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(54) **Strengthening and Revitalising
Fragile or Damaged Nails with 2-
Benzylthioethylamine**

(57) Composition for strengthening
fingernails are described, based on a
mineral acid salt or organic acid salt of
2-benzylthioethylamine.

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SPECIFICATION

Strengthening and Revitalising Fragile or Damaged Nails with 2-benzylthioethylamine

The present invention relates to the use of certain active compounds for strengthening and revitalising fragile or damaged nails, generally fingernails, in particular fingernails having a tendency to crack or split.

It is well known that fingernails, in particular women's fingernails, frequently possess defects of structure and consistency. These defects can have very diverse origins. They can be related, in particular, to the internal functioning of the individual, to his living conditions, to his eating habits, to his age or to his state of fatigue or over-exertion; however, these defects can also appear as a result of erosive action caused by, for example, prolonged and/or repeated exposure to detergents, to solvents or to chemical products such as those encountered in the home.

The effect of these defects of structure and consistency is to render the surface of the fingernails unattractive, and this can have certain repercussions on the psychism of the person who is affected thereby and can also cause certain physical unpleasantness ranging from embarrassment to irritation and possibly to pain.

Various types of compositions based on certain active products have already been proposed for treating fingernails with a view to strengthening them and revitalising them.

These compositions are essentially based on the use, on the one hand, of formaldehyde or N-methylolated derivatives, and, on the other hand, of cysteine derivatives and, in particular, S-carboxymethylcysteine.

The use of formaldehyde-based hardening compositions to exert a cross-linking action on proteins involves a degree of risk, taking into account the potential reactivity of formaldehyde towards the skin. Intolerance phenomena therefore result and the application of such compositions involves risks of sensitisation, all the more so because, in this type of composition, it is necessary to use relatively high concentrations of formaldehyde in order to obtain satisfactory results.

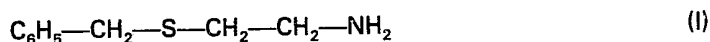
Compositions based on S-carboxymethylcysteine act trophically on the fingernail by providing it with cysteine, which is one of the eighteen aminoacids which form part of the polypeptide linkage of the unguinal keratin structure.

However, although it has been possible to obtain results with this type of composition, these results are not totally satisfactory, in particular as regards the strengthening of fingernails which have a tendency to split.

After much research into various classes of sulphur-containing compounds, it has been found according to the present invention, that it is possible to overcome the disadvantages of the various compositions used hitherto and furthermore to obtain excellent results as regards strengthening and revitalising fragile or damaged nails, by using, in suitable compositions, certain sulphur-containing organic compounds which hitherto have never been recommended in this type of composition.

In fact, after numerous experiments on fragile or damaged women's fingernails, it has been shown that substantial strengthening, which therefore makes it possible to give the fingernails, a more healthy appearance, is obtained by using 2-benzylthioethylamine salts.

The present invention relates to the use, for strengthening and revitalising fragile or damaged fingernails, of at least one mineral acid salt or organic acid salt of 2-benzylthioethylamine of the formula:



the said mineral acid preferably being hydrochloric acid, hydrobromic acid or phosphoric acid and the said organic acid preferably being malic acid, tartaric acid, salicylic acid, succinic acid, aspartic acid, glutamic acid, maleic acid, fumaric acid or 5-amino-3-thiahexanedioic acid.

The active compounds used according to the present invention are known and have already been described in the literature.

Amongst the compounds corresponding to the formula (I) above, which can advantageously be used according to the invention, 2-benzylthioethylamine hydrochloride, 2-benzylthioethylammonium malate, 2-benzylthioethylammonium tartrate, 2-benzylthioethylammonium aspartate, 2-benzylthioethylammonium glutamate and 2-benzylthioethylammonium 5-amino-3-thiahexanedioate may be mentioned in particular.

The active compounds as defined above are generally used as a mixture in a cosmetic vehicle which is suitable for unguinal application, and are present in a proportion of 0.05 to 5% by weight and preferably 0.2 to 2% by weight.

The compositions according to the invention are preferably presented in the form of emulsions of the water-in-oil or oil-in-water type.

If the emulsions are of the oil-in water type, they preferably contain from 2 to 14% by weight of a polyoxyethylene ester of, in particular, stearate, from 0.5 to 3% by weight of a glyceryl ester, in particular glyceryl monostearate or distearate, and from 2 to 9% by weight of a fatty alcohol, in particular cetyl alcohol.

These compositions in the form of oil-in-water emulsions can also contain isopropyl palmitate (e.g. up to 20%), ethyldiglycol (e.g. up to 20%), and oils, such as liquid petrolatum, silicone oil or a vegetable oil (e.g. up to 7%).

5 These emulsions can additionally contain from, say, 1 to 20% by weight of hydrogenated palm oil or 0.2 to 0.5% by weight of a polymethacrylic acid, such as that sold under the tradename Carbopol by Goodrich. 5

10 If the emulsions are of the water-in-oil type, they preferably contain from 2 to 40% by weight of paraffin oil, from 2 to 3% by weight of glycerol and from 1 to 40% by weight of a mixture of paraffinic hydrocarbons, monoglycerides and diglycerides, aliphatic alcohols and stearols, in particular the mixture sold under the tradename "Protegin X" by Goldschmidt. 10

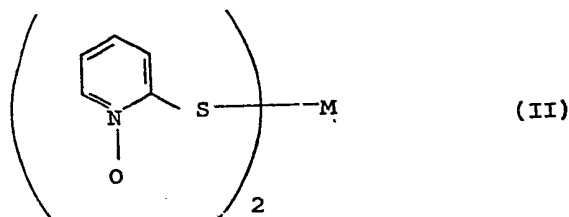
This product "Protegin X" has the following composition:

15	Paraffinic hydrocarbons of partially microcrystalline structure	about 53%	15
	Partial esters of fatty acids and glycerol	about 25%	
	Aliphatic alcohols	about 5%	
	Terpenes	about 10%	
	Steroids	about 7%	

These emulsions of the water-in-oil type can also contain (hydrated) magnesium sulphate in a proportion of, say, 0.1 to 3% by weight.

20 Although emulsions represent the preferred embodiment of the compositions according to the invention, these compositions can also be presented in the form of aqueous-alcoholic solutions in which the proportion of alcohol (ethanol or isopropanol) is generally 10 to 70% by weight. 20

According to this embodiment, the composition preferably additionally contains from 0.5 to 5% by weight of at least one compound of the formula:



25 in which either M represents a covalent bond and the compound can be in the form of a complex, or M represents a divalent radical of the formula: $>\text{Al}-\text{O}-\text{SO}_3\text{R}$, in which R represents an alkyl radical having 1 to 4 carbon atoms, a β -aminoethyl radical, a 2-amino-2-carboxyethyl radical, a phenyl radical or a phenyl radical substituted by an alkyl having from 1 to 3 carbon atoms, a hydroxyl or a halogen, or R represents the 2-oxobornan-10-yl radical. 25

30 If the radical M represents a covalent bond in the compound of the formula (II) above, that is to say if the compound corresponds to 2,2'-dithio-bis-(pyridine-N-oxide), this compound can be used according to the invention in the form of a complex with a metal salt, such as calcium chloride or magnesium sulphate. Such complexes are described in U.S. Patent No. 3,818,018. 30

35 2,2'-Dithio-bis-(pyridine-N-oxide), bis-(N-oxypyrid-2-yl)-aluminium camphosulphate, bis-(N-oxypyrid-2-yl)-aluminium p-toluenesulphonate, bis-(N-oxypyrid-2-yl)-aluminium methanesulphonate, bis-(N-oxypyrid-2-yl)-aluminium β -aminoethanesulphonate and bis-(N-oxypyrid-2-yl)-aluminium 2-amino-2-carboxyethanesulphonate may be mentioned amongst the compounds of the formula (II) which can be used according to the invention. 35

40 Of course, whether presented in the form of emulsions or aqueous-alcoholic solutions, the compositions can contain various other types of compounds, in particular sorbitol, propylene glycol, a polyethylene glycol having a molecular weight of 200 to 1,500, antioxidants, colourants, pigments, preservatives, unsaponifiable materials extracted from vegetable oils, perfumes, soluble proteins, (gelatin, collagen and soluble keratin), aminoacids or protein hydrolysates, and vitamins, such as A, D₃, E, F, B and C. 40

45 The present invention also provides a process for strengthening fingernails, this process consisting in uniformly applying a composition containing a salt of formula (I), such as defined above, to the surface of the fingernail with the aid of, for example, a paintbrush. 45

In order to obtain a lasting effect, it is recommended to apply the compositions according to the invention every day and preferably in the evening so that the action can continue throughout the night.

50 After drying, a colourless or coloured nail varnish can be applied if desired, the adhesion of the film to the fingernail being excellent. 50

The following Examples further illustrate the present invention.

A. Oil-in-water Emulsions**Example 1**

	Polyoxyethylene stearate containing 20 mols of ethylene oxide (20/EO)	3 g	
5	Glycerol monostearate and distearate	0.6 g	5
	Cetyl alcohol	2 g	
	Wheatgerm oil	7 g	
	Liquid petrolatum	8 g	
	Carbopol	0.2 g	
10	Triethanolamine q.s.p.	pH 6	10
	2-Benzylthioethylammonium malate	2 g	
	Water q.s.p.	100 g	

After daily application of this emulsion for a few weeks, a remarkable improvement in the general condition of brittle fingernails is observed.

15	Example 2		15
	Polyoxyethylene stearate containing 20/EO	8.25 g	
	Glycerol monostearate and distearate	1.5 g	
	Cetyl alcohol	5.25 g	
	Isopropyl palmitate	4 g	
20	Interesterified hydrogenated palm oil	5 g	20
	Ethylidiglycol	5 g	
	Bis-(N-oxyprid-2-yl)-aluminium camphosulphonate	0.1 g	
	2-Benzylthioethylammonium malate	1.5 g	
	Perfume	0.2 g	
25	Water q.s.p.	100 g	25

Example 3

	Polyoxyethylene stearate containing 20/EO	6 g	
	Glycerol monostearate and distearate	1.2 g	
	Cetyl alcohol	4 g	
30	Sunflower seed oil	5 g	30
	Silicone oil	4 g	
	Palm oil	3 g	
	2-Benzylthioethylammonium aspartate	2 g	
	Preservative	0.3 g	
35	Water q.s.p.	100 g	35

Example 4

	Polyoxyethylene stearate containing 20/EO	3 g	
	Glycerol monostearate and distearate	0.6 g	
	Cetyl alcohol	2 g	
40	Sunflower seed oil	7 g	40
	Liquid petrolatum	8 g	
	Carbopol	0.2 g	
	Triethanolamine q.s.p.	pH 6	
	2-Benzylthioethylammonium 5-amino-3-thiahexanedioate	2.5 g	
45	Pyridoxine camphosulphonate	0.9 g	45
	Preservative	0.2 g	
	Perfume	0.3 g	
	Water q.s.p.	100 g	

Example 5

50	Polyoxyethylene stearate containing 20/EO	8.25 g	50
	Glycerol monostearate and distearate	1.5 g	
	Cetyl alcohol	5.25 g	
	Isopropyl palmitate	4 g	
	Interesterified hydrogenated palm oil	5 g	
55	Ethylidiglycol	5 g	55
	Preservative	0.3 g	
	2-Benzylthioethylammonium malate	5 g	
	Perfume	0.3 g	
	Water q.s.p.	100 g	

B. Water-in-oil Emulsions**Example 6**

	Protegin X	20 g	
	Paraffin oil	10 g	
5	Glycerol	5 g	5
	Hydrated magnesium sulphate	0.5 g	
	2-Benzylthioethylammonium malate	2 g	
	Water q.s.p.	100 g	

Example 7

10	Protegin X	10 g	10
	Paraffin oil	20 g	
	Glycerol	10 g	
	Magnesium sulphate	2 g	
	2-Benzylthioethylammonium tartrate	1.5 g	
15	Unsaponifiable materials from soya	0.2 g	15
	Water q.s.p.	100 g	

Example 8

	Protegin X	30 g	
	Paraffin oil	5 g	
20	Glycerol	5 g	20
	Magnesium sulphate	1 g	
	2-Benzylthioethylammonium glutamate	3 g	
	Water q.s.p.	100 g	

Example 9

25	Protegin X	20 g	25
	Paraffin oil	10 g	
	Glycerol	5 g	
	Magnesium sulphate	0.5 g	
	2-Benzylthioethylammonium 5-amino-3-thiahexanedioate	2 g	
30	Vitamin AD ₃ E-biotin	0.1 g	30
	Water q.s.p.	100 g	

Example 10

	Protegin X	20 g	
	Paraffin oil	10 g	
35	Glycerol	5 g	35
	Complex of 2,2'-dithio-bis-(pyridine-N-oxide) and magnesium sulphate	0.1 g	
	2-Benzylthioethylammonium malate	1.8 g	
	Vitamin F	0.8 g	
40	Vitamin AD ₃ E-biotin	0.1 g	40
	Water q.s.p.	100 g	

C. Aqueous-alcoholic Solutions**Example 11**

	2-Benzylthioethylammonium malate	2 g	
45	Bis-(N-oxypyrid-2-yl)-aluminium camphosulphonate	0.05 g	45
	Polyethylene glycol 600	2 g	
	Sorbitol	4 g	
	Vitamin F	0.8 g	
	Unsaponifiable materials from lucerne	0.2 g	
50	Perfume	0.3 g	50
	70° strength ethanol q.s.p.	100 g	

Example 12

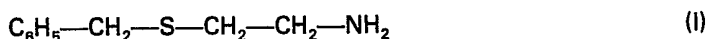
	2-Benzylthioethylammonium 5-amino-3-thiahexanedioate	2 g	
	Complex of 2,2'-dithio-bis-(pyridine-N-oxide) and magnesium sulphate	0.15 g	
55	Soluble keratin	0.5 g	55
	Vitamin AD ₃ E-biotin	0.1 g	
	Perfume	0.2 g	
	Ethanol	15 g	
60	Water q.s.p.	100 g	60

	Example 13		
	2-Benzylthioethylammonium tartrate	1.2 g	
	2,2'-Dithio-bis-(pyridine-N-oxide)	0.5 g	
	Soluble collagen	0.2 g	
5	Polyethylene glycol 400	3 g	5
	Ethanol or isopropanol	30 g	
	Perfume	0.4 g	
	Water q.s.p.	100 g	
	Example 14		
10	2-Benzylthioethylammonium malate	4 g	10
	2,2'-Dithio-bis-(pyridine-N-oxide)	0.3 g	
	Propylene glycol	6 g	
	Polyethylene glycol 1,500	1 g	
	Vitamin F	0.8 g	
15	Butylhydroxyanisole	0.1 g	15
	Butylhydroxytoluene	0.1 g	
	Perfume	0.5 g	
	Ethanol	45 g	
	Water q.s.p.	100 g	
20	Example 15		20
	2-Benzylthioethylammonium aspartate	0.8 g	
	Bis-(N-oxypyrid-2-yl)-aluminium camphosulphonate	0.2 g	
	Polyethylene glycol 300	1.5 g	
	Glycerol	4 g	
25	Perfume	0.15 g	25
	Ethanol	40 g	
	Water q.s.p.	100 g	
	Example 16		
30	2-Benzylthioethylamine hydrochloride	1 g	30
	Complex of 2,2'-dithio-bis-(pyridine-N-oxide) and calcium chloride	0.2 g	
	Soluble keratin	0.5 g	
	Vitamin AD ₃ E-biotin	0.1 g	
	Perfume	0.2 g	
	Ethanol	15 g	
35	Water q.s.p.	100 g	35

The compositions of Examples 2 to 16 produce a similar effect to that of Example 1.

Claims

1. A process for strengthening and revitalising a human nail which comprises applying to the surface thereof at least one mineral acid salt or organic acid salt of 2-benzylthioethylamine of the formula:



2. A process according to Claim 1 in which the salt is a hydrochloric acid, hydrobromic acid or phosphoric acid salt or a malic acid, tartaric acid, salicylic acid, succinic acid, aspartic acid, glutamic acid, maleic acid, fumaric acid or 5-amino-3-thiahexanedioic acid salt.
3. A process according to Claim 1 or 2, in which the active compound is 2-benzylthioethylamine hydrochloride or 2-benzylthioethylammonium malate, tartrate, aspartate, glutamate or 5-amino-3-thiahexanedioate.
4. A composition suitable for application to human nails which contains from 0.05 to 5% by weight of at least one active compound as defined in any one of Claims 1 to 3, in a vehicle suitable for unguinal application.
5. A composition according to Claim 4 which contains 0.2 to 2% by weight of the compound.
6. A composition according to Claim 4 or 5, in which the vehicle is an emulsion of the oil-in-water type containing from 2 to 14% by weight of a polyoxyethylene ester, from 0.5 to 3% by weight of a glyceryl ester and from 2 to 9% by weight of a fatty alcohol.
7. A composition according to any one of Claims 4 to 6 which also contains up to 20% by weight of isopropyl palmitate, up to 20% by weight of ethyldiglycol and up to 7% by weight of at least one oil which is liquid petrolatum, silicone oil or a vegetable oil.
8. A composition according to any one of Claims 4 to 7, which additionally contains from 1 to 20% by weight of hydrogenated palm oil.

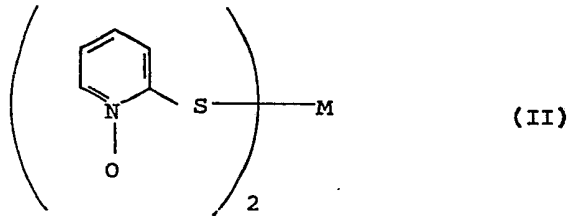
9. A composition according to any one of Claims 4 to 8, which additionally contains from 0.2 to 0.5% by weight of a polymethacrylic acid.

10. A composition according to Claim 4 or 5, in which the vehicle is a water-in-oil emulsion containing from 2 to 40% by weight of paraffin oil, from 2 to 30% by weight of glycerol and from 1 to 40% by weight of one or more of paraffinic hydrocarbons, monoglycerides and diglycerides, aliphatic alcohols and stearols. 5

11. A composition according to Claim 10 which also contains from 0.1 to 3% by weight of magnesium sulphate.

12. A composition according to Claim 4 or 5, in which the cosmetic vehicle is an aqueous-alcoholic solution in which the proportion of alcohol is from 10 to 70% by weight. 10

13. A composition according to Claim 12, which additionally contains from 0.5 to 5% by weight of at least one compound of the formula:



15 in which either M represents a covalent bond and the compound is in the form of a complex, or M represents a divalent radical of the formula: $>Al-O-SO_3R$, in which R represents an alkyl radical having 1 to 4 carbon atoms, a β -aminoethyl radical, a 2-amino-2-carboxyethyl radical, a phenyl radical or a phenyl radical substituted by an alkyl having from 1 to 3 carbon atoms, a hydroxyl radical or a halogen atom, or R represents the 2-oxobornan-10-yl radical. 15

20 14. A composition according to any one of Claims 4 to 13 which also contains at least one of sorbitol, propylene glycol, a polyethylene glycol having a molecular weight of 200 to 1,500, an antioxidant, colourant, pigment, preservative, unsaponifiable material from a vegetable oil extract, perfume, a soluble protein, aminoacid or protein hydrolysate, or a vitamin. 20

15. A composition according to Claim 4, substantially as described in any one of Examples 1 to 16.

25 16. A process according to any one of Claims 1 to 3 which comprises applying a composition as claimed in any one of Claims 4 to 15. 25

17. A mineral acid salt of 2-benzylthioethylamine for use in the treatment of fragile or damaged fingernails.