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(54) Method for shaping hair and curling sheet with superabsorbent material

(57) A method for shaping hair comprising the steps of:
(i) folding a curling sheet consisting of or comprising a superabsorbent material around the tips of the hair strand like an end-wrap,
(ii) winding the hair around the folded sheet, thereby using said sheet as a curler,
(iii) fixing the curlers with a clip, a pin or an other tool appropriate for fixing the hair on a curler,
(iv) applying a aqueous hair shaping composition onto the hair on the curler,
(v) leaving the shaping composition to act on the hair for 1 to 30 minutes, whereby said sheet is swelling and produces tension on the hair wound on it, and
(vi) removing the said sheet.
A curling sheet for the winding of hair during permanent hair shaping consisting of or comprising a superabsorbent material, wherein said curling sheet has the dimension: thickness 0,5mm to 10mm, width 20mm to 100mm and length 60mm to 200mm.

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Description

[0001] The present invention relates to a method of hair shaping, whereby for the winding of the hair on curlers a curler in form of a sheet is used, which serves also as an end-wrap, and whereby the sheet is provided at least partially with at least one superabsorbent polymer in non-swollen form.

[0002] For producing permanent hair shaping on human hair, winding bodies are required besides the use of a reducing agent and oxidizing agent. The hair is rolled up along its longitudinal axis from the ends of the hair to the roots close to the scalp. The curlers used conventionally in the hairdresser salon have some disadvantages: They display a rigid shape and because of this, when the hair relaxes by the effect of the reducing agent, the tension on the hair is either reduced or completely lost. On the other hand it is well known that the duration and elasticity of the curl can be improved by keeping the hair under tension during the reshaping process. From US patent 5,020,552 a hair curler is known whose diameter can be expanded or contracted by internal mechanical devices. In order to bring all of the curlers (about 30 to 50) under tension much time and effort is needed by the hairdresser and it is impossible to apply the same quantity of tension on each of the curlers.

[0003] It is therefore a goal of the invention to provide a method which easily allows to bring tension onto the hair wound on curlers without the aid of internal mechanical devices and without the disadvantages discussed above.

[0004] Another goal of the invention is to provide a method which allows to keep tension on the hair during the whole duration of waving process.

[0005] It is still another goal of the invention to provide a self acting method to keep the hair under tension.

[0006] It is still another goal of the invention to provide a simple, cheap and effective method to keep the hair under tension.

[0007] It is still another goal of the invention to provide a method of curling hair which avoids the need to clean the curlers after their use and therefore is more time saving, comfortable and hygienic.

[0008] It is still another object of the present invention to avoid overcurling effect on the hair tips so that during the contact time of the waving preparation, lengths and ends are protected in a particular way compared with conventional methods, thus avoiding the known disadvantages. The hair structure should be less damaged, and the lengths and ends should, despite tighter windings, be given a comparable wave radius to the roots close to the scalp.

[0009] The inventors have surprisingly found that the tension on the hair wound on the curlers can be automatically increased during the hair waving process and all other disadvantages discussed above are avoided, when a method according to the invention is used.

[0010] The method of the invention is disclosed in claim 1. The preferred embodiments are indicated in the sub claims.

[0011] Either a non-permanent or a permanent shaping composition may be used for carrying out the method of the invention.

[0012] If a non-permanent shaping composition is used, it may be applied in addition to step (iv) of the method also before step (i), whereby the majority, preferably more than 2/3 of the non-permanent shaping composition, is applied to the hair in step (iv). The non-permanent shaping composition preferably comprises 0.1 to 10% by weight, more preferably 0.2 to 5.0% by weight, of a hair fixing polymer, e. g. PVP/VA copolymer; native zein; a homopolymer of acrylic acid, crosslinked with an allyl ether of pentaerythriol; CTFA: OCTYLACRYLAMIDE/ACRYLATES /BUTYLAMINOETHYL METHACRYLATE COPOLYMER (Amphomer® of National Starch); vinylpyrrolidone/styrene-copolymer; CTFA: QUATERNIUM-79 HYDROLYZED WHEAT PROTEIN; and vinylpyrrolidone/vinylacetate-copolymer. The amout of solvent, selected from water, ethanol, propanol, isopropanol, and the mixture thereof, in the non-permanent shaping composition is from 50% by weight to 98% by weight, preferably 70% by weight to 95% by weight of the composition.

[0013] The invention also provides a "curling-sheet" for the winding of hair during permanent hair shaping according to claim 8.

[0014] The curling-sheet, besides its actual function, namely that as a curler, serves as end-wrap and as carrier for the superabsorbent polymer and ensures targeted effectiveness, particularly at the hair ends. The superabsorbent polymer is present in non-swollen form, it is thus virtually anhydrous and is not in the form of a gel.

[0015] The curling-sheet either consist of a superabsorbent polymer in non-swollen form or of any other foil material known per se for this purpose as carrier, whereby paper, fabric, felt, nonwoven or plastic being preferred, and this other foil material is provided at least partially with at least one superabsorbent polymer in non-swollen form.

[0016] End-foils for permanent waving are known per se; usually, ends-papers made of wet-strength paper, e.g. long-fibre paper, tissue paper or Japan paper, are used. Instead of paper, it is also possible to use alternative materials such as, for example, nonwoven material or nonwoven fabric, cotton fabric, fabric mixtures of synthetic fibres with natural fibres and other absorbent materials, or else polymer films. Further suitable natural or synthetic materials are polyester, acetate, cotton, nylon, orlon, silk, polypropylene, viscose, wool, polyamide and polyethylene. In case the curling-sheet does not consist of a superabsorbent polymer, than the sheet material is provided at least partially with at least one superabsorbent polymer in non-swollen form.

[0017] The superabsorbent polymers are known through their use as absorbents for liquids, for example in nappies.

These are polymers or hydrophilic copolymers of acrylic acid, methacrylic acid or graft copolymers of starch and acrylic acid, where the polymers may be present in neutralized or partially neutralized form as salts. They are formed by polymerization with partial crosslinking with suitable crosslinkers of ethylenically unsaturated hydrophilic monomers, in particular acrylic acid, methacrylic acid or alkali metal salts thereof. Such polymers and their preparation are described widely; for example, reference is made to EP-A 0 312 952, DE-A 44 18 818 and EP-A 0 441 507. US-A 5121762 describes a water-soluble or water-swelling ends-foil made of superabsorbent polymer (Fiebersorb® SAF), on which an ammonium thioglycolate resin solution is dispersed.

[0018] The superabsorbent polymers are characterized by their large water absorption capacity and their large water retention capacity. They are commercially available in powder or granule form. Suitable superabsorbent polymers are, for example, AQUA-KEEP® D (Elf Atochem S.A.), Sanwet® IM 7015 (BASF AG), Sanwet® 3746-5 (BASF AG), Hysorb® E1290-00 (BASF AG) or Hysorb® E 1291-00 (BASF AG). The average particle size of the dry polymers is preferably 5 to 850 μm. However, particular preference is given to relatively small particle sizes of 200 μm or below. The absorption capacity for demineralized water, measured in accordance with the method "Centrifuge Retention Capacity Determination for Superabsorbent Samples" Edna Doc. 87/RS7/037; Absorbency II 441. 1-99, is preferably at least 20 g/g.

[0019] The preparation of the curling-sheet with the superabsorbent polymer is described here by way of representation for all suitable materials, such as, for example, a paper, a fabric, a nonwoven or a foil, using the example of the curling-sheet.

[0020] The curling-sheet can be supplied in different ways with the superabsorbent polymer. One way is the homogeneous application of finely distributed polymer particles to the surface of the curling-sheet. In addition to the surface coating, the polymer can also be incorporated into the paper matrix (matrix = bulk, inside of the material). An alternative preparation variant consists in integrating the superabsorbent polymer into the paper matrix of the paper without coating the surface.

[0021] The curling-sheet according to the invention can be produced, for example, by applying the pulverulent superabsorbent polymer to the surface of the sheet in a manner known per se for pulverulent substances (e.g. spray application, roller application method "gravure coating").

[0022] For example, the production can be carried out by firstly washing and drying the surface of the carrier (sheet). The pulverulent superabsorbent polymer is then suspended in a nonaqueous liquid, in particular an alcohol. The carrier is then immersed into the stirred suspension on one or more sides. The well-wetted carrier sheet is then removed from the suspension. Finally, the curling sheet (carrier + superabsorbent polymer) is dried.

[0023] Another production option consists in applying superabsorbent and also non-superabsorbent polymers (e.g. crosslinked or crosslinkable homopolymers or copolymers) to the carrier material (paper, nonwoven, foil, fabric etc.) and only subsequently crosslinking the polymers with suitable crosslinkers (e.g. glyoxal, etc.) on the carrier surface.

[0024] Production may also take place by firstly washing the surface of the carrier sheet, e.g. made of fabric, with water and then uniformly applying 10 to 20 g of pulverulent superabsorbent polymer to the surface on the wet carrier sheet. Finally, the curling sheet (carrier + superabsorbent polymer) is dried on a glass plate overnight at 40 to 100°C, preferably 60 to 80°C, in a drying cabinet and, if appropriate, rolled smooth.

[0025] Another production variant consists of a sandwich-like combination in which the superabsorbent polymer is embedded between two foil layers, in particular two paper layers (this last variant refers specifically to the use of paper as carrier material).

[0026] In a particular embodiment of the invention, adhesion of the superabsorbent polymer to the surface or within the paper matrix of the curling sheet takes place with the help of thickeners or gel formers. Suitable thickeners for this purpose are, for example, carboxyvinyl polymers, in particular polyacrylates, such as, for example, the various carbopol grades, also polyglycols, cellulose derivatives, in particular hydroxyalkylcelluloses, and alginates and carrageenan. Preference is given to using nonionic cellulose ethers, such as methylcellulose, ethylcellulose, e.g. Culminal (nonionic cellulose ether, Aqualon), Viscotran (methylcellulose, Aqualon) or Aquacoat ECD (ethylcellulose, FMC Corporation).

[0027] These thickeners or gel formers are expediently processed in the form of the aqueous gels. Preferably, the use concentration of these materials for producing the gels is 0.1 to 10% by weight. The aqueously swollen gel is applied to the ends-foil or the ends-paper preferably in an amount of from 0.1 to 20 mg per square centimetre area of the ends-foil or ends-paper. The preferably pulverulent superabsorbent polymer is then applied to the surface of the ends-foil or ends-paper, or it is integrated into the paper matrix, in an amount of from 0.05 to 500 mg per square centimetre area of the ends-foil or ends-paper, preferably in an amount of from 0.1 to 50 mg per square centimetre area of the ends-foil or ends-paper, particularly preferably in an amount of from 0.3 to 10 mg per square centimetre area of the ends-foil or ends-paper.

[0028] Pretreatment with the gel causes the particles of the superabsorbent polymer to stick to the surface and/or in the paper matrix of the curling sheet and gives rise to a durable bond which withstands the mechanical stresses of application.

[0029] The curling sheet according to the invention can of course, together with the superabsorbent polymer, comprise all additives which are known and customary for hair-treatment compositions. These are, for example, wetting agents

or emulsifiers from the classes of nonionic, anionic, cationic or amphoteric surface-active surfactants, such as ethoxylated or nonethoxylated fatty alcohol sulphates, alkylbenzenesulphonates, alkyltrimethylammonium salts, alkylbetaines; humectants, such as, for example, 1,2-pentanediol, perfume oils; opacifiers, such as, for example, ethylene glycol distearate; pearlizing agents, such as, for example, a mixture of fatty acid monoalkylolamide and ethylene glycol distearate; bactericidal and fungicidal active ingredients, such as, for example, 2,4,4-trichloro-2-hydroxydiphenyl ether or methylchloroisothiazolione; buffer substances, such as, for example, sodium citrate or sodium phosphates; acids, such as, for example, citric acids; dyes; care substances, such as, for example, plant and herb extracts, protein and silk hydrolysates, lanolin derivatives; physiologically compatible silicone derivatives, such as, for example, volatile or nonvolatile silicone oils or high molecular weight siloxane polymers; deodorizing active ingredients, such as, for example, polyhydric alcohols having preferably 5 to 8 carbon atoms, e.g. 1,2-pentanediol, 1,3-pentanediol, 1,5-pentanediol, 1,2-hexanediol, 1,3-hexanediol, 2,5-hexanediol, 1,5-hexanediol, 1,6-hexanediol, 1,2-heptanediol, 1,3-heptanediol, 1,2-octanediol and 1,3-octanediol, and citric trialkyl esters, such as, for example, triethyl citrate, tributyl citrate, tricapryl citrate, tri-C_{12-13}-alkyl citrate and tri-C_{14-15}-alkyl citrate, and perfume oils; photoprotective agents, oxidizing agents, antioxidants, free-radical scavengers, antidandruff active ingredients; fatty alcohols, shine-imparting agents, vitamins, betaine, softeners, combability improvers, refatting agents and antifoams.

[0030] The abovementioned additives are used in the amounts customary for such purposes. The weight percentages given below refer to the amount of superabsorbent polymer. For example, the surface-active substances, the conditioning constituents such as combability-improving substances and the care substances are in each case used in an amount of from 0.1 to 20 per cent by weight, the UV absorbers in concentrations of in total 0.1 to 5 per cent by weight, the perfume oils, anti-grease active ingredients, plant extracts, vitamins and vitamin derivatives, pH stabilizers, antidandruff active ingredients, and the bactericidal or fungicidal substances in an amount of in total 0.1 to 10 per cent by weight and the preservatives and dyes in an amount of in each case 0.01 to 5 per cent by weight.

[0031] The application of the invention described below is presented by way of a representation of the various carrier materials using the example of a curling sheet. For this purpose, a conventional ends-paper (Jumbo End Wraps, Sally Beauty Company, area 60 cm^2) was tested against the variant of the invention described in Example 1.

[0032] The permanent shaping agents that can be used in the process described herein are those that are based on typical hair keratin-reducing materials such as, for example, salts of sulfuric acid or certain mercapto compounds, particularly salts or esters of mercapto carboxylic acids. The permanent shaping composition contains the keratin-reducing compounds in the quantities typical for restructuring, for example, the ammonium salts of mercaptoacetic acid or thiolactic acid or cysteine, in a concentration of from 6 to 12 percent by weight. The pH value of the alkaline permanent shaping composition is generally 7 to 10, wherein the pH is preferably set with ammonia, monoethanolamine, ammonium carbonate, or ammonium hydrogen carbonate.

[0033] If the permanent shaping composition is adjusted to be acidic (for example to a pH = 6.5 to 6.9), then esters of mercapto carboxylic acids are used such as, for example, monothioglycol acid glycol esters or -glycerin esters, with mercapto acetamides or 2-mercaptopropionic acid amides being preferred, in a concentration of from 2 to 14 percent by weight; or the salts of the sulfuric acid, for example, sodium, ammonium, or monoethanol ammonium sulfite, in a concentration of from 3 to 8 percent by weight (calculated as SO_2).

[0034] It is preferred that the hair keratin-reducing compound used be the salt or the derivative of a mercapto carboxylic acid. It is especially preferred that the keratin-reducing compound be selected from mercaptoacetic acid, cysteine, and thiolactic acid, or salts thereof.

[0035] To increase the effect, bulking and penetration agents, for example, urea, polyvalent alcohols, ether, melamine, alkali or ammonium thiocyanate, isopropanol, imidazolidine-2-on, 2-pyrrolidone, and 1-methyl-2-pyrrolidone can be added to the permanent shaping composition in a concentration of about 0.5 to 50 percent by weight, or preferably 2 to 30 percent by weight.

[0036] It is advantageous if the permanent shaping composition also contains the disulfide of a hair keratin-reducing compound (thiol), particularly dithioglycolate. The preferred quantity for use is 2 to 20 wt%, or preferably 3 to 10 wt%, wherein the ratio between the hair keratin-reducing compound and the disulfide is preferably 2 : 1 to 1 : 2, or particularly 2 : 1 to 1 : 1.

[0037] The amout of water in the permanent shaping composition is from 50% by weight to 98% by weight, preferably 70% by weight to 95% by weight, of the composition.

[0038] After an action time has elapsed that is sufficient for the permanent restructuring, which is 1 to 30 minutes, or preferably 2 to 20 minutes, depending on hair quality, the pH value, and the restructuring effectiveness of the permanent shaping composition as well as on the application temperature, the hair is, if necessary, rinsed with water, and then fixed with an oxidative agent.

[0039] The fixing composition is used in a quantity of about 50 to 200 g (1.76 to 7.05 oz) depending on hair thickness. Any oxidizing agent that has been used before in fixing agents can be used for the fixation. Examples of such oxidizing agent are potassium bromate, sodium bromate, sodium perborate, dehydroascorbic acid, hydrogen peroxide, and urea peroxide. The concentration of the oxidizing agent varies depending on application time (normally 1 to 40 minutes, or

preferably 5 to 20 minutes) and application temperature (25 to 50° C (77 °F to 122 °F)). Normally, oxidizing agents are used in a concentration of about 0.5 to 12.0% by weight in the aqueous fixing agents. The fixing agents can obviously contain other materials, for example, weak acids or peroxide stabilizers.

[0040] The shaping composition used with the method according to the present invention and the fixing agent can be present in the form of an aqueous solution or an emulsion, as well as in a thickened form on an aqueous basis, particularly as a cream, gel, or paste.

[0041] It is especially preferred that the fixation be in low viscosity liquid form. It is preferred that the fixing agent be an oxidation agent-containing, liquid preparation with a viscosity of from 1 to 100 mPa • s at 25 degrees Celsius (77 °F), wherein viscosity of from 1 to 10 mPa • s at 25 degrees Celsius (77 °F) is especially preferred. The viscosity values are based on measurements with a Haake rotational viscometer, type VT 501, at a shear speed of 64.5 per second.

[0042] It is also possible to fill this agent into aerosol cans under pressure and to release it as aerosol foam.

[0043] With regard to the compounds cited in the examples reference is made to the "International Cosmetic Ingredient Dictionary and Handbook", 10th Edition of 2004, published by The Cosmetic, Toiletry, and Fragrance Association, 1101 17th Street, NW, Suite 300, Washington, D.C. 20036-4702.

EXAMPLES

Example 1

[0044] A non-woven fleece Sawaloom 06615SO16 needle punched nonwoven, including 50% of the super-absorbent fibre PP/30% CV/20% SAP 180g/m^2, having a thickness of 3 mm, is cut into a sheet with the dimensions length 120 mm and width 70 mm. This curling sheet is folded along the longitudinal axis around the hair tips in the way as with an end wrap.

[0045] The hair is wound up by hand or by the aid of a clip without the use of curlers, just using and the curling sheet as the curler. The curl is fixed with a clip, e.g. Wella Creative Shaper®. A conventional permanent waving composition of the formula below is evenly distributed onto the rolled hair. The curling sheet, which serves as a as the curler, is swelling by absorption of the aqueous liquid and produces tension on the hair wound on it.

Permanent waving composition

12.00 g	ammonium thioglycolate, 70% aqueous solution
5.00 g	dithioglycolate
1.00 g	ammonia, 25% aqueous solution
4.00 g	ammonium hydrogen carbonate
1.00 g	castor oil, oxyethylated with 35 mol ethylene oxide
1.00 g	polydimethyl diallyl ammonium chloride homopolymer (CTFA: POLYQUATERNIUM-6)
0.50 g	perfume oil
ad 100.00 g	water

[0046] The permanent waving composition is left on the hair for 15 min, and a hood-type infrared radiator is used at a temperature of 40 °C. The hair is than rinsed with lukewarm water. The rolled up hair is then treated with 80 g of the following fixing agent:

Liquid fixing agent

4.00 g	hydrogen peroxide, 50% aqueous solution
0.10 g	salicylic acid
0.20 g	disodium hydrogen phosphate
0.15 g	o-phosphoric acid
1.00 g	castor oil, oxyethylated with 35 mol ethylene oxide
0.10 g	vinylpyrrolidone/styrene-copolymer
0.10 g	perfume oil
balance to 100 g	water

[0047] There is then an action period of 10 minutes. After the action period has elapsed, the curling sheets are removed and the hair is thoroughly rinsed with warm water and then treated with a known acidic rinse. The hairstyle is then created in the normal manner with a blow dryer and brush. The curled hair displays an even curl from the tip to the roots and no

overcurling at the tips was considered. The curls are looking very natural and are keeping their elasticity over a period of more than 3 weeks.

Example 2

[0048] Natural hair of 25 cm length on the left side of the head are wound with commercial paper end-wraps on curlers with 30 mm diameter (Wella Creative Shaper No.23). On the right side the hair was wound on curling sheets of example 1. Than the hair on both sides of the head was treated as disclosed in example 1.

[0049] The hair treated with the curling sheets according to the invention (right side) showed a more even curl from the tip to the roots compared to the hair on the left side, treated conventionally. No overcurling at the tips was noticed. The hair on the right side moreover showed a more natural and well-groomed look.

Example 3

[0050] A non-woven fleece Sawaloom 06615SO16 needle punched nonwoven, including 50% of the super-absorbent fibre PP/30% CV/20% SAP 180g/m^2, having a thickness of 3 mm, is cut into a sheet with the dimensions length 120 mm and width 70 mm. This curling sheet is folded along the longitudinal axis around the hair tips in the way as with an end wrap.

[0051] Natural hair of 20 cm length is wound up by the aid of a clip, using the curling sheet as the curler. The curl is fixed with a pin. A non-aerosol hair spray composition of the formula below is evenly sprayed onto the rolled hair.

Non-Aerosol Hairspray

6.00 g	CTFA: OCTYLACRYLAMIDE/ACRYLATES /BUTYLAMINOETHYL METHACRYLATE COPOLYMER (Amphomer® of National Starch)
1.10 g	2-amino-isobutanol
0.20 g	triethylcitrate
0.20 g	polyethylene glycol derivative of Dimethicone, containing an everage of 12 moles of ethyleneoxide (CTFA: PEG-12 DIMETHICONE)
0.10 g	vinylpyrrolidone/vinylacetate-copolymer
0.10 g	perfume oil
90.00 g	ethanol
balance to 100 g	water

[0052] The curling sheet, which serves as the curler, is swelling by absorption of the aqueous-alcoholic liquid and produces tension on the hair wound on it. The hair spray composition is left on the hair for 15 min, during which treating period a hood-type infrared radiator is used at a temperature of 40° C. Thereafter the curlers are removed and the hair is combed to a hairstyle. The hair shows excellent elasticity and long-lasting wave.

Example 4

[0053] Natural blond hair of 18 cm length is treated in the same way as in example 3. Instead of the *Non-Aerosol Hairspray* the following *Conditioning and Setting Lotion* is applied:

Conditioning and Setting Lotion

8.00 g	PVP/N,N-dimethylaminoethyl methacrylic acid copolymer diethylsulfate (CTFA: POLYQUATERNIUM-11)
2.50 g	CTFA: QUATERNIUM-79 HYDROLYZED WHEAT PROTEIN
0.50 g	cetyl alcohol
0.10 g	perfume oil
balance to 100 g	water

[0054] The curling sheet, which serves as the curler, is swelling by absorption of the aqueous liquid and produces tension on the hair wound on it. The hair spray composition is left on the hair for 12 min, during which treating period a hood-type infrared radiator is used at a temperature of 42 °C. Thereafter the curlers are removed and the hair is combed to a hairstyle. The hair shows excellent elasticity and long-lasting wave.

Example 4

[0055] Bleached hair of 22 cm length is treated in the same way as in example 3. Instead of the *Non Aerosol Hairspray* the following *Spray Hair Gel* is used:

Spray Hair Gel

0.30 g	homopolymer of acrylic acid, crosslinked with an allyl ether of pentaerythriol (CTFA: CARBOMER)
8.00 g	vinylpyrrolidone/vinylacetate-copolymer
2.00 g	glycerine
0.12 g	triethanolamine
0.10 g	polyethylene glycol derivative of the mono and diglycerides of palm kernel oil with an average of 45 moles of ethyleneoxide (CTFA: PEG-45 PALM KERNEL GLYCERIDES)
0.20 g	methylparabene
0.10 g	perfume oil
balance to 100 g	water

[0056] The curling sheet, which serves as a curler, is swelling by absorption of the aqueous liquid and produces tension on the hair wound on it. The hair spray composition is left on the hair for 20 min, during which treating period a hood-type infrared radiator is used at a temperature of 39 °C. Thereafter the curlers are removed and the hair is combed to a hairstyle and dryed. The hair shows excellent elasticity and long-lasting wave.

Claims

1. A method for shaping hair comprising the steps of:

(i) folding a curling sheet consisting of or comprising a superabsorbent material around the tips of the hair strand like an end-wrap,
(ii) winding the hair around the folded sheet, thereby using said sheet as a curler,
(iii) fixing the curlers with a clip, a pin or an other tool appropriate for fixing the hair on a curler,
(iv) applying a aqueous hair shaping composition onto the hair on the curler,
(v) leaving the shaping composition to act on the hair for 1 to 30 minutes, whereby said sheet is swelling and produces tension on the hair wound on it, and
(vi) removing the said sheet.

2. A method for permanent shaping of hair comprising the steps of:

(a) folding a curling sheet consisting of or comprising a superabsorbent material around the tips of the hair strand like an end-wrap,
(b) winding the hair around the folded sheet, thereby using said sheet as a curler,
(c) fixing the curlers with a clip, a pin or an other tool appropriate for fixing the hair on a curler,
(d) applying a permanent hair shaping composition onto the hair on the curler,
(e) leaving the waving composition to act on the hair for 3 to 20 minutes, whereby said sheet is swelling and produces tension on the hair wound on it,
(f) where required rinsing the hair with water,
(g) applying a fixing composition onto the curler, and
(h) finally rinsing the hair with water and removing the said sheet.

3. A method according to claim 1 or 2, wherein said curling sheet has a thickness of 0.5 mm to 10 mm.

4. A method according to anyone of claims 1 to 3, wherein said curling sheet has the dimension: thickness 0.5 mm to 10 mm, width 20 mm to 100 mm and length 60 to 200 mm.

5. A method according to anyone of claims 1 to 4, wherein said curling sheet has the dimension: thickness 1 mm to 8 mm, width 50 mm to 100 mm and length 80 to 150 mm.

6. A method according to anyone of claims 1 to 5, wherein said curling sheet has the dimension: thickness 2 mm to 6 mm, width 60 mm to 80 mm and length 100 to 140 mm.

7. A method according to anyone of claims 1 to 6, wherein said curling sheet mainly consists of non-woven material.

8. A curling sheet for the winding of hair during permanent hair shaping consisting of or comprising a superabsorbent material, wherein said curling sheet has the dimension: thickness 0.5 mm to 10 mm, width 20 mm to 100 mm and length 60 to 200 mm.

9. A sheet according to claim 8, wherein said sheet has the dimension: thickness 1 mm to 8 mm, width 50 mm to 100 mm and length 80 to 150 mm.

10. A sheet according claim 9 or 10, wherein said curling sheet has the dimension: thickness 2 mm to 6 mm, width 60 mm to 80 mm and length 100 to 140 mm.

11. A sheet for the winding of hair during permanent hair shaping, according to anyone of claims 8 to 10, exclusively consisting of

(a) a carrier material,
(b) at least one superabsorbent polymer in nonswollen form and
(c) at least one thickener.

12. A sheet according to claim 11, wherein said carrier material is selected from the group of paper, fabric, felt, nonwoven or plastic.

13. A sheet according to anyone of claims 11, wherein said superabsorbent polymer is chosen from the group of superabsorbent crosslinked polyacrylic acids, polymethacrylic acids, graft copolymers of starch and acrylic acid, copolymers of acrylic acid and methacrylic acid, and neutralized or partially neutralized salts thereof.

14. A sheet according to anyone of claims 11 to 13, **characterized in that** the average particle size of the dry superabsorbent polymer is from 5 to 850 μm.

15. A sheet according to anyone of claims 11 to 14, **characterized in that** the absorbency of the dry superabsorbent polymer for demineralized water (centrifuge retention capacity) is at least 20 g/g.

16. A sheet according to anyone of Claims 1 to 15, wherein said superabsorbent material is embedded between two paper layers.

17. A sheet according to anyone of Claims 11 to 16, wherein the adhesion of the superabsorbent polymer to the surface or within the matrix of the ends-foil takes place through thickeners or gel formers.

18. A sheet according to Claim 17, wherein said thickener or gel former is chosen from the group consisting of carboxyvinyl polymers, polyglycols, cellulose derivatives, alginates and carrageenan.

19. A sheet according to one of Claims 11 or 17, wherein the aqueously swollen thickener or gel former is applied to the ends-foil in an amount of from 0.1 to 20 mg per square centimetre area of the ends-foil.

20. A sheet according to one of Claims 11 to 19, wherein the superabsorbent polymer is present on the surface of said sheet or within the paper matrix in an amount of from 0.05 to 500 mg per square centimetre area of the sheet.

21. A sheet according to one of Claims 11 to 20, wherein said superabsorbent polymer is present on the surface of the ends-foil or within the paper matrix in an amount of from 0.1 to 50 mg per square centimetre area of the ends-foil.

22. A sheet for the winding of hair during permanent hair shaping, exclusively consisting of

(i) a carrier material,
(ii) at least one superabsorbent polymer in nonswollen form and
(iii) optionally at least one additive known and customary for hair-treatment agents, chosen from: thickeners,

gel formers, wetting agents or emulsifiers from the classes of nonionic, anionic, cationic or amphoteric surface-active surfactants, humectants, perfume oils, opacifiers, pearlizing agents, bactericidal and fungicidal active ingredients, buffer substances, acids, dyes, care substances, physiologically compatible silicone derivatives, deodorizing active ingredients, polyhydric alcohols having 5 to 8 carbon atoms, citric acid trialkyl esters, photoprotective agents, oxidizing agents, antioxidants, free radical scavengers, antidandruff active ingredients, fatty alcohols, shine-imparting agents, vitamins, betaine, softeners, combability improvers, refatting agents and antifoams.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 01 2480

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