpha-substituted aldehyde and/or a hydroxy aldehyde, and an amine salt of a carboxylic acid.

In some embodiments the composition further comprises a succinimidyl ester and an amine salt of a carboxylic acid.

10 In some embodiments the composition further comprises an aldehyde which is an alpha-substituted aldehyde or a hydroxy aldehyde, an amine salt of a carboxylic acid and a succinimidyl ester.

15 In some embodiments the composition may further comprise a crosslinking agent comprising two or more reactive moieties and a linker. Compounds of this type are described for example in US2015/034117 and US2015/0034119.

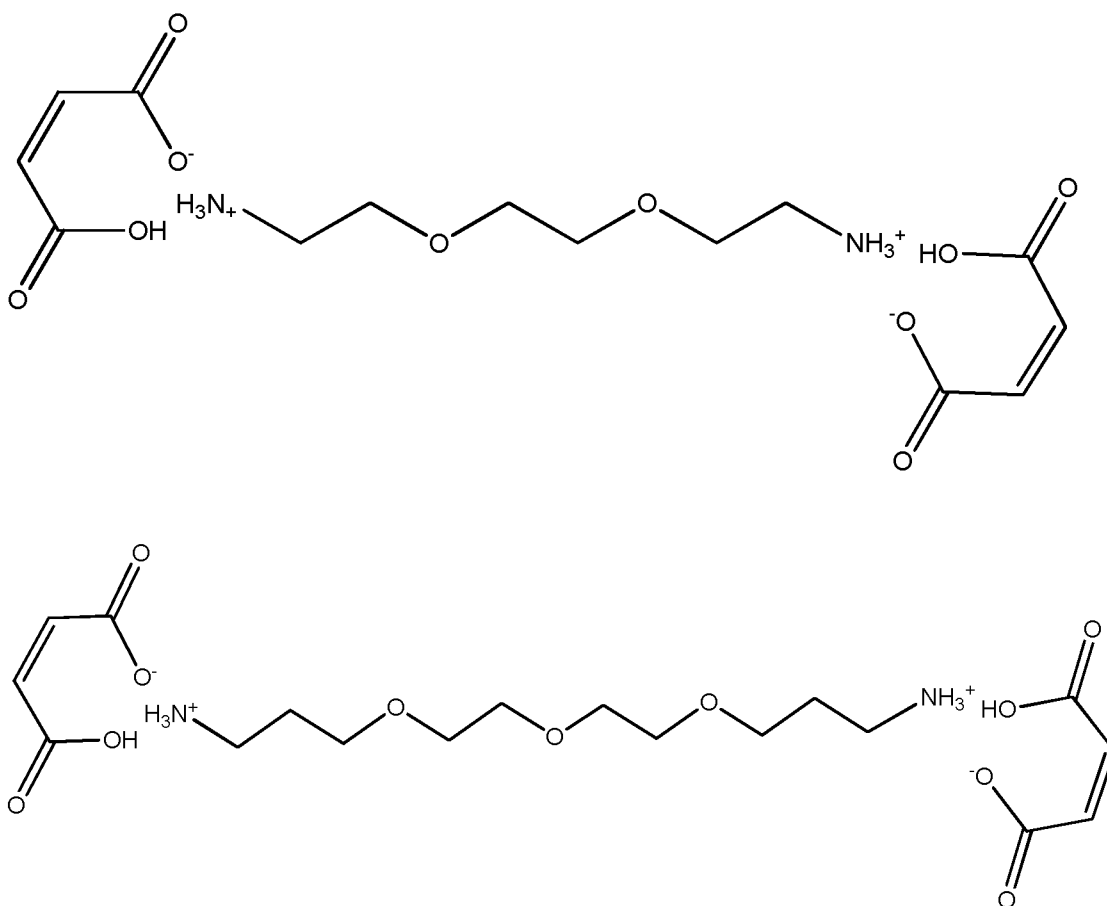
20 In some embodiments the reactive moieties are activated carboxylic acid or sulfonic acid derivatives and the linkers are polyamino compounds which may form salts or covalent bonds with the reactive moieties.

25 In some embodiments the reactive moieties are maleic acid or derivatives thereof and the linker has two or more amino groups linked by alkylene or oxyalkylene chains. The crosslinking agent may be a maleimide or a maleic acid amine salt.

In some embodiments the reactive moieties are maleic acid ions and the linker comprises quaternary ammonium ions linked by alkylene or oxyalkylene chains.

30 Some preferred crosslinking agents have the following structures:

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The crosslinking agent comprising two or more reactive moieties and a linker may be present in an amount of from 0.1 to 30 wt%, preferably 0.1 to 10 wt%, suitably 0.5 to 5 wt%.

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In some embodiments the composition used in the present invention is a shampoo composition.

Suitable shampoo compositions used in the present invention may typically comprise 0.5 to 60 wt% of one or more anionic surfactants, preferably 1 to 50 wt%, more preferably 5 to 30 wt%, for example 8 to 20 wt% or 8 to 12 wt%; optionally from 0.1 to 30 wt% of amphoteric surfactants, preferably 1 to 15 wt%, for example 2 to 12 wt%; and optionally 0.1 to 40 wt% of non-ionic surfactants, preferably 0.5 to 30 wt%, for example 1 to 15 wt% or 2 to 12 wt%.

Shampoo compositions used in the present invention may comprise one or more ingredients selected from anionic surfactants (eg, sodium laureth sulfate, sodium lauroyl methyl isethionate, sodium cocoyl methyl isethionate, sodium alpha-olefin sulfonate, sodium lauryl

sulfoacetate, sodium monoalkyl phosphates, sodium dialkyl phosphates, sodium methyl cocoyl taurate), amphoteric surfactants (eg, cocamidopropyl betaine, sodium lauroamphoacetate, cocamidopropylhydroxy sultaine and disodium cocoamphodiacetate), foam boosters (eg, cocamide DEA, cocamide MEA, cocamide MIPA laureth-3), fatty alkyl alcohols (eg, cetyl alcohol, stearyl alcohol and behenyl alcohol), nonionic surfactants (eg, alkylpolyglucosides and alkyl ether ethoxylates), cationic polymers (eg, guar hydroxypropyl trimonium chloride, polyquaternium-10), silicones (eg, polydimethylsiloxanes such as dimethicone and dimethiconol), rheology modifiers (eg, carbomer, PEG-150 distearate and xanthan gum), synthetic or natural oils or resins (eg, mineral oil or vegetable oils), anti-dandruff agents (eg, piroctone olamine, zinc pyrithione and salicylic acid), styling agents (eg, polyisobutylene and polyvinyl pyrrolidone/vinyl acetate copolymer), moisturising agents (eg, panthenol and glycerol), non-polymeric conditioning agents (eg, quaternary ammonium compounds such as behentrimonium chloride and stearylalkonium chloride), opacifying/pearlising agents (eg, styrene/acrylates copolymer and ethylene glycol distearate), scalp benefit agents, fragrance, colouring agents, hair dyes, sunscreens, UV filters, preservatives, penetration enhancers (eg, propylene carbonate, benzyl alcohol etc) and diluents and carriers as defined herein.

Some preferred shampoo compositions used in the present invention include 0.5 to 60 wt% of one or more anionic surfactants (for example, sodium laureth sulfate, sodium lauroyl methyl isethionate, sodium cocoyl isethionate, sodium alpha-olefin sulfonate, sodium lauryl sulfoacetate, sodium monoalkyl phosphates and sodium dialkyl phosphates); and 0 to 30 wt% of amphoteric surfactants (for example, cocamidopropyl betaine, sodium lauroamphoacetate and cocamidopropylhydroxy sultaine).

In some embodiments the composition used in the present invention is a conditioning composition.

Suitable conditioning compositions used in the present invention may typically comprise 0.1 to 20 wt% of one or more cationic surfactants, preferably 0.5 to 8 wt%, more preferably 1 to 4 wt%; and 0.1 to 20 wt% of one or more fatty alkyl alcohols, preferably 0.5 to 8 wt%, more preferably 1 to 4 wt%; and optionally 0.1 to 20 wt% of one or more non-ionic surfactants, preferably 0.5 to 8 wt%, more preferably 1 to 4 wt%; and optionally 0.1 to 20 wt% of one or more cationic polymers, preferably 0.5 to 8 wt%, more preferably 1 to 4 wt%.

Conditioning compositions used in the present invention including rinse-off and leave-on conditioners (including 'hair masks') and hair shine or appearance enhancing products, anti-frizz treatment serums and other treatments, either leave-in or rinse-off, designed to be applied to the hair immediately after colouring or any time thereafter, and hair-tonics. Such compositions may comprise one or more further ingredients selected from: cationic surfactants

including mono- and-di fatty alkyl tertiary amines and quaternary ammonium compounds (eg, mono- and di-fatty alkyl quaternary ammonium compounds, such as cetrimonium chloride, steartrimonium chloride and behentrimonium chloride), fatty alkyl alcohols (eg, cetyl alcohol, stearyl alcohol and behenyl alcohol), nonionic surfactants (eg, alkylpolyglucosides and alkyl
 5 ether ethoxylates, eg, cetareth-20), cationic polymers (eg, guar hydroxypropyl trimonium chloride, polyquaternium-10), silicones (eg, polydimethylsiloxanes such as dimethicone and dimethiconol), rheology modifiers (eg, hydroxyethyl cellulose and polyquaternium-37), moisturising agents (eg, panthenol and glycerol), non-polymeric conditioning agents (eg, quaternary ammonium compounds such as behentrimonium chloride and stearammonium
 10 chloride), scalp benefit agents, fragrance, colouring agents, hair dyes, sunscreens, UV filters preservatives, penetration enhancers (eg, propylene carbonate, benzyl alcohol, etc), and diluents and carriers as defined herein.

Some preferred conditioning compositions used in the present invention include 0.1 to 20 wt%
 15 of cationic surfactants (for example mono- and di-fatty alkyl quaternary ammonium compounds, mono- and di-fatty alkyl tertiary amines), 0.1 to 20 wt% of fatty alkyl alcohols; and 0.1 to 20 wt% of non-ionic surfactants (for example cetareth-20).

In some embodiments the composition used in the present invention is a hair styling
 20 composition.

Suitable hair styling compositions used in the present invention may typically comprise from 0.1 to 40 wt% of one or more hair styling polymers, preferably from 0.1 to 30 wt%, more preferably from 0.5 to 10 wt%.

25 Hair styling compositions used in the present invention (including gels, mousses with and without propellant, hair sprays with and without propellant, hair pomades, hair waxes, hair creams, hair brilliantines and compositions designed to be used in conjunction with heated styling appliances such as blow dryers, curling tongs, straightening irons, hot air hoods (as
 30 used for example in hair salons)) may comprise one or more further ingredients selected from: hair styling polymers (eg, polyvinylpyrrolidone, polyvinylpyrrolidone/vinyl acetate copolymers, octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer, methyl vinyl ether/maleic anhydride copolymers and polyethylene waxes), rheology modifiers (eg, carbomers, acrylates copolymers, hydroxyethylcellulose, xanthan gum and polyquaternium-37), aminomethyl
 35 propanol, fatty alkyl alcohols (eg, cetyl alcohol, stearyl alcohol and behenyl alcohol), ethanol, propyl alcohol, isopropyl alcohol, petrolatum, mineral oil, ozokerite, beeswax, carnauba wax, silicones (eg, polydimethylsiloxanes such as dimethicone and dimethiconol), polyethylene glycols, anionic surfactants (eg, sodium laureth sulfate and sodium lauroyl methyl isethionate), amphoteric surfactants (eg, cocamidopropyl betaine and disodium cocoamphodiacetate),

nonionic surfactants (eg, alkylpolyglucosides and alkyl ether ethoxylates), cationic polymers (eg, guar hydroxypropyl trimonium chloride, Polyquaternium-10), silicones (eg, polydimethylsiloxanes such as dimethicone and dimethiconol), moisturising agents (eg, panthenol and glycerol), non-polymeric conditioning agents (eg, quaternary ammonium compounds such as behentrimonium chloride and stearylalkonium chloride), scalp benefit agents, fragrance, colouring agents, hair dyes, sunscreens, UV filters, preservatives, penetration enhancers (eg, propylene carbonate, benzyl alcohol, etc), and diluents and carriers as defined herein.

Some preferred hair styling compositions used in the present invention include 0.1 to 40 wt% of one or more hair styling polymers/resins (for example polyvinylpyrrolidone, polyvinylpyrrolidone/vinyl acetate copolymers, octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer, methyl vinyl ether/maleic anhydride copolymers and polyethylene waxes).

Those skilled in the art will appreciate that it is possible to confer one or more attributes of hair conditioning, shine etc., and hair styling to the hair from a single product containing the appropriate ingredients thus, compositions having such combinations of hair benefit effects are also covered in the invention.

In some embodiments the composition is a hair permanent waving composition.

Suitable hair permanent waving compositions used in the present invention may typically comprise 0.1 to 20 wt% of one or more reducing agents, preferably from 0.5 to 15 wt%, more preferably 3 to 12 wt%.

Some preferred hair permanent waving compositions used in the present invention include 0.5 to 15 wt% of one or more reducing agents (for example as thioglycolic acid, ammonium thioglycolate, thiolactic acid, cysteamine, cysteine, glycerol monothioglycolate, sodium sulfite/bisulfite); alkalising agents (for example ammonia, monoethanolamine) in an amount sufficient to adjust the pH of the reducing component to between pH 8-13. Hair permanent waving compositions are typically provided in a package with a second composition comprising 0.5 to 10 wt% of one or more oxidising agents (for example hydrogen peroxide, sodium bromate, sodium percarbonate and sodium perborate) which are applied after the reducing agent composition has been applied, allowed to process and then rinsed off.

In some embodiments the composition used in the present invention is a hair relaxing composition.

Hair relaxing compositions used in the present invention may include one or more ingredients selected from sodium hydroxide, lithium hydroxide, potassium hydroxide, calcium hydroxide and guanidine carbonate. These components are suitably present in an amount of from 0.5 to 5 wt%.

5

Other types of permanent straightening compositions may include one or more ingredients selected from formaldehyde, glyoxylic acid, glutaraldehyde and glyoxyloyl carbocysteine. These components are suitably present in an amount of from 0.1 to 10 wt%.

- 10 The hair permanent waving, relaxing and permanent straightening compositions mentioned above may further include one or more additional ingredients selected from anionic surfactants (eg, sodium laureth sulfate and sodium lauroyl methyl isethionate), amphoteric surfactants (eg, cocamidopropyl betaine and disodium cocoamphodiacetate), quaternary ammonium compounds (eg, cetrimonium chloride, steartrimonium chloride and behentrimonium chloride),
15 fatty alkyl alcohols (eg, cetyl alcohol, stearyl alcohol and behenyl alcohol), nonionic surfactants (eg, alkylpolyglucosides and alkyl ether ethoxylates), cationic polymers (eg, guar hydroxypropyl trimonium chloride, polyquaternium-10), silicones (eg, polydimethylsiloxanes such as dimethicone and dimethiconol), opacifying agents (eg, styrene acrylates copolymer), rheology modifiers (eg, hydroxyethyl cellulose and xanthan gum), moisturising agents (eg,
20 panthenol and glycerol), non-polymeric conditioning agents (eg, quaternary ammonium compounds such as behentrimonium chloride and stearalkonium chloride), fragrance, sunscreens, UV filters, colouring agents and diluents and carriers as defined herein.

- 25 In some embodiments the composition used in the present invention is a hair colouring composition.

Hair colouring compositions may include a dye compound and/or may include a dye precursor compound which forms an active dye in the hair *in situ* following admixture with an oxidising composition.

30

- Oxidative hair colouring compositions used in the present invention may include one or more intermediates, for example p-phenylenediamine, N,N-bis(2-hydroxyethyl)-p-phenylenediamine, p-toluenediamine, p-aminophenol phenyl methyl pyrazolone, m-phenylenediamine, resorcinol, 1-naphthol, 1-hydroxyethyl 4,5-diamino pyrazole and m-aminophenol. These intermediates
35 can be present in any combination and ratios at a total intermediate concentration of from 0.01 to 15%, depending upon the desired shade. Such compositions typically further include one or more alkalisng agents, for example ammonia, ammonium hydroxide, sodium hydroxide and monoethanolamine. Developer compositions for oxidative dyeing include an oxidising agent,

for example hydrogen peroxide, sodium bromate, sodium percarbonate or sodium perborate. These are typically present in an amount of from 0.1 to 30 wt%.

5 Direct-dye colour compositions used in the present invention may include one or more direct dyes for example from the classes of nitrophenylenediamines (eg, 4-nitro-o-phenylenediamine, etc), nitroaminophenols (eg, 2-amino-4-nitrophenol, etc) and aminoanthraquinones (eg, Disperse Red 11, etc). These are typically present in an amount of 0.1 to 20 wt%, depending on the desired shade.

10 In some preferred embodiments the composition of the present invention is not a hair colouring composition. Preferably the composition comprises less than 0.1 wt%, preferably less than 0.01 wt% of dye compounds and/or dye precursor compounds. Preferably the composition does not comprise dye compounds and/or dye precursor compounds. Compounds which provide colour to the composition such as pigments and pearlescent agents
15 may be present but suitably the composition does not include any compounds which may be used to dye hair.

In the method of the first aspect the material is contacted with a composition comprising a polycarboxylic acid-derived chelating agent.

20 The material, preferably hair, may be wet or dry when contacted with the composition.

Suitably the composition is applied to the material and spread across the surface of the material. In preferred embodiments in which the material is hair the composition may be
25 rubbed into the hair in the manner of a shampoo and/or it may be combed through the hair.

The composition may be left on the material or it may be removed from the material. Suitably it may be rinsed using warm water.

30 In some embodiments the composition may be contacted with the material, spread throughout and then immediately removed.

Suitably the composition may be removed from the material by rinsing, preferably by using water.

35 In some embodiments the composition may be washed from the material by washing with a detergent composition.

In some embodiments the composition may be mechanically removed from the material, for example by brushing.

5 In some embodiments the composition may be left on the material and not removed until the material is washed during a normal cycle.

10 In some embodiments in which the material is hair, the composition may be applied to the hair, spread throughout and rubbed into the hair, and then rinsed with water, in the manner of a shampoo.

In some embodiments in which the material is hair, the composition may be applied to the hair, spread throughout the hair (optionally with combing), left on the hair for a short period and then rinsed from the hair with water, in the manner of a conditioner.

15 In some embodiments in which the material is hair, the composition may be contacted with the hair and left on the hair in the manner of a styling product. The composition may be sprayed throughout the hair, rubbed throughout the hair, combed throughout the hair or otherwise spread through the hair in a manner known to those skilled in the art.

20 In embodiments in which the composition is left on the hair, it suitably remains on the hair until the hair is next washed, although some of the composition may be brushed out or rubbed away during normal activity.

25 In the method of the present invention the composition is suitably contacted with the material, preferably hair, at ambient temperature. In some embodiments the composition may be contacted with the material at a temperature greater than the ambient temperature.

30 In some embodiments the composition may be contacted with the hair and the hair carrying the compositions is then heated and/or manipulated and/or dried. Thus the hair may be dried using a hairdryer or straightened after the composition is applied.

35 The methods of the first and second aspect of the present invention may involve heating the hair. Such a heating step may involve commonly used heating techniques such as blow drying, or using tongs, straighteners or hoods etc.

The present invention provides a method of combating colour loss from a dyed material, preferably from dyed hair. By combating colour loss we mean to include reducing the loss of colour from a dyed material and/or preventing or inhibiting the loss of colour from a dyed material, for example dyed hair.

There are a number of ways which colour loss can be measured. For example colour intensity can be measured immediately after dyeing and then after a period of time or after a number of washes. Any colour loss from a material treated according to the present invention
5 can be compared with a control sample which is dyed and subsequently treated in an identical manner except for the use of the polycarboxylic acid-derived chelating agent according to the invention.

Skilled experienced professionals are able to judge colour tone and intensity by sight
10 and thus colour loss can be assessed by the naked eye. However in many cases a suitable device is used. Such devices and the operation thereof are known to the person skilled in the art and include for example chromameters or colourimeters.

A standard method of defining a colour difference is to provide a dE (or ΔE or delta E)
15 measurement. This uses a formula to calculate colour difference based CIELAB measurements.

One suitable method of determining colour loss is to measure the reflectance of light at a particular wavelength. The difference in reflectance after time, washing or other treatment
20 can be compared with a control. For example the reflectance of light at 457nm could be measured (R457).

One suitable method is described in example 2.

25 Preferably the method of the present invention reduces colour loss by at least 10%, preferably at least 20%, more preferably at least 30%, for example at least 40%.

In some embodiments, the method of the present invention may reduce colour loss by more than 50%, preferably by more than 60%, more preferably by more than 70%, for example
30 by more than 80% or more than 90%.

By a reduction of at least 10% we mean that if a material is treated according to the method of the present invention the colour loss is at least 10% less than if a material is treated with an equivalent method in which the chelating agent is not included. For example in the
35 case of a shampoo composition, washing the hair with a shampoo comprising a polycarboxylic acid-derived chelating agent provides a 10% reduction in colour loss compared with washing with a shampoo which is otherwise identical but does not contain the chelating agent.

Suitably the method of the present invention provides a reduction in colour loss of at least 10%, preferably at least 20%, suitably at least 30%, compared with a control, when measured according to the method of example 2. In this regard it should be noted that the control provides a colour loss of 100%. Thus if a colour loss of 90% is observed, this
5 represents a reduction in colour loss of 10%.

The present invention may involve contacting the material with a composition comprising a polycarboxylic acid-derived chelating agent once or more than once.

10 The invention may be used on a regular basis, for example every time hair (or another material) is washed. Alternatively the invention may be used periodically on a less frequent basis, for example, every week or every month.

It has been surprisingly found that the method of the present invention can significantly
15 reduce the loss of colour from dyed hair.

The present invention may provide reduced colour loss following a number of washes. For example in embodiments in which the invention relates to a colouring composition the inclusion of a polycarboxylic acid derived chelating agent at some stage in the dyeing process
20 may provide improved wash fastness and/or reduced colour fade over time.

Preferably dyeing the hair according to the method of the second aspect provides improved wash fastness. Suitably hair dyed according to the method of the second aspect has colour loss of at least 10% less after three washes compared with hair dyed by an equivalent
25 method excluding the polycarboxylic acid-derived chelating agent, preferably at least 30%, more preferably at least 50%.

According to a third aspect of the present invention there is provided the use of a polycarboxylic acid derived chelating agent to combat colour loss from dyed hair.
30

According to a fourth aspect of the present invention there is provided a packaged hair colouring product comprising one or more compositions wherein the one or more compositions together comprise at least one dye compound and/or one dye precursor compound and a polycarboxylic acid derived chelating agent.
35

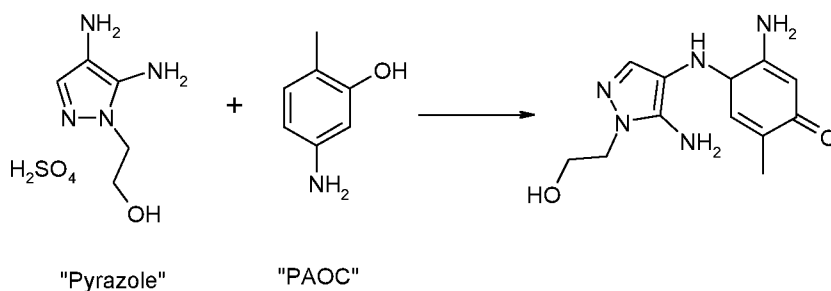
Preferred features of the product of the fourth aspect are as described in relation to the first, second, and third aspects and the product is suitable for use in the colouring method of the second aspect.

In some embodiments the product of the fourth aspect may be a product for oxidative dyeing of the hair comprising a first composition comprising one or more dye precursor compounds and a second oxidising composition comprising one or more oxidising agents. The polycarboxylic acid derived chelating agent may be included in the composition comprising the one or more dye precursor compounds and/or in the composition comprising the oxidising agent. However in preferred embodiments it is provided as a separate third composition. This third composition can be applied to the hair before, during or after treatment with the first and/or second compositions. Alternatively it may be admixed with the first or second composition prior to contact with the hair.

The invention will now be further defined with reference to the following non-limiting examples.

Example 1

Wool swatches were dyed with an oxidative red dye formed as follows:



The dyed swatches were immersed in an aqueous solution comprising 10 wt% of the test chelating agents listed in table 1 and 0.1 wt% SLES buffered to pH 5.5 with sodium acetate buffer for 30 minutes at 40°C. The swatches were then rinsed in water for 2 minutes and then dried. A 30-minute treatment represents a relatively severe test, equivalent to multiple "regular" washes.

A visual assessment was made of the cloth and this was rated on a scale of 1-5, as follows:

- 1 Colour significantly more intense than control and close to original colour
- 2 Colour visibly more intense than control
- 3 Colour not visibly more intense than control
- 4 Colour visibly less intense than control
- 5 Colour significantly less intense than control or colour hue change (eg, blue) or cloth greasy or spotted (reasons recorded)

For cloths visually assessed as more intense than the control (Score 1 or 2), then the actual reading of the colour intensity was measured using standard reflectometry and compared with a deionised water control (containing 0.1 wt% SLES). 100% is the amount of dye removed by the control and a number <100% shows less dye removal than the control and 0% is the colour of the original cloth. In this case the difference in reflectance of light having a wavelength of 457 nm was measured.

Table 1 details the compounds tested and the results obtained.

Table 1

Chelating agent	Score	Result	Colour loss relative to control
DTPA	1	0.4	6%
GLDA	1	1.3	20%
IDS	2	2.3	36%
EDTA	2	3.4	53%
EDDS	2	3.7	58%
HEDTA	2	3.7	58%
HEDP (comparative)	3	5.8	91%
Deionised water Control	3	6.4	100%

Example 2

The wash fastness of the dyeings according to the invention was assessed according to the following method.

Wool swatch samples were initially treated as in example 1. They were then treated with a deionized water composition comprising 0.1% SLES for wetting for 15 minutes, rinsed and dried. The reflectance at 457 nm (R457) was measured. A further two washing steps with deionized water comprising 0.1% SLES were carried out for 15 minutes each.

The results in table 2 are the absolute values of ΔR_{457} wherein ΔR_{457} is the difference in reflectance at 457 nm between the initially dyed wool swatches and the swatches that have been treated as detailed in the table.

Table 2

Composition	Chelant	30 min treatment with chelant	Wash 15 min	Wash 30 min (total)	Wash 45 min (total)	% colour loss compared to control
1	DTPA	0.9	1.9	3.5	5.4	29
2	GLDA	1.2	2.5	3.3	4.9	27
3	IDS	2.5	5.8	9.6	13.3	72
4	EDDS	3.4	6.1	8.7	12.8	70
5	Citric Acid	4.2	7.3	9.7	13.5	73
6	0.1% SLES (control)	6.4	9.3	13.8	18.4	100

The results in table 2 clearly show that the present invention provides a benefit in terms of reducing subsequent leaching of dye relative to the control.

5 Example 3

The effect of multiple treatments with chelating agent was carried out by repeatedly contacting the wool swatches with a chelating agent for periods of 30 or 15 minutes as generally described in example 1. After each treatment the swatches were then rinsed in water for 2 minutes and then dried.

The results in table 3 are the absolute values of ΔR_{457} wherein ΔR_{457} is the difference in reflectance at 457 nm between the initially dyed wool swatches and the swatches that have been treated as detailed in the table.

Table 3

	Initial 30 min treatment	15 min	15 min	15 min
GLDA 10%	-0.5	-0.6	-0.2	0.2
DTPA 10%	-0.1	-0.2	0.1	0.6
IDS 10%	2.4	3.0	4.4	5.4
EDDS 10%	2.9	3.4	4.7	6.5
DIW Control (0.1% SLES)	5.2	8.1	12.9	16.9

Example 4

A study of the use of shampoo compositions comprising GLDA to achieve wash fastness was carried out according to the following method.

- 5 Wool swatch samples were treated as in example 2 using 5 wt% solutions of GLDA or deionised water control and 10% of a basic shampoo formula (12.5 wt% SLES, 2.5 wt% CAPB in water). The results in Table 4 are the absolute values of ΔR_{457} wherein ΔR_{457} is the difference in reflectance at 457 nm between the initially dyed wool swatches and the swatches that have been treated with the inventive composition or the control.

10

Table 4

Composition	ΔR_{457}
Shampoo + GLDA	1.9
Shampoo control	7.8

Claims

1. A method of combatting colour loss from a dyed material, the method comprising contacting the material with a composition comprising a polycarboxylic acid derived chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.
2. A method according to claim 1 wherein the material is a keratinous material.
3. A method according to claim 1 or claim 2 wherein the material is human hair or animal hair, preferably human hair.
4. A method according to claim 3 wherein the material is growing human hair or animal hair, preferably growing human hair.
5. A method according to any preceding claim which is carried out on a material that has been dyed.
6. A method according to any preceding claim wherein the composition contacted with the hair comprises two or more polycarboxylic acid derived chelating agents.
7. A method according to any preceding claim wherein the composition comprising a polycarboxylic acid derived chelating agent is selected from a shampoo composition, a conditioning composition, a hair styling composition, a hair permanent waving composition, a hair relaxing composition, a hair permanent straightening composition or a hair colouring composition.
8. A method or composition according to any preceding claim wherein the composition comprising the polycarboxylic acid derived chelating agent further comprises 1 to 30 wt% of one or more surfactants.
9. A method of colouring hair, the method comprising:
 - (a) contacting the hair with a colouring composition; and
 - (b) contacting the hair with a composition comprising a polycarboxylic acid derived chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof and wherein step (b) is carried out after step (a) or step (b) is carried out before step (a).

10. A method or composition according to any preceding claim wherein the composition comprising the polycarboxylic acid derived chelating agent further comprises an aldehyde which is an alpha-substituted aldehyde and/or a hydroxy aldehyde.
11. A method or composition according to any preceding claim wherein the composition comprising the polycarboxylic acid derived chelating agent further comprises a succinimidyl ester.
12. A method or composition according to any preceding claim wherein the composition comprising the polycarboxylic acid derived chelating agent further comprises an amine salt of a carboxylic acid.
13. A method or composition according to any preceding claim wherein the composition comprising the polycarboxylic acid derived chelating agent further comprises a crosslinking agent comprising two or more maleic acid derived reactive moieties and a linker having two or more amino groups.

14. A method according to any preceding claim which provides a significant reduction in colour loss after 1 to 3 washes such that the colour is visibly more intense compared with hair treated by an equivalent method excluding the chelating agent.
15. A method according to any preceding claim which provides a reduction in colour loss of at least 10% after three washes compared with hair treated by an equivalent method excluding the chelating agent.
16. The use of a polycarboxylic acid derived chelating agent to combat colour loss from dyed hair ; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.
17. The use according to claim 16 of two or more polycarboxylic acid derived chelating agents to combat colour loss from dyed hair.
18. A method or use according to any preceding claim which reduces colour loss by at least 20 %.
19. A packaged hair colouring product comprising one or more compositions wherein the one or more compositions together comprise at least one dye compound and/or one dye precursor compound and a polycarboxylic acid chelating agent; wherein the chelating agent is selected from glutamic acid N,N-diacetic acid (GLDA), diethylene triamine pentaacetic acid (DTPA) and mixtures thereof.
20. A method according to claim 1 wherein the dyed material is a textile material, preferably a textile material comprising wool.
21. A method according to claim 1 or claim 20 which combats colour loss resulting from washing a dyed textile material in a laundry washing process.