

Cosmetic Nail Formulations

Field of the Invention

The present invention relates to a topical cosmetic nail formulation, uses of the formulation on a nail and a cosmetic method for improving the appearance of a nail.

5 Background

A number of medical and lifestyle-related factors can lead to toe and/or finger-nails becoming discoloured, thickened, brittle and dry. Nail fungus, psoriasis, sports injury, use of nail varnish are examples of such factors.

Summary of the Invention

- 10 The present invention solves this problem by providing a nail formulation which conditions the nail, as well as aiding nail recovery and restoring the appearance of the nail.

In a first aspect of the invention there is provided a topical aqueous cosmetic nail formulation, the formulation comprising:

- 15 a) an acyclic polymer or mixture of polymers, the acyclic polymer or each acyclic polymer in the mixture comprising 3-100 amino acids; and
b) polyethylene glycol (PEG) 500-PEG 8000.

In a further aspect of the invention, there is provided use of the formulation of the first aspect on a nail.

- 20 In a further aspect of the invention, there is provided a cosmetic method for improving the appearance of a nail, the method comprising applying the formulation of the first aspect to the nail and/or skin surrounding the nail.

Detailed description

Formulation

- 25 The formulation is topical. That is, the formulation is for application to the nail and/or skin surrounding the nail.

The formulation is a liquid. The formulation is aqueous, i.e. it comprises water. The formulation is a cosmetic formulation.

Polymer

- 30 The polymer comprises (or consists) of 3-100 amino acids either as a single polymer or mixture thereof.

The polymers may comprise (or consist) 3, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100 amino acids or any range within these numbers. For example, the polymer may comprise (or consist) of 20-60 amino acids or 25-55 amino acids. The polymer is acyclic. The polymer is a linear polymer or a linear branched polymer. That is, by polymer is meant an acyclic chain
5 of amino acids either branched or unbranched.

When a mixture, the polymers may comprise or consist of a shorter polymer, for example of length 3-20 or 3-15 amino acids; in combination with a longer polymer, for example of 30 amino acids or more, for example 3-15 or 3-20 amino acids for the first polymer and 20-100
10 or 30-100 amino acids for the second polymer.

The amino acids in the polymer may be D or L amino acids. For example, the amino acids in the polymer may be 90% or 95%, 98% or 99% L amino acids. The definition of the polymer also includes salts, isomers (structural, stereo-, conformational & configurational),
15 peptidomimetics, structural analogues of the above amino acids, and those modified either naturally (e.g. post-translational modification) or chemically, including, but not exclusively, phosphorylation, glycosylation, sulfonylation and/or hydroxylation.

The formulation may comprise 0.0001-80% of the polymer. For example 0.05, 0.1, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20%. For example, 5-15%; or 8-12%.
20 The percentage is weight to volume (w/v). That is, weight of the polymer in grams divided by the volume of the final solution in millilitres multiplied by 100. Typically, the polymer is prepared by first dissolving the polymer in water and then diluting the polymer and water solution in liquified PEG to the concentration required in the final solution.

25 The polymers may comprise (or consist) of at least 50% cationic amino acids. Cationic amino acids are arginine, histidine and lysine. The polymer may comprise (or consist) of at least 50% arginines, or 50% histidines or 50% lysines, or the 50% is a mixture of any 2 or more of these cationic amino acids. Percentages here are number of cationic amino acids in the polymer divided by total number of amino acids in the polymer.

30 The polymer may be a poly-arginine polymer, i.e. comprising (or consisting of) 60, 70, 80, 90 or 100% arginines. For example, the polymer may comprise (or consist) of 20, 30, 40, 50, 60, 70, 80, 90 or 100 arginines.

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Substitutions

When the polymer is a polyarginine polymer, one of the polyarginines may be substituted for another amino acid. Alternatively, 2, 3, 4 or 5 of the polyarginines may be substituted. That is, 1-5 substitutions are made into an otherwise polyarginine background.

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Conservative amino acids are often utilised, i.e. substitutions of amino acids with similar chemical and physical properties. Hence, for example, conservative amino acid substitutions may involve exchanging arginine for lysine or isoleucine. Histidine and other cationic amino acids, including non-naturally occurring cationic amino acids, may also be substituted.

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Lactate

Lactate may also be present in the formulation. Lactate may work as a keratinolytic agent and/or as a nail brightener.

15 The lactate may be in an amount 0.005 – 10% w/v.

PEG

PEG is polyethylene glycol, a polymer of ethylene oxide. The molecular weight of the polymer is typically denoted by numbers following PEG, for example PEG8000 has a molecular weight of 8000g/mol.

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The PEG may be PEG 1000-6000. The PEG may be PEG 1000, PEG 1500, PEG 2000, PEG3000, PEG 3350, PEG4000, PEG 5000, PEG 6000, PEG 7000 or PEG 8000. That is PEG with an average molecular weight (mwt) of 4000 g/mol or 3000 g/mol respectively, or PEG of a higher average molecular weight, such as PEG6000 or PEG8000.

25 The concentration of PEG is % (v/v). If solid, the PEG is dissolved in H₂O. Lower molecular weight PEGs are liquid at room temperature, e.g. below PEG1000. PEG1000 and the heavier PEGs are typically all solid at room temperature (i.e. <30°C).

30 The formulation may comprise 10-80% of any of the above PEGs. For example, the formulation may comprise 20-70% PEG or 30-60% PEG or 40-60 PEG. For example 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79 or 80% v/v. For example, 45-50% PEG v/v.

The formulation may comprise up to about 60% v/v PEG, for example about 40% to 60% v/v PEG. In one embodiment the formulation comprises 40% to 55% v/v PEG. In an alternative embodiment, the formulation comprises 45% to 50% v/v PEG

The formulation may comprise from 47.5 to about 55% v/v PEG4000 or about 47.5 to about 5
60% v/v PEG3000. The PEG may comprise approximately 50% v/v PEG4000.
Alternatively, the PEG may comprise approximately 52.5% v/v PEG3000.

As well as drying quickly, the PEG formulation allows the client to see a film of the solution on the nail due to the presence of the PEG. This makes the client aware of any areas
10 missed and the client can then reapply to ensure coverage over the entire surface of the nail. That is, the formulation is a film-forming formulation. By film is meant a thin, visible, non-tacky layer formed on the surface of the nail.

Nail brightener and other nail enhancers or additives

15 A nail brightener may be added or biotin. Nail brighteners include vitamin C, ascorbate and/or citric acid.

Pigment may also be added to the formulation. The pigment may be any colour.

Keratinolytic agents

By keratinolytic is meant a compound which can degrade keratin. For example urea.
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Combinations of PEG and the polymer

Example formulations include 1-20% polymer (w/v), for example a polymer of 20-100 amino acids (for example, arginines), optionally 25-55 amino acids (for example arginines), and 40-80% PEG 1000-PEG8000 (v/v).

25 For example, the formulation may comprise 1-20% polymer (w/v) wherein the polymer comprises or consist of 20-100 amino acid polyarginine, the formulation further comprising PEG 500-PEG 8000 and wherein the formulation comprises between about 40% and 60% v/v PEG.

30 The formulation may comprise 5-10% polymer (w/v), and 40-55% PEG 1000-8000 (v/v).
The formulation may comprise 5-12.5% polymer (w/v), and 40-55% PEG 1000-6000 (v/v).
The formulation may comprise 5-15% polymer (w/v), and 40-55% PEG 1000-3000 (v/v).

The formulations above may comprise a polymer of 20-100 amino acids, preferably 25-60 amino acids. For example:

5 The formulation may comprise 5-10% polymer (w/v), and 40-55% PEG 1000-8000 (v/v) and a polyarginine polymer of 25-60 arginines.

The formulation may comprise 5-12.5% polymer (w/v), and 40-55% PEG 1000-6000 (v/v) and a polyarginine polymer of 25- 60 amino acids.

The formulation may comprise 5-15% polymer (w/v), and 40-55% PEG 1000-3000 (v/v) and a polyarginine polymer of 25-60 amino acids.

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Any of the combinations above when a polymer of 20-100 amino acids is provided, this may be replaced by a combination of a shorter polymer of 3-20 or 3-15 amino acids AND a longer polymer of 20-100 amino acids.

15 For example, the polymer mixture may comprise: a) a polyarginine polymer of 20-40 arginines, for example 30 arginines; and b) a polyarginine polymer of 40-60 arginines, for example 50 arginines. Therefore, the formulation may comprise a 30mer and a 50mer (both polyarginine and both unbranched). The formulation may also comprise 40-55% PEG4000 (v/v). For example 50% PEG4000. The formulation may additionally comprise lactate, for
20 example approximately 5% lactate.

Therefore, an example formulation may comprise:

- a) a mixture of a 30mer polyarginine and a 50mer polyarginine. Each of the polymers in an amount of approximately 0.05% w/v;
- 25 b) PEG 4000; The PEG in an amount of approximately 50% w/v; and
- c) lactate. The lactate in an amount of approximately 5% w/v.

The formulations may be pH adjusted to a pH within the range 2-5, optionally 3-4.

30 The formulations described herein are self-preserving therefore the formulations described herein may not contain a preservative. For example, the formulations may not contain urea and/or parabens.

Therefore, an example formulation may comprise:

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- a) a mixture of a 30mer polyarginine and a 50mer polyarginine. Each of the polymers in an amount of approximately 0.05% w/v;
- b) PEG 4000; The PEG in an amount of approximately 50% w/v;
- c) lactate. The lactate in an amount of approximately 5% w/v;
- 5 at a pH within the range 2-5, optionally 3-4; and additionally not contain urea and/or parabens.

Units

As an example of how to prepare a formulation:

- 10 To prepare a 10% (w/v) polymer solution (as an example only) in 50% (v/v) PEG4000, all materials used were pre-warmed to 37°C in an incubator before starting the formulation work to ensure and facilitate accurate dispensing of liquified PEG. The polymer was prepared as an aqueous solution in sterile deionised water (18 MΩ purity) at a concentration of 400 mg/ml, filtered through a 0.22 µm syringe filter to ensure sterility, and pre-warmed to 37°C
- 15 immediately prior to use in formulation preparation. 20 g PEG4000 (solid at room temperature; melting point 53 – 58°C) was melted in a glass beaker in a microwave oven on low power until a clear solution was obtained. At no point was the temperature of the PEG4000 allowed to exceed 70°C. Once liquified, 5 ml PEG4000 was transferred to a sterile glass universal bottle, placed in a 37°C incubator and allowed to equilibrate to 37°C for 30 –
- 20 60 min. To this was added 2.5 ml polymer (400 mg/ml; 40% (w/v)) and the volume was made up to 10 ml with pre-warmed sterile deionised water (18 MΩ purity). Solutions were stored at room temperature (18 – 20°C) in the dark.

- If a higher MW PEG such as PEG 1000 and upwards, these come as solids. Therefore, the
- 25 concentration can also be referred to as w/v which has the same amount of PEG as v/v. For example, the above formulations with PEGs above PEG1000, e.g. PEG4000, may be referred to as w/v in the formulations.

Device

- 30 Typically, the topical formulation is applied using an applicator such as a dropper, pipette, sponge or brush.

A device may be used to apply the formulation to the nail. The device may for example be a bottle with brush applicator.

The applicator for applying the treatment may be a brush or sponge. Advantageously, use of an applicator permits a controlled amount of a formulation to be laid down on the nail. Further advantageously, use of a sponge or brush permits the formulation to be spread evenly, or approximately evenly, over the surface of the nail.

5 Cosmetic method

The formulation may be used in a cosmetic method of treatment of the nail. By cosmetic is meant non-medical treatment to improve the appearance of the nail. The formulation may for example improve the condition of the nail, for example by treating brittleness and/or dryness. The formulation may also/alternatively treat nail dystrophy (abnormal changes in the shape, colour, texture and/or growth of the nail). For example, the formulation may treat discolouration of the nail. The formulation can also be used to improve hydration; and/or smoothness; and/or reduce thickness of the nail.

Use

- 15 By use is meant cosmetic use. The use is as a nail coating, for example to improve the appearance of the nail for example by reducing the hardness of the nail or reducing discolouration in accordance with the improvements described above for the cosmetic method.
- 20 Throughout the specification, unless the context demands otherwise, the terms 'comprise' or 'include', or variations such as 'comprises' or 'comprising', 'includes' or 'including' will be understood to imply the method or kit includes a stated integer or group of integers, but not the exclusion of any other integer or group of integers. Aspects of the invention comprising certain elements are also intended to extend to alternative embodiments "consisting" or
- 25 "consisting essentially" of the relevant elements.

Where technically appropriate, embodiments of the invention may be combined.

- Each document, reference, patent application or patent cited in this text is expressly
- 30 incorporated herein in their entirety by reference, which means it should be read and considered by the reader as part of this text. That the document, reference, patent application or patent cited in the text is not repeated in this text is merely for reasons of conciseness. Reference to cited material or information contained in the text should not be understood as a concession that the material or information was part of the common general
- 35 knowledge or was known in any country.

Description of the Figures

Figure 1 shows the percentage change in mass toenail fragments over time comparing Tinexyl® to a comparator product.

5 (Tinexyl®:

50% Polyethylene glycol 4000

44.9% water

5% lactic acid

0.05% polymer-TXYL30 (30mer poly-arginine (Poly(L-arginine HCl)) MW = 5800

10 0.05% polymer-TXYL50 (50mer poly-arginine (Poly(L-arginine HCl)) MW = 9600

Figure 2a shows the percentage change in mass of toenail fragments over time comparing 50% PEG 4000 with 0.05% PLR-30, 0.05% PLR-50 and 5% Lactic acid formulation to water.

Figure 2b shows the data represented in 2a illustrating how weight increases in mgs

15 corresponds to total percentage increase in the weight of the nail fragments over time. The weight increase in mgs correlates to the amount deposited when applying the product and how much penetrates the nail.

Figure 3 shows the percentage change in mass toenail fragments over time using the immersion method comparing Tinexyl® to a comparator product.

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Figure 4 shows the percentage change in mass toenail fragments over time and the increase in weight of the fragments over time indicates that Tinexyl® has penetrated and hydrated the nail.

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Figure 5 shows the efficacy of the ingredients within the product. This is demonstrated with average cell counts for microbes at specified time points.

Figure 6 shows excised toenails submerged in Tinexyl® for up to 12 weeks. The figure demonstrates the improvement in the appearance of the excised toenail.

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Figure 7 shows excised toenails submerged in Tinexyl® for up to 28 days. The figure demonstrates the improvement in the appearance of the excised toenail.

35 Figure 8 shows the percentage change in mass toenail fragments over time for excised human toenails immersed in Tinexyl®.

Figure 9 shows client 1 at day 0, 2 weeks and 3 weeks after using Tinexyl®.

Figure 10 shows client 1 at day 0 and 7 weeks after using Tinexyl®.

5 Figure 11 shows client 2 at day 0, 5 weeks, 6 weeks and 9 weeks after using Tinexyl®.

Figure 12 shows client 3 at day 0, 2 weeks, 5 weeks and 9 weeks after using Tinexyl®.

Figure 13 shows client 3 at day 0 and 12 weeks after using Tinexyl®.

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Figure 14 shows client 4 at day 0 and 6 weeks after using Tinexyl®.

Figure 15 shows client 5 at day 0 and 8 weeks after using Tinexyl®.

15 Figure 16 shows client 6 at day 0 and 8 weeks after using Tinexyl®.

Figure 17 shows client 7 at day 0 and 10 weeks after using Tinexyl®.

Figure 18 shows client 8 at day 0 and 8 weeks after using Tinexyl®.

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Figure 19 shows client 9 at day 0 and 5 weeks after using Tinexyl®.

Figure 20 shows example polymers in the formulation.

25 Figure 21 shows client 10's left foot at day 0 and 28 days after using Tinexyl®.

Figure 22 shows client 10's right foot at day 0 and 28 days after using Tinexyl®.

30 Figure 23 shows client 11's left foot at day 0, day 21, 6 weeks and 9 weeks after using Tinexyl®.

Figure 24 shows client 11's right foot at day 0, day 21, 6 weeks and 9 weeks after using Tinexyl®.

35 Figure 25 shows client 12's left foot at day 0, 5 weeks, 7 weeks and 9 weeks after using Tinexyl®.

Figure 26 shows client 12's left foot at 15 weeks, 18 weeks and 21 weeks after using Tinexyl®.

5 Figure 27 shows client 12's right foot at day 0, 5 weeks, 7 weeks and 9 weeks after using Tinexyl®.

Figure 28 shows client 12's right foot at 15 weeks, 18 weeks and 21 weeks after using Tinexyl®.

10 Figure 29 shows client 13 at day 0, 2 weeks and 4 weeks after using Tinexyl®.

Examples

Aspects of the present invention will now be illustrated by way of example only and with reference to the following experimentation.

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Example Tinexyl® formulation used (per 10 litres):

Ingredient	Amount (Kg)
PEG 4000	5
Lactic acid	0.5
TXYL 30 (30mer Poly L-arginine HCl)	0.005
TXYL 50 (50mer Poly L-arginine HCl)	0.005
Purified water	Qs up to 1 litre
Sodium hydroxide	

Manufacturing process:

1. Dry ingredients are weighed prior to use
- 20 2. PEG4000 is mixed and dissolved with a portion of the purified water and 90% of the lactic acid at approximately 60°C until homogenous. The solution is maintained at approximately 50-60°C until the next step
3. TXYL30 (Figure 20) is pre-mixed with a portion of the purified water and then added to the step 2 solution and mixed until homogenous. The solution is maintained at
25 approximately 50-55°C until the next step
4. TXYL50 (Figure 20) is pre-mixed with a portion of the purified water and then added to the step 3 solution and mixed until homogenous. The pH of the solution is

adjusted (with sodium hydroxide) to a pH in the range approximately 3.75 and the solution is maintained at approximately 50-55°C until the next step

5. The solution is made up to a volume with purified water and cooled to 25°C with mixing
- 5 6. The bulk solution is transferred to a suitable holding vessel prior to filling into the cosmetic containers.

Example 1: Linear polymers with PEG hydrate and penetrate the nail

- The inventors excised human toenails and immersed them in the solution to ensure maximum exposure. This experiment included 4 nail fragments per treatment group, with
- 10 Tinexyl®, water and a comparator product included. It was run for 5 d with weights measured at 0hr, 2hr and 4hrs then daily for up to 96hrs (5d).

Results:

- As shown in Figure 1 the increase in weight of the fragments over time indicates that Tinexyl® has penetrated and hydrated the nail and is much more effective compared to a
- 15 comparator product.

The comparator product (Kerasal®) contained propylene glycol, urea, glycerin, lactic acid, water, sodium hydroxide and disodium EDTA.

Example 2: Further testing shows the penetration and hydration goes up further beyond the 5 days monitored in Example 1

- 20 The aim of this experiment was to determine product penetration, hydration and speed of effect of Tinexyl®. By painting toenail fragments, 4 per treatment group, once a day and then measuring the weight over 28 days (28days excluding weekends -20days).

Results:

The results are shown in Figure 2 which shows an increase in weight up to at least day 20.

- 25 **Example 3: Shows the speed at which penetration occurs compared to the comparator product**

The aim of this experiment was to repeat experiment 1 to ascertain whether Tinexyl® would penetrate and hydrate fragments of excised human toenails while immersed in solution (immersion ensure maximum exposure to the product) over a longer period of time.

This experiment included Tinexyl® (6 fragments), water (5 fragments) and a comparator product Kerasal® (5 fragments). It was ran for 6 d with weights measured at 0hr, 2hr, 4hr and 6hrs then daily for 24, 48, 72 and 144hrs (6 d).

5 The comparator was chosen as the most similar product in the market to Tinexyl® in that it comprises water and lactate but uses a different film former to PEG and importantly no polymers.

Results:

As shown in Figure 3 the increase in weight of the fragments over time indicates that Tinexyl® has penetrated and hydrated the nail and is much more effective compared to a
10 comparator product which is only starting to show increase in weight after 72 hours compared with 2 hours with Tinexyl®.

Example 4: shows Tinexyl® works within minutes to penetrate and hydrate the nail

This experiment (a repeat of example 3 but using shorter time points) assessed shorter timepoints (0 – 2 hrs) and only included Tinexyl® (6 fragments).

15 The experiment was run for 2 hrs with weights measured at 0 hr, 15 min, 30 min, 45 min, 60 min and 120min.

Results:

As shown in Figure 4 the increase in weight of the fragments over time indicates that Tinexyl® has penetrated and hydrated the nail.

20 **Example 5: The formulation demonstrates no anti-microbial contamination**

The inventors conducted challenge testing to determine the efficacy of the ingredients within the formulation and to ensure there is minimal to no microbial penetration. Tinexyl® prepared at NovaBiotics were inoculated with 5 different microorganisms, E.coli, S.aureus, P.aeruginosa, C.albicans and A.brasiliensis at a concentration of 1×10^5 cfu/ml and then at
25 specified timepoints of 7, 14, 21 and 28 days, a sample plated out onto agar, in triplicate, and the number of microbial counts determined. This method (detailed in ISO11930) was followed however the bacteria plated onto Muller-Hinton Agar and the fungi and yeast plated on to Sabouraud Dextrose Agar. The experiment also included time points at 8 weeks and 12 weeks after inoculation.

30 **Results:**

Figure 5 demonstrates the formulation does not support microbial growth.

Example 6: Linear polymers and PEG formulations improve the appearance of nails

The aim of this experiment was to assess the appearance of whole excised toenails submerged in Tinexyl® for up to 28 days. Submersion ensured maximum exposure to the product. Images were captured prior to exposure to the product and then every 7 days after exposure. This allows the visualisation of any improvement in the appearance of the excised toenail including, the nail texture, discolouration, shine and condition of the nail

Results:

As shown in Figures 6, 7, 9-19, and 21-29 improved conditioning, appearance, texture, reduced discolouration and increased shine of the nails was seen after using Tinexyl®.

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CLAIMS

1. A topical aqueous cosmetic nail formulation, the formulation comprising:
 - a) an acyclic polymer or mixture of acyclic polymers, the acyclic polymer or each acyclic polymer in the mixture comprising 3-100 amino acids; and
 - b) polyethylene glycol (PEG) 500-PEG 8000.
2. The nail formulation of claim 1, further comprising lactate.
3. The nail formulation of claim 1-2, wherein the polymer(s) comprise(s) at least 50% cationic amino acids, optionally 100% cationic amino acids.
4. The nail formulation of any of claims 1-3, wherein the polymer(s) comprise(s) at least 50% arginines, optionally wherein the polymer(s) comprise(s) at least 60%, at least 70%, at least 80% or at least 90% arginines.
5. The nail formulation of any of the preceding claims, wherein the polymer is, or the polymers in the mixture are, a poly-arginine polymer having optionally 1-5 amino acid substitutions.
6. The nail formulation of any of the preceding claims, wherein the polymer comprises
 - a) 20-60 amino acids, optionally wherein the polymer comprises 25-55 amino acids in length; or
 - b) wherein the mixture comprises a polymer of 3-15 amino acids and a polymer of 20-100 amino acids.
7. The nail formulation of any of the preceding claims, wherein the PEG has an average molecule weight of between 1000 and 6000, optionally wherein the PEG has an average molecular weight of between 4000-6000.
8. The nail formulation of any of the preceding claims, wherein the formulation comprises 10-80% v/v PEG, optionally wherein the formulation comprises 40-60% v/v PEG.

9. The nail formulation of any of the preceding claims, further comprising a nail brightener, optionally wherein the nail brightener is vitamin C, ascorbate and/or citric acid
- 5 10. The nail formulation of any of the preceding claims, further comprising a keratinolytic agent, optionally wherein the keratinolytic agent is urea.
- 10 11. The topical aqueous cosmetic nail formulation of any of the previous claims, wherein the acyclic polymer or mixture of acyclic polymers comprise(s) at least 50% cationic amino acids, optionally 100% cationic amino acids; and wherein the formulation further comprises lactate.
- 15 12. The topical aqueous cosmetic nail formulation of claim 11, wherein the mixture of acyclic polymers comprises: i) a polyarginine polymer of 40-60 arginines, optionally 50 arginines; and ii) a polyarginine polymer of 20-40 arginines, optionally 30 arginines; and the PEG is PEG4000.
- 20 13. A cosmetic method for improving the appearance of a nail, the method comprising applying the formulation of any of claims 1-12 to the nail and/or skin surrounding the nail.
- 25 14. Use of the formulation of any of claims 1-12 on a nail.
- 30 15. The use of claim 14, wherein the use of the formulation on the nail improves the appearance of the nail.
16. The cosmetic method of claim 13, or the use of claim 15, wherein improvement of the appearance of the nail is by: a) hydrating, b) reducing discolouration; c) reducing brittleness/improving smoothness; and/or d) reducing thickness.