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ANTIPERSPIRANT STICKS WITH IMPROVED LONG-TERM STABILITY

(57) **Abstract** [*In English and German*]

The present invention relates to water-free wax-based antiperspirant sticks that have improved long-term stability.

Water-free antiperspirant compositions that are manufactured as a wax-based stick generally contain, in addition to perspiration-reducing particulate active agents, at least one cosmetic oil as a carrier for the perspiration-reducing particulate active agent. Commercial sticks contain thickening agents such as aliphatic alcohols and/or waxes so that the antiperspirant active agent suspended in the oil does not precipitate during storage.

In commercial antiperspirant sticks, the antiperspirant active agent suspended in the water-free oil-containing carrier is covered with an oil layer. However, this oil layer delays the release of an antiperspirant active agent in the effective water-soluble form. In order to avoid this, water-free wax-based antiperspirant sticks usually contain an oil-in-water emulsifier, which promotes the release of the antiperspirant active agent from the wax matrix on the skin under the influence of skin moisture and sweat.

The basis for the present application was the observation that, in the case of such sticks from the prior art, the interaction between antiperspirant active agent, oil-in-water emulsifier and atmospheric humidity (during relatively long storage periods) or skin moisture and sweat (through contact with the skin during application) gives rise to adverse changes in the stick surface. The stick surface becomes hard, the product delivery when rubbed on the skin is reduced, and the cosmetic properties of the stick deteriorate. The perspiration-inhibiting effect of the product diminishes markedly after a period of regular use of as little as 2 to 3 weeks.

The object of the present invention was therefore to provide water-free wax-based antiperspirant sticks that do not exhibit any deterioration of the delivery properties even after many use cycles under the influence of moisture (air/skin/sweat), wherein delivery properties should be understood to mean, in particular, the melting behavior and gliding ability of the stick when applied to the skin, but also the release of the antiperspirant active agent and thus the antiperspirant performance.

Surprisingly, it was now found that the abovementioned disadvantages can be eliminated or at least significantly reduced, and the long-term stability of the delivery properties and the resistance to the influence of moisture can be significantly improved, for water-free wax-based antiperspirant sticks when the sticks contain, with respect to their total weight in each case,

1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier, selected from ethoxylates of C₁₀-C₂₂ alkanols with 8 to 16, preferably 10 – 14, especially preferably with 12, ethylene oxide units in the molecule.

The subject matter of the present application is antiperspirant wax sticks, containing in total 3 – 27% by weight, with respect to the total weight of the anhydrous active substance (USP) in the total composition, of antiperspirant active agent(s), 0 to maximum 8% by weight of free water, in total 30 – 70% by weight of at least one cosmetic oil that is liquid under normal conditions, therein 10 – 50% by weight of at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones and volatile aliphatic hydrocarbons, as well as mixtures thereof, and in addition to the at least one volatile oil in total 1 – 30% by weight of at least one nonvolatile oil, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, therein 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol, 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, 0.5 – 6% by weight of at least one water-insoluble particulate filler, 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier, selected from ethoxylates of C₁₀-C₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick unless otherwise noted.

The subject matter of the present application is also antiperspirant wax sticks, containing in total 3 – 27% by weight, with respect to the total weight of the anhydrous active substance (USP) in the total composition, of antiperspirant active agent(s), 0 to maximum 8% by weight of free water, in total 30 – 70% by weight of at least one cosmetic oil that is liquid under normal conditions, therein 10 – 50% by weight of at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones and volatile aliphatic hydrocarbons, as well as mixtures thereof, and in addition to the at least one volatile oil in total 1 – 30% by weight of at least one nonvolatile oil, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, therein

in total 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol,
in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C,
in total 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C,
furthermore in total 0.5 – 6% by weight of at least one water-insoluble particulate filler,
in total 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by
weight, of at least one oil-in-water emulsifier, selected from ethoxylates of C₁₀-C₂₂ alkanols with
8 to 16 ethylene oxide units in the molecule,
wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick
unless otherwise noted.

Within the meaning of the present application, “normal conditions” are a temperature of 20°C
and a pressure of 1013 hPa. Melting point specifications likewise relate to a pressure of 1013
hPa.

The content of free water in the sticks according to the invention is 0 – 8% by weight, preferably
0.1 – 6% by weight, especially preferably 0.2 – 4% by weight, extremely preferably 0.5 – 3% by
weight, in each case with respect to the total weight of the antiperspirant wax stick.

Within the meaning of the present application, “free water” is water included in the antiperspirant
composition that is not in the form of water of crystallization, water of hydration or similarly
molecularly bound water. The content of water of crystallization, water of hydration or similarly
molecularly bound water that is included in the constituents employed, in particular in the
perspiration-inhibiting active agents, does not represent free water within the meaning of the
present application. Free water is water that, for example, is added as a solvent, as a gel
activator, or as a solvent constituent of other active agents, to the composition according to the
invention.

In the case of cosmetic oils, a distinction is drawn between volatile and nonvolatile oils.
Nonvolatile oils are understood according to the invention to be oils that have a vapor pressure
of less than 2.66 Pa (0.02 mm Hg) at 20°C and an ambient pressure of 1013 hPa. Volatile oils
are understood according to the invention to be oils that have a vapor pressure of 2.66 Pa –
40000 Pa (0.02 mm – 300 mm Hg), preferably 10 Pa – 12000 Pa (0.1 mm – 90 mm Hg),
especially preferably 13 Pa – 3000 Pa, extremely preferably 15 – 500 Pa, at 20°C and an
ambient pressure of 1013 hPa.

The terms, “antiperspirant wax stick,” “antiperspirant stick,” “wax-based antiperspirant stick,” “stick composition” and “composition according to the invention” are used synonymously with respect to the subject matter of the present application.

The compositions according to the invention contain at least one perspiration-inhibiting active agent, which is also referred to as antiperspirant active agent, in a total amount of 3 – 27% by weight, preferably 5 – 22% by weight and especially preferably 10 – 20% by weight, in each case with respect to the total weight of the anhydrous active substance (USP) in the total composition.

Preferred antiperspirant active agents are selected from the water-soluble astringent inorganic and organic salts of aluminum, zirconium and zinc, or any desired mixtures of these salts.

According to the invention, water solubility is understood to be a solubility of at least 5% by weight at 20°C, which is to say that amounts of at least 5 g of the antiperspirant active agent are soluble in 95 g water at 20°C.

The perspiration-inhibiting active agents are present in undissolved, suspended form. For reasons of product stability, it is preferred that the active agent particles have a number average particle size of 0.1 – 200 µm, preferably 1 – 50 µm, especially preferably 3 – 20 µm and extremely preferably 5 – 10 µm.

Especially preferred antiperspirant active agents are selected from aluminum chlorohydrate, in particular aluminum chlorohydrate with the general formula $[\text{Al}_2(\text{OH})_5\text{Cl} \cdot 1-6 \text{H}_2\text{O}]_n$, preferably $[\text{Al}_2(\text{OH})_5\text{Cl} \cdot 2-3 \text{H}_2\text{O}]_n$, which can be present in nonactivated or in activated (depolymerized) form, as well as aluminum chlorohydrate with the general formula $[\text{Al}_2(\text{OH})_4\text{Cl}_2 \cdot 1-6 \text{H}_2\text{O}]_n$, preferably $[\text{Al}_2(\text{OH})_4\text{Cl}_2 \cdot 2-3 \text{H}_2\text{O}]_n$, which can be present in nonactivated or in activated (depolymerized) form.

The production of preferred antiperspirant active agents is disclosed in US 3,887,692, US 3,904,741, US 4,359,456, GB 2,048,229 and GB 1,347,950, for example.

Also preferred are aluminum sesquichlorohydrate, aluminum dichlorohydrate, aluminum chlorohydrate propylene glycol (PG) or aluminum chlorohydrate polyethylene glycol (PEG), aluminum or aluminum zirconium glycol complexes, e.g. aluminum or aluminum zirconium propylene glycol complexes, aluminum sesquichlorohydrate PG or aluminum sesquichlorohydrate PEG, aluminum PG dichlorohydrate or aluminum PEG dichlorohydrate, aluminum hydroxide, additionally selected from the aluminum zirconium chlorohydrates, such as aluminum zirconium trichlorohydrate, aluminum zirconium tetrachlorohydrate, aluminum zirconium

pentachlorohydrate and aluminum zirconium octachlorohydrate, as well as the aluminum zirconium chlorohydrate glycine complexes, such as aluminum zirconium trichlorohydrate glycine, aluminum zirconium tetrachlorohydrate glycine, aluminum zirconium pentachlorohydrate glycine, and aluminum zirconium octachlorohydrate glycine, additionally from potassium aluminum sulfate ($KAl(SO_4)_2 \cdot 12 H_2O$, alum), aluminum undecylenoyl collagen amino acid, sodium aluminum lactate + aluminum sulfate, sodium aluminum chlorohydroxy lactate, aluminum bromohydrate, aluminum chloride, the complexes of zinc salts and sodium salts, the complexes of lanthanum and cerium, the aluminum salts of lipoamino acids, aluminum sulfate, aluminum lactate, aluminum chlorohydroxyallantoinate, sodium aluminum chlorohydroxy lactate, zinc chloride, zinc sulfocarbolate, zinc sulfate, zirconyl oxyhalides, in particular zirconyl oxychlorides, zirconyl hydroxyhalides, in particular zirconyl hydroxychlorides (zirconium chlorohydrate). Antiperspirant active agents that are especially preferred according to the invention are selected from aluminum chlorohydrate and aluminum zirconium chlorohydrates, in particular from aluminum zirconium tetrachlorohydrate glycine complexes.

Antiperspirant active agents that are especially preferred according to the invention are selected from so-called "activated" aluminum and aluminum-zirconium salts, which are also referred to as "enhanced activity" antiperspirant active agents. Such active agents are known in the prior art and are also commercially available. Manufacture thereof is disclosed in GB 2,048,229, US 4,775,528 and US 6,010,688, for example. Activated aluminum and aluminum-zirconium salts are generally made by heat treatment of a relatively dilute solution of the salt (e.g., approximately 10% by weight of salt) in order to increase its HPLC peak 4 to peak 3 area ratio. The activated salt can then be dried, in particular spray dried, to a powder. Also suitable in addition to spray drying is, for example, drum drying.

Activated aluminum and aluminum-zirconium salts typically have an HPLC peak 4 to peak 3 area ratio of at least 0.4, preferably at least 0.7, especially preferably at least 0.9, wherein at least 70% of the aluminum is to be attributed to these peaks.

Additional preferred perspiration-inhibiting active agents are basic calcium-aluminum salts, such as are disclosed in US 2,571,030, for example. These salts are produced by reacting calcium carbonate with aluminum chlorhydroxide or aluminum chloride and aluminum powder, or by adding calcium chloride dihydrate to aluminum chlorhydroxide.

Additional preferred perspiration-inhibiting active agents are aluminum zirconium complexes that are buffered with salts of amino acids, in particular with alkali and alkaline earth glycinate, such as are disclosed in US 4,017,599, for example.

Additional preferred perspiration-inhibiting active agents are activated aluminum or aluminum-zirconium salts such as are disclosed, for example, in US 6,245,325 or US 6,042,816, containing 5 – 78% by weight (USP) of an activated perspiration-inhibiting aluminum or aluminum-zirconium salt, an amino acid or hydroxyalkanoic acid in an amount so as to provide an (amino acid or hydroxyalkanoic acid) to (Al+Zr) weight ratio of 2:1 to 1:20, and preferably 1:1 to 1:10, as well as a water-soluble calcium salt in an amount so as to provide a Ca:(Al+Zr) weight ratio of 1:1 to 1:28, and preferably 1:2 to 1:25.

Especially preferred solid activated perspiration-inhibiting salt compositions, for example according to US 6,245,325 or US 6,042,816, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water (water of hydration), and also sufficient water-soluble calcium salt that the Ca:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient amino acid that the amino acid to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Additional especially preferred solid perspiration-inhibiting activated salt compositions, for example according to US 6,245,325 or US 6,042,816, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water (water of hydration), and also sufficient water-soluble calcium salt that the Ca:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient glycine that the glycine to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Additional especially preferred solid perspiration-inhibiting activated salt compositions, for example according to US 6,245,325 or US 6,042,816, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water, and also sufficient water-soluble calcium salt that the Ca:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient hydroxyalkanoic acid that the hydroxyalkanoic acid to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Preferred water-soluble calcium salts for stabilizing the perspiration-inhibiting salts are selected from calcium chloride, calcium bromide, calcium nitrate, calcium citrate, calcium formate, calcium acetate, calcium gluconate, calcium ascorbate, calcium lactate, calcium glycinate, calcium carbonate, calcium sulfate, calcium hydroxide and mixtures thereof.

Preferred amino acids for stabilizing the perspiration-inhibiting salts are selected from glycine, alanine, leucine, isoleucine, β -alanine, valine, cysteine, serine, tryptophan, phenylalanine, methionine, β -amino-n-butyric acid, and γ -amino-n-butyric acid and the salts thereof, in each case in the D-form, the L-form and the DL-form; glycine is especially preferred.

Preferred hydroxyalkanoic acids for stabilizing the perspiration-inhibiting salts are selected from glycolic acid and lactic acid.

Additional preferred perspiration-inhibiting active agents are activated aluminum or aluminum-zirconium salts such as are disclosed, for example, in US 6,902,723, containing 5 – 78% by weight (USP) of an activated perspiration-inhibiting aluminum or aluminum-zirconium salt, an amino acid or hydroxyalkanoic acid in an amount so as to provide an (amino acid or hydroxyalkanoic acid) to (Al+Zr) weight ratio of 2:1 to 1:20, and preferably 1:1 to 1:10, as well as a water-soluble strontium salt in an amount so as to provide a Sr:(Al+Zr) weight ratio of 1:1 to 1:28, and preferably 1:2 to 1:25.

Especially preferred solid perspiration-inhibiting activated salt compositions, for example according to US 6,902,723, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water, and also sufficient water-soluble strontium salt that the Sr:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient amino acid that the amino acid to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Additional especially preferred solid perspiration-inhibiting activated salt compositions, for example according to US 6,902,723, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water, and also sufficient water-soluble strontium salt that the Sr:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient glycine that the glycine to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Additional especially preferred solid perspiration-inhibiting activated salt compositions, for example according to US 6,902,723, contain 48 – 78% by weight (USP), preferably 66 to 75% by weight, of an activated aluminum or aluminum-zirconium salt, and 1 – 16% by weight, preferably 4 – 13% by weight, of molecularly bound water, and also sufficient water-soluble strontium salt that the Sr:(Al+Zr) weight ratio is 1:1 to 1:28, preferably 1:2 to 1:25, and sufficient hydroxyalkanoic acid that the hydroxyalkanoic acid to (Al+Zr) weight ratio is 2:1 to 1:20, preferably 1:1 to 1:10.

Additional preferred activated aluminum salts are those with the general formula $\text{Al}_2(\text{OH})_{6-a}\text{X}_a$, wherein X is Cl, Br, I, or NO_3 , and “a” is a value from 0.3 to 5, preferably from 0.8 to 2.5, and especially preferably from 1 to 2, so that the mole ratio of Al:X is 0.9:1 to 2.1:1, such as are disclosed in US 6,074,632, for example. In the case of these salts, there is generally some associatively bound water of hydration, typically 1 to 6 moles of water per mole of salt. Especially preferred is aluminum chlorohydrate (i.e., X is Cl in the aforementioned formula), and specifically 5/6 basic aluminum chlorohydrate, where “a” is 1, so that the mole ratio of aluminum to chlorine is 1.9:1 to 2.1:1.

Preferred activated aluminum-zirconium salts are those that represent mixtures or complexes of the above-described aluminum salts with zirconium salts of the formula $\text{ZrO}(\text{OH})_{2-pb}\text{Y}_b$, wherein Y is Cl, Br, I, NO_3 , or SO_4 , b is a rational number from 0.8 to 2, and p is the valence of Y, such as are disclosed in US 6,074,632, for example. The zirconium salts likewise generally have some associatively bound water of hydration, typically 1 to 7 moles of water per mole of salt. Preferably, the zirconium salt is zirconyl hydroxychloride with the formula $\text{ZrO}(\text{OH})_{2-b}\text{Cl}_b$, wherein b is a rational number from 0.8 to 2, preferably from 1.0 to 1.9. Preferred aluminum-zirconium salts have an Al:Zr mole ratio of 2 to 10 and a metal:(X+Y) ratio of 0.73 to 2.1, preferably 0.9 to 1.5. An especially preferred salt is aluminum-zirconium chlorohydrate (i.e., X and Y are Cl) that has an Al:Zr ratio of 2 to 10 and a molar metal:Cl ratio of 0.9 to 2.1. The term “aluminum-zirconium chlorohydrate” includes the tri-, tetra-, penta- and octa-chlorohydrate forms.

Zirconium salts that are preferred according to the invention have the general formula $\text{ZrO}(\text{OH})_{2-a}\text{Cl}_a \cdot x \text{H}_2\text{O}$, where $a = 1.5 - 1.87$; $x = 1 - 7$, wherein a and x are rational numbers. These zirconium salts are disclosed, for example, in Belgian patent document BE 825,146.

Additional preferred perspiration-inhibiting active agents are disclosed in US 6,663,854 and US 2004/0009133.

Preferred perspiration-inhibiting aluminum-zirconium salts have a metal to chloride molar ratio of 0.9 – 1.5, preferably 0.9 – 1.3, especially preferably 0.9 – 1.1.

Zirconium-free aluminum salts that are especially preferred according to the invention have a metal to chloride molar ratio of 1.9 – 2.1. Zirconium-free aluminum sesquichlorohydrates that are especially preferred according to the invention have a metal to chloride molar ratio of 1.5:1 – 1.8:1.

Preferred aluminum zirconium chlorohydrates generally have the empirical formula $\text{Al}_n\text{Zr}(\text{OH})_{[3n+4-m(n+1)]}(\text{Cl})_{[m(n+1)]}$ where $n = 2.0 - 10.0$, preferably $3.0 - 8.0$, $m = 0.77 - 1.11$ (corresponding to a metal (Al+Zr) to chloride molar ratio of $1.3 - 0.9$), preferably $m = 0.91 - 1.11$ (corresponding to $\text{M}:\text{Cl} = 1.1 - 0.9$), and especially preferably $m = 1.00 - 1.11$ (corresponding to $\text{M}:\text{Cl} = 1.0 - 0.9$), further very preferred $m = 1.02 - 1.11$ (corresponding to $\text{M}:\text{Cl} = 0.98 - 0.9$), as well as very preferred $m = 1.04 - 1.11$ (corresponding to $\text{M}:\text{Cl} = 0.96 - 0.9$).

In the case of these salts, there is generally some associatively bound water of hydration, typically 1 to 6 moles of water per mole of salt, corresponding to 1 – 16% by weight, preferably 4 – 13% by weight, of water of hydration.

Normally, the preferred aluminum zirconium chlorohydrates are associated with an amino acid in order to prevent polymerization of the zirconium species during production. Preferred stabilizing amino acids are selected from glycine, alanine, leucine, isoleucine, β -alanine, cysteine, valine, serine, tryptophan, phenylalanine, methionine, β -amino-n-butyric acid and γ -amino-n-butyric acid, and the salts thereof, in each case in the D-form, the L-form and the DL-form; glycine is especially preferred. The amino acid is included in an amount from 1 – 3 moles, preferably 1.3 – 1.8 moles, in each case per mole of zirconium in the salt.

Preferred perspiration-inhibiting salts are aluminum zirconium tetrachlorohydrate glycine complexes, in particular those with an Al:Zr atomic ratio of 2 – 6 and a metal to chloride molar ratio $\text{M}:\text{Cl}$ of 0.9 – 1.5, preferably aluminum zirconium tetrachlorohydrate glycine complexes with a metal to chloride molar ratio of 1.0 – 1.4, especially preferably 1.1 – 1.3.

Also preferred according to the invention are aluminum zirconium chlorohydrate glycine complexes that are stabilized with betaine ($(\text{CH}_3)_3\text{N}^+-\text{CH}_2-\text{COO}^-$). Especially preferred corresponding compounds have an overall (betaine+glycine)/Zr molar ratio of (0.1 – 3.0):1, preferably (0.7 – 1.5):1 and a molar ratio of betaine to glycine of at least 0.001:1. Corresponding compounds are disclosed in US 7,105,691, for example.

In an especially preferred embodiment according to the invention, a so-called “activated” salt is included as an especially effective antiperspirant salt, in particular one having a high HPLC peak 5 aluminum content, in particular having a peak 5 area of at least 33%, especially preferably at least 45%, with respect to the total area under peaks 2 to 5, measured by HPLC in a 10% by weight aqueous solution of the active agent under conditions in which the aluminum species are resolved into at least four successive peaks (designated peaks 2 to 5). Preferred

aluminum-zirconium salts having a high HPLC peak 5 aluminum content (also referred to as "E⁵AZCH") are disclosed in US 6,436,381 and US 6,649,152, for example.

Also preferred are those activated "E⁵AZCH" salts with HPLC peak 4 to peak 3 area ratio of at least 0.4, preferably at least 0.7, especially preferably at least 0.9.

Additional especially preferred antiperspirant active agents are those aluminum-zirconium salts having a high HPLC peak 5 aluminum content that are additionally stabilized with a water-soluble strontium salt and/or with a water-soluble calcium salt. Corresponding salts are disclosed in US 6,923,952, for example.

In an especially preferred embodiment, the composition contains an astringent aluminum salt, in particular aluminum chlorohydrate, which is marketed, for example, in powder form as Micro Dry® Ultrafine or Superultrafine by Reheis, as Micro-Dry 323 or Micro-Dry 3115 by Summit, as Chlorhydrol®, as well as in activated form as Reach® 501 by Reheis. Under the name Reach® 301, an aluminum sesquichlorohydrate, which likewise is especially preferred, is offered by Reheis. Activated aluminum chlorohydrates are also especially preferred, which are available from Summit under the names Reach® 101 and Reach® 103, as well as AACH-7171. The use of aluminum zirconium tetrachlorohydrate glycine complexes can also be especially preferred according to the invention; these are on the market in powder form, for example, under the name Rezal® 36 GP from Reheis or AZG-364 or 369 from Summit, in activated quality, as Reach® AZP-908. Aluminum zirconium pentachlorohydrate glycine complexes (AAZG-3108 or AAZG-3110 from Summit) are also preferred antiperspirant active agents.

Especially preferred antiperspirant sticks according to the invention contain an astringent aluminum salt having a number average particle size of 1 – 50 µm, preferably 3 – 20 µm, and especially preferably 5 – 10 µm, selected from aluminum chlorohydrate, aluminum sesquichlorohydrate, aluminum zirconium tetrachlorohydrate glycine complexes, aluminum zirconium pentachlorohydrate glycine complexes and aluminum zirconium octachlorohydrate glycine complexes, as well as mixtures thereof.

The antiperspirant sticks according to the invention furthermore contain in total 30 – 70% by weight of at least one cosmetic oil that is liquid under normal conditions, therein 10 – 50% by weight of at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones, and volatile aliphatic hydrocarbons, as well as mixtures thereof, and in addition to the at least one volatile oil, contain in total 1 – 30% by weight of at least one nonvolatile oil, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick.

Such mixtures of volatile and nonvolatile oils provide for a pleasant, non-greasy feeling on the skin and good active substance release on the one hand and, on the other hand, good masking of visual residues that can arise owing to the powdered constituents of the stick.

The total amount of cosmetic oils that are liquid under normal conditions is 30 – 70% by weight, preferably 39 – 60% by weight, especially preferably 42 – 54% by weight, extremely preferably 45 – 49% by weight, in each case with respect to the total weight of the antiperspirant wax stick.

Volatile Oils

Preferred antiperspirant wax sticks according to the invention contain the at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones and volatile aliphatic hydrocarbons, as well as mixtures thereof, in a total amount of 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, in each case with respect to the total weight of the stick.

Preferred volatile cyclic silicones are those with the INCI name cyclomethicones, in particular cyclotrisiloxane (hexamethylcyclotrisiloxane), cyclotetrasiloxane (octamethylcyclotetrasiloxane), cyclopentasiloxane (decamethylcyclopentasiloxane), and cyclohexasiloxane (dodecamethylcyclohexasiloxane), as well as mixtures thereof. These oils have a vapor pressure of approximately 13 to 15 Pa at 20° C. Preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of cyclomethicones, in each case with respect to the total weight of the antiperspirant wax stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of cyclopentasiloxane, in each case with respect to the total weight of the antiperspirant wax stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of a cyclopentasiloxane / cyclohexasiloxane mixture, in each case with respect to the total weight of the antiperspirant wax stick. Additional preferred antiperspirant sticks according to the invention contain at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones and volatile aliphatic hydrocarbons, as well as mixtures thereof, in a total amount of 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, in each case with respect to the total weight of the stick, wherein the at least one volatile oil is selected from cyclopentasiloxane.

Preferred volatile linear silicone oils are selected from linear silicone oils with 2 – 10, preferably 3 – 6, siloxane units, such as hexamethyldisiloxane (L_2), octamethyltrisiloxane (L_3), decamethyltetrasiloxane (L_4), dodecamethylpentasiloxane (L_5), such as are included, for example, in the commercial products DC 2-1184 (or Xiameter 2-1184), Dow Corning® 200 (0.65 cSt) or Xiameter PMX 0.65 cSt, and Dow Corning® 200 (1.5 cSt) or Xiameter PMX 1.5 cSt from Dow Corning, as well as from low-molecular phenyl trimethicone with a vapor pressure of approximately 2000 Pa at 20°C, such as is available from GE Bayer Silicones/Momentive under the name Baysilone Fluid PD 5, for example. Preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of at least one linear silicone oil with 2 – 10, preferably 3 – 6, siloxane units, in each case with respect to the total weight of the antiperspirant wax stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of at least one linear silicone oil, selected from octamethyltrisiloxane, decamethyltetrasiloxane and dodecamethylpentasiloxane, as well as mixtures thereof, in each case with respect to the total weight of the antiperspirant wax stick.

Preferred volatile aliphatic hydrocarbons are selected from C_8 - C_{16} isoalkanes, in particular from isononane, isodecane, isoundecane, isododecane, isotridecane, isotetradecane, isopentadecane and isohexadecane, as well as mixtures thereof. Preferred are C_{10} - C_{13} isoalkane mixtures, in particular those with a vapor pressure of approximately 300 to 400 Pa, preferably 360 Pa, at 20°C. This at least one C_8 - C_{16} isoalkane is preferably included in a total amount of 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, in each case with respect to the total antiperspirant wax stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of at least one C_8 - C_{16} isoalkane selected from isodecane, isoundecane, isododecane, isotridecane, as well as mixtures thereof, in each case with respect to the total weight of the stick.

Additional preferred volatile aliphatic hydrocarbons are selected from linear C_9 - C_{17} alkanes, in particular from n-nonane, n-decane, n-undecane, n-dodecane, n-tridecane, n-tetradecane, n-pentadecane, n-hexadecane and n-heptadecane, as well as mixtures thereof. Preferred linear C_9 - C_{17} alkanes are selected from n-nonane, n-undecane, n-tridecane, n-pentadecane and n-heptadecane, as well as mixtures thereof, in particular mixtures of n-undecane and n-tridecane.

Preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of at least one linear C₉-C₁₇ alkane, in each case with respect to the total weight of the stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of n-nonane, n-undecane, n-tridecane, n-pentadecane and n-heptadecane, as well as mixtures thereof, in each case with respect to the total weight of the stick. Additional preferred antiperspirant sticks contain 10 – 50% by weight, preferably 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, of a mixture of n-undecane and n-tridecane, in each case with respect to the total weight of the stick.

Nonvolatile Oils

In addition to the at least one volatile oil, the antiperspirant sticks according to the invention contain at least one nonvolatile oil in a total amount of 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, wherein the total oil content is 30 – 70% by weight and all specifications of % by weight relate to the total weight of the antiperspirant wax stick.

Nonvolatile oils that are especially preferred according to the invention are selected from the addition products of 6 to 20, preferably 9 to 15, propylene oxide units with mono- or polyvalent C₃₋₂₂ alkanols such as glycerin, butanol, butanediol, myristyl alcohol and stearyl alcohol, which may be esterified if desired, for example PPG-14 butyl ether (e.g., Ucon Fluid® AP), PPG-9 butyl ether (e.g., Breox® B25), PPG-10 butanediol and PPG-15 stearyl ether. Especially preferred is PPG-14 butyl ether.

Preferred antiperspirant wax sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one addition product of 6 to 20, preferably 9 to 15, propylene oxide units with a mono- or polyvalent C₃₋₂₂ alkanol, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick. Additional preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of PPG-14 butyl ether or PPG-15 stearyl ether or mixtures of PPG-14 butyl ether and PPG-15 stearyl ether, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick. Especially preferred antiperspirant sticks according to the invention contain 8 – 20% by weight, preferably

10 – 15% by weight, of PPG-14 butyl ether, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick.

Additional nonvolatile oils that are especially preferred according to the invention are selected from the addition products of 1 to 5 propylene oxide units with mono- or polyvalent C₈₋₂₂ alkanols such as octanol, decanol, decanediol, lauryl alcohol, myristyl alcohol and stearyl alcohol, for example PPG-2 myristyl ether and PPG-3 myristyl ether.

Additional nonvolatile oils that are preferred according to the invention are esters of the linear or branched, saturated or unsaturated alkanols with 2 – 30 carbon atoms with linear or branched, saturated or unsaturated fatty acids with 2 – 30 carbon atoms, which may be hydroxylated.

Esters of the linear or branched, saturated alkanols with 2 – 5 carbon atoms with linear or branched, saturated or unsaturated fatty acids with 10 – 18 carbon atoms, which may be hydroxylated, are preferred. Preferred examples of these are isopropyl palmitate, isopropyl stearate, isopropyl myristate, 2-hexyldecyl stearate, 2-hexyldecyl laurate, isononyl isononanoate, 2-ethylhexyl palmitate and 2-ethylhexyl stearate. Likewise preferred are isooctyl stearate, isononyl stearate, isocetyl stearate, isononyl isononanoate, isotridecyl isononanoate, cetearyl isononanoate, 2-ethylhexyl laurate, 2-ethylhexyl isostearate, 2-ethylhexyl cocoate, 2-octyldodecyl palmitate, butyl octanoic acid 2-butyl octanoate, diisotridecyl acetate, n-hexyl laurate, n-decyl oleate, oleyl oleate, oleyl erucate, erucyl oleate, C₁₂-C₁₅ alkyl lactate and di-C₁₂-C₁₃ alkyl malate, as well as the benzoic acid esters of linear or branched C₈₋₂₂ alkanols.

Especially preferred are benzoic acid C₁₂-C₁₅ alkyl esters, which are available as a commercial product as Finsolv® TN (C₁₂-C₁₅ alkyl benzoate), for example, as well as benzoic acid isostearyl esters, available as, e.g., Finsolv® SB, ethylhexyl benzoate, available as, e.g., Finsolv® EB, and benzoic acid octyldodecyl esters, available as, e.g., Finsolv® BOD. Benzoic acid C₁₂-C₁₅ alkyl ester is extremely preferred.

Preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one ester of linear or branched, saturated or unsaturated alkanols with 2 – 30 carbon atoms with linear or branched, saturated or unsaturated fatty acids with 2 – 30 carbon atoms, with respect to the total weight of the stick. Additional preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one ester, with respect to the total weight of the stick, selected from isopropyl palmitate, isopropyl stearate, isopropyl myristate, 2-propylheptyl octanoate (octanoic acid, 4-methyl-2-pentylbutyl ester), 2-

hexyldecyl stearate, 2-hexyldecyl laurate, isononyl isononanoate, 2-ethylhexyl palmitate, 2-ethylhexyl stearate, isooctyl stearate, isononyl stearate, isocetyl stearate, isononyl isononanoate, isotridecyl isononanoate, cetearyl isononanoate, 2-ethylhexyl laurate, 2-ethylhexyl isostearate, 2-ethylhexyl cocoate, 2-octyldodecyl palmitate, butyl octanoic acid 2-butyl octanoate, diisotridecyl acetate, n-hexyl laurate, n-decyl oleate, oleyl oleate, oleyl erucate, erucyl oleate, C₁₂-C₁₅ alkyl lactate, di-C₁₂-C₁₃ alkyl malate, benzoic acid C₁₂-C₁₅ alkyl ester (C₁₂-C₁₅ alkyl benzoate), benzoic acid isostearyl ester, 2-ethylhexyl benzoate and benzoic acid octyldodecyl ester, as well as mixtures of these esters. Especially preferred antiperspirant sticks according to the invention contain 8 – 20% by weight, preferably 10 – 15% by weight, of at least one ester, with respect to the total weight of the stick, selected from isopropyl palmitate, isopropyl stearate, isopropyl myristate, 2-propylheptyl octanoate, 2-ethylhexyl palmitate, 2-ethylhexyl stearate, isononyl isononanoate, cetearyl isononanoate, 2-ethylhexyl laurate, 2-ethylhexyl isostearate, n-hexyl laurate, benzoic acid C₁₂-C₁₅ alkyl ester, as well as mixtures of these esters. A content of benzoic acid C₁₂-C₁₅ alkyl esters of 8 – 20% by weight, preferably 10 – 15% by weight, in each case with respect to the total weight of the stick, is especially preferred according to the invention.

Additional nonvolatile oils that are preferred according to the invention are selected from branched, saturated or unsaturated alkanols with 6 – 30 carbon atoms. These alkanols frequently are also referred to as Guerbet alcohols, since they can be obtained after the Guerbet reaction. Preferred Guerbet alcohols are 2-hexyldecanol, 2-octyldodecanol and 2-ethylhexyl alcohol. Isostearyl alcohol is likewise preferred. Additional preferred nonvolatile oils are selected from mixtures of Guerbet alcohols and Guerbet alcohol esters, for example 2-hexyldecanol and 2-hexyldecyl laurate.

Preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one branched, saturated or unsaturated alkanol with 6 – 30 carbon atoms, with respect to the total weight of the stick. Additional preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of 2-octyldodecanol, with respect to the total weight of the stick.

Additional nonvolatile oils that are preferred according to the invention are selected from the triglycerides of linear or branched, saturated or unsaturated, possibly hydroxylated C₈₋₃₀ fatty acids. The use of natural oils can be especially suitable, e.g., soybean oil, cottonseed oil,

sunflower oil, palm oil, palm kernel oil, linseed oil, almond oil, castor oil, corn oil, canola oil, olive oil, sesame oil, safflower oil, wheat germ oil, peach kernel oil and the liquid components of coconut oil, and the like. Synthetic triglyceride oils are especially preferred, in particular capric/caprylic triglycerides, e.g., the commercial product Myritol® 318 or Myritol® 331 (BASF) with unbranched fatty acid esters, as well as glyceryl triisostearin and glyceryl tri(2-ethylhexanoate) with branched fatty acid esters.

Preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one triglyceride of linear or branched, saturated or unsaturated, possibly hydroxylated C₈₋₃₀ fatty acids, with respect to the total weight of the stick. Additional preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of capric/caprylic triglycerides, with respect to the total weight of the stick.

Additional nonvolatile oils that are especially preferred according to the invention are selected from the dicarboxylic acid esters of linear or branched C₂-C₁₀ alkanols, in particular diisopropyl adipate, di-n-butyl adipate, di-(2-ethylhexyl)adipate, dioctyl adipate, diethyl / di-n-butyl / dioctyl sebacate, diisopropyl sebacate, dioctyl malate, dioctyl maleate, dicaprylyl maleate, diisooctyl succinate, di-2-ethylhexyl succinate and di(2-hexyldecyl) succinate.

Additional nonvolatile oils that are especially preferred according to the invention are selected from the symmetrical, unsymmetrical, or cyclic esters of carbonic acid with C₆-C₂₀ alcohols, for example dicaprylyl carbonate (e.g., Cetiol® CC) or di(2-ethylhexyl) carbonate.

Additional nonvolatile oils that are especially preferred according to the invention are selected from nonvolatile silicone oils. These include, in particular, linear polydimethylsiloxanes with a kinematic viscosity at 25°C of at least up to 2000 cSt, such as are available as, e.g., Dow Corning® 200 or Xiameter PMX from Dow Corning. Additional preferred nonvolatile silicone oils are phenyltrimethicones with a kinematic viscosity at 25°C from at least 10 to 100 cSt, preferably 15 - 30 cSt, as well as cetyl dimethicones.

Additional nonvolatile oils that are especially preferred according to the invention are selected from nonvolatile aliphatic alkanes and alkenes, such as, in particular, 1,3-bis(2-ethylhexyl)cyclohexane, polydecenes, hydrogenated polydecenes, polyisobutenes, hydrogenated polyisobutenes, eicosane, isoeicosane, squalane and squalene.

Additional nonvolatile oils that can be preferred according to the invention are selected from the esters of dimers of unsaturated C₁₂-C₂₂ fatty acids (dimer fatty acids) with monovalent linear, branched, or cyclic C₂-C₁₈ alkanols or with polyvalent linear or branched C₂-C₆ alkanols.

Additional nonvolatile oils that are especially preferred according to the invention are those that have a refractive index n_D^{20} of at least 1.44, preferably from 1.445 to 1.54. Such oils are especially well-suited for masking visible residues of the antiperspirant active agent on the skin or on clothing.

Nonvolatile oils with a refractive index n_D^{20} of at least 1.44 that are preferred according to the invention are listed in Table 1 below.

Table 1: Preferred nonvolatile oils with a refractive index n_D^{20} of at least 1.44

Nonvolatile Oil	n_D^{20}
PPG-2 myristyl ether propionate	1.4408
PPG-3 myristyl ether	1.4438
Lauryl lactate	1.4448
Hydrogenated polydecene (75-85% by weight C30 and 25-15% by weight C40)	1.445
PPG-14 butyl ether	1.4460
Glyceryl tri(2-ethylhexanoate), tri(2-ethylhexanoin)	1.4467
2-ethylhexyl palmitate	1.447
PPG-15 butyl ether	1.4479
2-ethylhexyl stearate	1.448
Dow Corning 2502 (cetyl dimethicone)	1.4488
Cetearyl isononanoate	1.449
Caprylic/capric triglycerides	1.4492
2-hexyldecanol	1.45
PPG-53 butyl ether	1.4512
Isostearyl lactate	1.4519
Cetiol PGL (hexyldecanol, hexyldecyl laurate)	1.4525
Isocetyl palmitate	1.4538
Isocetyl stearate	1.4541
Isostearyl palmitate	1.4546
2-octyldodecanol	1.455
2-hexyldecyl stearate	1.456
Isostearyl alcohol	1.4578

1,3-bis(2-ethylhexyl)cyclohexane	1.4598
Dow Corning 556 Fluid (phenyl trimethicone)	1.460
Isostearyl isostearate	1.4612
Oleyl erucate	1.467
Benzyl laurate	1.4811
C ₁₂ -C ₁₅ alkyl benzoate	1.4820
Isostearyl benzoate	1.4820
2-octyldodecyl benzoate	1.4833
Glycereth-7 benzoate	1.4953

Preferred antiperspirant sticks according to the invention contain 1 – 30% by weight, preferably 5 – 25% by weight, especially preferably 8 – 20% by weight, extremely preferably 10 – 15% by weight, of at least one nonvolatile oil with a refractive index n_D^{20} of at least 1.44, preferably from 1.445 to 1.54, in each case with respect to the total weight of the stick.

Wax Component

The antiperspirant sticks according to the invention contain in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol, 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C are included.

Within the meaning of the present application, wax components that are solid under normal conditions are to be understood as linear and saturated C₁₄-C₂₂ alkanols, natural vegetable and animal waxes as well as their synthetic imitations, such as, e.g., synthetic beeswax, and furthermore the waxes that are explicitly mentioned below as suitable wax components.

Additional components that are solid under normal conditions, for example ethoxylated alkanols such as cetareth-12, are not numbered among the wax components. Alkane acids that are solid under normal conditions likewise are not numbered among the wax components.

As wax components that are solid under normal conditions, the sticks according to the invention contain, in each case with respect to their total weight, in total 12 – 22% by weight, preferably 13 – 20% by weight, especially preferably 14 – 19% by weight, extremely preferably 15 – 18% by weight, of at least one linear and saturated C₁₄-C₂₂ alkanol. Preferred C₁₄-C₂₂ alkanols are selected from myristyl alcohol, cetyl alcohol, stearyl alcohol, arachidyl alcohol and behenyl

alcohol, as well as mixtures thereof. Cetyl alcohol, stearyl alcohol, as well as mixtures thereof, are especially preferred. Stearyl alcohol is extremely preferred. Further preferred is the sole use of stearyl alcohol. Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 12 – 22% by weight of a mixture of two or three linear and saturated C₁₄-C₂₂ alkanols, wherein 0.1 – 3% by weight, with respect to the total stick, of arachidyl alcohol and/or behenyl alcohol are included, and the remaining C₁₄-C₂₂ alkanol consists of stearyl alcohol.

In addition to the above-described C₁₄-C₂₂ alkanols, the sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 5% by weight, preferably 1 – 4% by weight, especially preferably 1.5 – 2% by weight, of at least one wax with a melting point from 65 – 150°C.

Waxes with a melting point from 65 – 150°C that are preferred according to the invention are natural vegetable waxes, in particular candelilla wax, carnauba wax, Japan wax, sugar cane wax, ouricury wax, cork wax, sunflower wax, fruit waxes such as orange waxes, lemon waxes, and grapefruit wax, and animal waxes, in particular beeswax, shellac wax and spermaceti, as well as synthetic imitations of natural waxes, such as, e.g., synthetic beeswax. It can be especially preferred within the meaning of the invention to use hydrogenated or hardened waxes. Chemically modified waxes, in particular the hard waxes such as, e.g., montan wax esters, hydrogenated jojoba waxes and Sasol waxes, are also preferred as a wax component. Numbered among the synthetic waxes that likewise are preferred according to the invention are polyalkylene waxes, in particular polyethylene waxes, paraffin waxes and polyethylene glycols that have only polyethylene glycol units in the molecule and a molar weight of at least 3 million daltons, in particular compounds with the INCI name PEG-90M, C₂₀-C₄₀ dialkyl esters of dimer acids, C₃₀-C₅₀ alkyl beeswax, as well as alkyl and alkylaryl esters of dimer fatty acids.

An especially preferred wax component is selected from at least one ester from a saturated, monovalent C₁₆-C₆₀ alcohol and a saturated C₈-C₃₆ monocarboxylic acid. Also counted among these according to the invention are lactides, the cyclic double esters of α-hydroxycarboxylic acids of the corresponding chain length. Esters from fatty acids and long-chain alcohols have proven especially advantageous for the composition according to the invention, because they confer excellent sensory properties on the antiperspirant preparation and high stability on the stick as a whole. The esters are composed of saturated, branched or unbranched monocarboxylic acids and saturated, branched or unbranched monovalent alcohols. Esters from aromatic carboxylic acids or hydroxycarboxylic acids (e.g., 12-hydroxystearic acid) and

saturated, branched or unbranched alcohols can also be used according to the invention as long as the wax component has a melting point from 65 – 150°C. It is especially preferred to select the wax components from the group of esters from saturated, branched or unbranched alkane carboxylic acids with a chain length of 12 to 24 C atoms and the saturated, branched or unbranched alcohols with a chain length of 16 to 50 C atoms that have a melting point from 65 – 150°C. In particular, C₁₆-C₃₆ alkyl stearates and C₁₈-C₃₈ alkyl hydroxystearoyl stearates, C₂₀-C₄₀ alkyl erucates, cetyl behenate and stearyl behenate can be advantageous as a wax component. An especially preferred embodiment of the invention contains a C₂₀-C₄₀ alkyl stearate as a wax component. This ester is known under the name Kester Wax® K82H or Kester Wax® K80H and is marketed by Koster Keunen Inc.

Additional especially preferred wax components with a melting point from 65 – 150°C are the triglycerides of saturated and possibly hydrogenated C₁₂-C₃₀ fatty acids, such as hardened triglyceride fats (hydrogenated palm oil, hydrogenated coconut oil, hydrogenated castor oil), glyceryl tribehenate (tribehenin) or glyceryl tri(12-hydroxystearate), furthermore synthetic full esters from fatty acids and glycols or polyols with 2 – 6 carbon atoms as long as they have a melting point above 65 – 150°C [sic], for example preferably C₁₈-C₃₆ acid triglycerides. According to the invention, as a wax component, hydrogenated castor oil, available as a commercial product as, e.g., Cutina® HR, which is especially preferably included in an amount from 1 – 4% by weight, especially preferably 1.5 – 2% by weight, in each case with respect to the total weight of the stick [sic].

Preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol, selected from cetyl alcohol, stearyl alcohol, arachidyl alcohol, and behenyl alcohol, as well as mixtures thereof, in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a linear and saturated C₁₄-C₂₂ alkanol that is selected only from stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a mixture of two or three linear and saturated C₁₄-C₂₂ alkanols is included, wherein 0.1 – 3% by weight, with respect to the total stick, arachidyl alcohol and/or behenyl alcohol are included, and the remaining C₁₄-C₂₂ alkanol consists of stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

Preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol, selected from cetyl alcohol, stearyl alcohol, arachidyl alcohol and behenyl alcohol, as well as mixtures thereof, in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a linear and saturated C₁₄-C₂₂ alkanol that is selected only from stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a mixture of two or three linear and saturated C₁₄-C₂₂ alkanols is included, wherein 0.1 – 3% by weight, with respect to the total stick, arachidyl alcohol and/or behenyl alcohol are included, and the remaining C₁₄-C₂₂ alkanol consists of stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, are included.

In addition to the above-described C₁₄-C₂₂ alkanols, and the waxes with a melting point from 65 – 150°C, the sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 8% by weight, preferably 1 – 6% by weight, especially preferably 3 – 4% by weight, of at least one wax with a melting point from 25 to < 50°C.

Preferred waxes with a melting point in the range from 25 to < 50°C are selected from coconut fatty acid glycerol mono-, di-, and triesters, which may be partially hardened or fully hardened, mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter) and esters of saturated, monovalent C₈-C₁₈ alcohols with saturated C₁₂-C₁₈ monocarboxylic acids, as well as mixtures of these substances. These wax components that melt in the range from 25 to < 50°C permit a consistency optimization of the product and a minimization of the visual residues on the skin. Especially preferred are coconut fatty acid glycerides, in particular those with the INCI name cocoglycerides, in particular the commercial product Novata® (e.g., BASF/Cognis), especially preferred a mixture of C₁₂-C₁₈ mono-, di- and triglycerides that melts in the range from 30 – 32°C, such as is available under the trade name Novata® AB from BASF/Cognis, for example, as well as hardened and partially hardened coconut fatty acid glycerides, in particular those with the INCI name hydrogenated cocoglycerides, in particular available as products of the Softisan line (Sasol Germany GmbH) with the INCI name hydrogenated cocoglycerides, in particular Softisan 100, 133, 134, 138, 142. Additional preferred esters of saturated, monovalent C₈-C₁₈ alcohols with saturated C₁₂-C₁₈ monocarboxylic acids are stearyl laurate, cetearyl stearate (e.g., Crodamol® CSS), cetyl palmitate (e.g., Cutina® CP), and myristyl myristate (e.g., Cetiol® MM). Especially preferred waxes with a melting point in the range from 25 to < 50°C are selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter), stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof.

Preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol, selected from cetyl alcohol, stearyl alcohol, arachidyl alcohol and behenyl alcohol, as well as mixtures thereof, in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter), stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a linear and saturated C₁₄-C₂₂ alkanol that is selected only from stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter), stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof, are included.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 15 – 25% by weight of at least one wax component that is solid under normal conditions, wherein in total 12 – 22% by weight of a mixture of two or three linear and saturated C₁₄-C₂₂ alkanols is included, wherein 0.1 – 3% by weight, with respect to the total stick, arachidyl alcohol and/or behenyl alcohol are included, and the remaining C₁₄-C₂₂ alkanol consists of stearyl alcohol, furthermore in total 0.5 – 5% by weight of at least one wax with a melting point from 65 – 150°C, selected from hydrogenated castor oil, and 0.5 – 8% by weight of at least one wax with a melting point from 25 to < 50°C, selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter), stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof, are included.

Filler

In order to improve the stick consistency and the sensory properties, the sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 6% by weight, preferably 1 – 5% by weight, especially preferably 2 – 4% by weight, extremely preferably 3 – 3.5% by weight, of at least one water-insoluble particulate filler. Water-insoluble particulate fillers that are preferred according to the invention are selected from silicates, primarily sheet silicates, and in particular among these montmorillonite, kaolinite, illite, beidellite, nontronite, saponite, hectorite, bentonite, smectite and talc, furthermore silicon dioxide, silicic acids, for example Aerosil® types, polyalkylsesquioxane particles (in particular Aerosil® R972 and Aerosil® 200V from Degussa), silica gels, silica, cellulose powders, starches, modified starches

(e.g., from corn, rice, potatoes) and starch derivatives, which may be pregelatinized, kaolin, magnesium aluminum silicates, zeolites, perlite (volcanic glass), expanded perlite, boron nitride, glass powders, polymer powders, in particular from polyolefins, polycarbonates, polyurethanes, polyamides, e.g., nylon, polyesters, polystyrenes, polyacrylates, (meth)acrylate or (meth)acrylate-vinylidene copolymers, which may be cross-linked, or silicones, as well as mixtures of these substances. Especially preferred water-insoluble particulate fillers are selected from talc, silicon dioxide, silicic acids, for example Aerosil® types, polyalkylsesquisiloxane particles (in particular Aerosil® R972 and Aerosil® 200V from Degussa), silica gels, silica, perlite, expanded perlite, as well as mixtures of these substances.

Extremely preferred sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 6% by weight, preferably 1 – 5% by weight, especially preferably 2 – 4% by weight, extremely preferably 3 – 3.5% by weight, of at least one water-insoluble particulate filler, selected from talc, silicon dioxide, silicic acids, polyalkylsesquisiloxane particles, silica gel, silica, as well as mixtures of these substances. Additional extremely preferred sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 6% by weight, preferably 1 – 5% by weight, especially preferably 2 – 4% by weight, extremely preferably 3 – 3.5% by weight, of at least one water-insoluble particulate filler, selected from talc. Additional extremely preferred sticks according to the invention contain, in each case with respect to their total weight, in total 0.5 – 6% by weight, preferably 1 – 5% by weight, especially preferably 2 – 4% by weight, extremely preferably 3 – 3.5% by weight, of talc as the sole water-insoluble particulate filler.

Fatty Alcohol Polyglycol Ethers

The sticks according to the invention contain, in each case with respect to their total weight, in total 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier that is selected from ethoxylates of C₁₀-C₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule, preferably with 10 – 14 ethylene oxide units, preferably with 12 ethylene oxide units in the molecule. Surprisingly, it was found that such an oil-in-water emulsifier in the claimed ranges of amounts prevents moisture, in particular atmospheric humidity, skin moisture, and sweat, from causing a hardening, embrittlement, or other structural changes of the stick surface. The oil-in-water emulsifier according to the invention in the claimed ranges of amounts achieves the result that the delivery properties, in particular the melting behavior and gliding ability of the stick when applied to the skin, but also

the release of the antiperspirant active agent and thus the antiperspirant performance, retain long-term stability. Preferred oil-in-water emulsifiers that are ethoxylates of C₁₀-C₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule are selected from deceth-8, deceth-10, deceth-12, deceth-14, deceth-16, undeceth-8, undeceth-10, undeceth-12, undeceth-14, undeceth-16, laureth-8, laureth-9, laureth-10, laureth-11, laureth-12, laureth-14, laureth-16, trideceth-8, trideceth-9, trideceth-10, trideceth-12, trideceth-14, trideceth-16, myreth-8, myreth-10, myreth-12, myreth-14, myreth-16, ceteth-8, ceteth-10, ceteth-12, ceteth-14, ceteth-15, ceteth-16, steareth-10, steareth-12, steareth-14, steareth-16, cetareth-8, cetareth-10, cetareth-12, cetareth-14, cetareth-16, beheneth-8, beheneth-10, beheneth-12, beheneth-14, beheneth-16, as well as mixtures thereof. Ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, myreth-10, myreth-12, myreth-14, trideceth-9, trideceth-10, trideceth-12, laureth-10, laureth-11, laureth-12, as well as mixtures thereof, are especially preferred. Extremely preferred are ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, as well as mixtures thereof. The mixture of ceteth-12 and steareth-12 that is also referred to as cetareth-12 is especially preferred.

Preferred sticks according to the invention contain, in each case with respect to their total weight, in total 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier that is selected from ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, as well as mixtures thereof.

Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier that is selected from mixtures of ceteth-12 and steareth-12. Additional preferred sticks according to the invention contain, in each case with respect to their total weight, in total 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier that is selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included.

Listed in Table 1a below are antiperspirant stick compositions No. 1 to No. 52, which are preferred and especially preferred according to the invention. All amounts are specified in % by weight with respect to the total weight of the stick composition.

	No. 1	No. 2	No. 3	No. 4
antiperspirant active agent (USP)	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) at least one volatile oil, selected from volatile cyclic silicones, volatile linear silicones, and volatile aliphatic hydrocarbons, as well as mixtures thereof	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) at least one linear and saturated C ₁₄ -C ₂₂ alkanol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) at least one wax with a melting point from 65 – 150°C	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
at least one oil-in-water emulsifier, selected from ethoxylates of C ₁₀ -C ₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 5	No. 6	No. 7	No. 8
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) at least one volatile oil, selected from volatile cyclic silicones, volatile linear silicones, and	10 - 50	15 - 40	20 - 35	25 - 30

volatile aliphatic hydrocarbons, as well as mixtures thereof				
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) at least one linear and saturated C ₁₄ -C ₂₂ alkanol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) at least one wax with a melting point from 65 – 150°C	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
at least one oil-in-water emulsifier, selected from ethoxylates of C ₁₀ -C ₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 9	No. 10	No. 11	No. 12
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) at least one volatile oil, selected from volatile cyclic silicones, volatile linear silicones, and volatile aliphatic hydrocarbons, as well as mixtures thereof	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) at least one linear and saturated C ₁₄ -C ₂₂ alkanol	12 - 22	13 - 20	14 - 19	15 - 18

d)ii) at least one wax with a melting point from 65 – 150°C	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
at least one oil-in-water emulsifier, selected from ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, as well as mixtures thereof	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 13	No. 14	No. 15	No. 16
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) at least one linear and saturated C ₁₄ -C ₂₂ alkanol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) at least one wax with a melting point from 65 – 150°C	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
at least one oil-in-water emulsifier, selected from ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, as well as mixtures thereof	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 17	No. 18	No. 19	No. 20
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
at least one oil-in-water emulsifier, selected from ceteth-10, ceteth-12, ceteth-14, steareth-10, steareth-12, steareth-14, as well as mixtures thereof	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 21	No. 22	No. 23	No. 24
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18

d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with a melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 25	No. 26	No. 27	No. 28
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil, selected from PPG-14 butyl ether	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5
oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 29	No. 30	No. 31	No. 32
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3

in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil, selected from PPG-14 butyl ether	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5
oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 33	No. 34	No. 35	No. 36
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	20 - 35
c)ii) at least one nonvolatile oil, selected from PPG-14 butyl ether	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5

oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3
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	No. 37	No. 38	No. 39	No. 40
aluminum zirconium tetrachlorohydrex glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	20 - 35
c)ii) at least one nonvolatile oil, selected from PPG-14 butyl ether	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5
oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 41	No. 42	No. 43	No. 44
aluminum zirconium tetrachlorohydrex glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	20 - 35
c)ii) at least one nonvolatile oil, selected from PPG-14 butyl ether	1 - 30	5 - 25	8 - 20	10 - 15

d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2
d)iii) at least one wax with melting point from 25 to < 50°C, selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, <i>Butyrospermum Parkii</i> , stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5
an oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 45	No. 46	No. 47	No. 48
aluminum chlorohydrate or aluminum zirconium chlorohydrate, in particular aluminum zirconium tetrachlorohydrate glycine complex	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	20 - 35
c)ii) at least one nonvolatile oil, selected from benzoic acid C ₁₂ -C ₁₅ alkyl esters	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2

d)iii) at least one wax with melting point from 25 to < 50°C, selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, <i>Butyrospermum Parkii</i> , stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof	0.5 - 8	1 - 6	3 - 4	3 - 4
talc	0.5 - 6	1 - 5	2 - 4	3 - 3.5
an oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

	No. 49	No. 50	No. 51	No. 52
an astringent aluminum salt having a number average particle size of 1 – 50 µm, preferably 3 – 20 µm, especially preferably 5 – 10 µm, selected from aluminum chlorohydrate, aluminum sesquichlorohydrate, aluminum zirconium tetrachlorohydrate glycine complexes, aluminum zirconium pentachlorohydrate glycine complexes and aluminum zirconium octachlorohydrate glycine complexes, as well as mixtures thereof	3 - 27	5 - 22	10 - 20	10 - 20
free water	0 - 8	0.1 - 6	0.2 - 4	0.5 - 3
in total at least one cosmetic oil c) that is liquid under normal conditions	30 - 70	30 - 70	30 - 70	30 - 70
c)i) cyclomethicones	10 - 50	15 - 40	20 - 35	25 - 30
c)ii) at least one nonvolatile oil	1 - 30	5 - 25	8 - 20	10 - 15
d) at least one wax component that is solid under normal conditions, therein	15 - 25	15 - 25	15 - 25	15 - 25
d)i) stearyl alcohol	12 - 22	13 - 20	14 - 19	15 - 18
d)ii) hydrogenated castor oil	0.5 - 5	1 - 4	1.5 - 2	1.5 - 2

d)iii) at least one wax with melting point from 25 to < 50°C	0.5 - 8	1 - 6	3 - 4	3 - 4
at least one water-insoluble particulate filler	0.5 - 6	1 - 5	2 - 4	3 - 3.5
oil-in-water emulsifier, selected from mixtures of ceteth-12 and steareth-12	1 - 4	2 - 3.5	2.5 - 3	2.5 - 3

The sticks according to the invention preferably contain at least one fragrance, especially preferably in a total amount of 0.1 – 5% by weight, extremely preferably 0.3 – 2% by weight, in each case with respect to the total weight of the stick.

In order to further improve the perspiration-inhibiting and odor-reducing effect of the antiperspirant sticks according to the invention, in a preferred embodiment the sticks contain at least one deodorant active agent.

Deodorant active agents that are preferred according to the invention are germ-inhibiting agents, prebiotically active components, as well as enzyme inhibitors, or, especially preferred, combinations of the said active agents.

Germ-inhibiting or antimicrobial active agents are understood according to the invention as those active agents that reduce the number of microbes on the skin involved in odor formation or inhibit their growth. These microbes include various species from the group of staphylococci, the group of corynebacteria, anaerococci and micrococci, among others.

Preferred according to the invention as germ-inhibiting or antimicrobial active agents are, in particular, organohalogen compounds and organohalogenides, quaternary ammonium compounds, a number of plant extracts, and zinc compounds. These include, among others, triclosan, chlorhexidine and chlorhexidine gluconate, 3,4,4'-trichlorocarbanilide, bromochlorophene, dichlorophene, chlorothymol, chloroxylenol, hexachlorophene, dichloro-m-xyleneol, dequalinium chloride, domiphen bromide, ammonium phenolsulfonate, benzalkonium halides, benzalkonium cetyl phosphate, benzalkonium saccharinates, benzethonium chloride, cetylpyridinium chloride, laurylpyridinium chloride, lauryl isoquinolinium bromide, methylbenzethonium chloride. It is furthermore possible to use phenol, phenoxyethanol, disodium dihydroxyethyl sulfosuccinyl undecylenate, sodium bicarbonate, zinc lactate, sodium phenolsulfonate and zinc phenolsulfonate, ketoglutaric acid, terpene alcohols such as, e.g., farnesol, chlorophyllin copper complexes, α -monoalkyl glycerol ethers with a branched or linear, saturated or unsaturated, possibly hydroxylated C₆ – C₂₂ alkyl group, especially preferably α -(2-ethylhexyl)glycerin ether, available commercially as Sensiva® SC 50 (e.g., Schülke & Mayr),

carboxylic acid esters of mono-, di- and triglycerol (e.g. glycerol monolaurate, diglycerol monocaprate), lantibiotics, as well as plant extracts (e.g., green tea and constituents of linden blossom oil).

Additional preferred deodorant active agents are selected from so-called prebiotically active components, which should be understood according to the invention to be those components that inhibit only or at least predominantly the odor-forming microbes of the skin microflora, but not the desirable, which is to say non-odor-forming, microbes, which belong to a healthy skin microflora. Explicitly included here are the active agents that are disclosed as prebiotically active in DE 10333245 and DE 102004011968; these comprise conifer extracts, in particular from the group of Pinaceae, and plant extracts from the group of Sapindaceae, Araliaceae, Lamiaceae and Saxifragaceae, in particular extracts from *Picea spp.*, *Paullinia sp.*, *Panax sp.*, *Lamium album* or *Ribes nigrum*, as well as mixtures of these substances.

Additional preferred deodorant active agents are selected from the germ-inhibiting perfume oils and the Deosafe® perfume oils, which are available from the Symrise company, formerly Haarmann & Reimer.

Additional preferred deodorant active agents are selected from silver salts, in particular silver citrate, silver dihydrogen citrate, silver lactate and silver sulfate, soluble complex salts of silver, colloidal silver and silver zeolites.

The enzyme inhibitors include substances that inhibit the enzymes responsible for the decomposition of sweat, in particular arylsulfatase, β -glucuronidase, aminoacylase, esterases, lipases and/or lipoxigenase, for example esters of trialkyl citric acid, in particular triethyl citrate or zinc glycinate.

Preferred antiperspirant sticks according to the invention are characterized in that the at least one deodorant active agent is selected from arylsulfatase inhibitors, beta-glucuronidase inhibitors, aminoacylase inhibitors, esterase inhibitors, lipase inhibitors and lipoxigenase inhibitors, α -monoalkyl glycerol ethers with a branched or linear, saturated or unsaturated, possibly hydroxylated C₆ – C₂₂ alkyl group, in particular alpha-(2-ethylhexyl)glycerin ether, phenoxyethanol, germ-inhibiting perfume oils, cyclodextrins, prebiotically active components, esters of trialkyl citric acid, in particular triethyl citrate, active agents that reduce the number of, or inhibit the growth of, skin microbes involved in odor formation from the group of staphylococci, corynebacteria, anaerococci and micrococci, zinc compounds, in particular zinc phenolsulfonate and zinc ricinoleate, organohalogen compounds, in particular triclosan,

chlorhexidine, chlorhexidine gluconate and benzalkonium halides, quaternary ammonium compounds, in particular cetylpyridinium chloride, odor absorbers, in particular silicates and zeolites, sodium bicarbonate, silver salts, silver zeolites, as well as mixtures of the aforementioned substances.

Additional preferred antiperspirant sticks according to the invention contain, in each case with respect to their total weight, at least one deodorant active agent in a total amount of 0.1 – 10% by weight, preferably 0.2 - 7% by weight, especially preferably 0.3 – 5% by weight, and extremely preferably 0.4 – 1.0% by weight.

Another preferred embodiment of the invention is characterized in that 0.01 – 5% by weight, preferably 0.05 - 2% by weight, especially preferably 0.1 – 1% by weight, in each case with respect to the total composition according to the invention, of a mineral matter mixture obtained from a natural mineral water, a thermal water or a natural curative water is included.

Surprisingly, it was found that such mineral matter mixtures can further improve the perspiration-inhibiting performance of the compositions according to the invention. Moreover, such mineral matter mixtures can have a beneficial effect on the skin-friendliness of the compositions according to the invention. The designation “natural mineral water” conforms to the definition from the German Mineral and Table Water Ordinance (MinTafWV, § 2). The solid residue of the said waters is considered to be a mineral matter mixture. Mineral matter mixtures that are especially preferred according to the invention are derived from thermal water from La Toja (Spain), Bad Blumau, Bad Radkersburg, Aachen, Wiesbaden (all in Germany), Karlovy Vary (Czech Republic), La Bourboule, Enghien-les-Bains, Allevard-les-Bains, Digne, Neyrac-les-Bains, Lons-le-Saunier, Eaux-Bonnes, Rochefort, Les Fumades, Saint-Christau, Uriage-les-Bains, La Roche-Posay (all in France) or natural mineral waters or curative waters from Evian, Volvic, Vichy, Avène, Vittel (all in France), Gerolstein or Fachingen (Germany).

Surprisingly, it was found that the antiperspirant sticks according to the invention allow for up to 8% by weight, with respect to the total weight of the stick, of free water to be incorporated without sacrificing storage stability. This opens up the possibility of incorporating a corresponding amount of hydrophilic active agents in the form of aqueous solutions or suspensions. In one preferred embodiment, at least one deodorant active agent is included as an aqueous solution or as aqueous suspension, wherein the amount used of the solution is selected such that the antiperspirant stick contains a maximum of 8% by weight, with respect to its total weight, of free water. Especially preferred antiperspirant sticks according to the invention contain, with respect to their total weight, 0.05 – 8% by weight, preferably 0.1 – 6% by

weight, especially preferably 0.2 – 4% by weight, extremely preferably 0.3 – 2% by weight, of an aqueous solution of at least one silver salt. In another preferred embodiment, at least one vitamin or a provitamin is included as an aqueous solution or as an aqueous suspension, wherein the amount used of the solution is selected such that the antiperspirant stick contains a maximum of 8% by weight, with respect to its total weight, of free water. This teaching can be applied analogously to other hydrophilic active agents as well, for example to active agents that inhibit hair growth, amino acids, proteins and other active agents.

Furthermore, preservatives, coloring agents, antioxidants, in particular tocopherols and tocopheryl esters, complexing agents and other additives may be included.

A further object of the present application is a method for nontherapeutic sweat reduction that is characterized in that a stick composition according to the invention or a stick composition that is preferred according to the invention is applied to the skin, in particular underarm skin. With respect to additional preferred embodiments of the method according to the invention, the remarks about the stick compositions according to the invention apply *mutatis mutandis*.

A further object of the present application is the use of a stick composition according to the invention or a stick composition that is preferred according to the invention for nontherapeutic sweat reduction. With respect to additional preferred embodiments of the use according to the invention, the remarks about the stick compositions according to the invention apply *mutatis mutandis*.

The formulation examples below are intended to explain the subject matter of the invention without restricting it hereto.

The following antiperspirant sticks were produced (all amounts are specified in % by weight).

Example No. 3 is according to the invention.

Table 2: Test Formulations

	No. 1 (comparison) no oil-in- water emulsifier	No. 2 (comparison) 3% PEG-40 stearate	No. 3	No. 4 (compar- ison)	No. 5 (compar- ison)	No. 6 (compar- ison)
Cyclomethicones (min. 95% by weight cyclopentasiloxane)	35.2	32.2	32.2	30.2	40.7	54.7
Hydrogenated castor oil	1.5	1.5	1.5	1.5	2.0	2.0
Stearyl alcohol	18	18	18	18	12	12
Novata AB**	4	4	4	4	-	-
PPG-14 butyl ether	15.3	15.3	15.3	15.3	-	-
PEG-40 stearate	-	3	-	-	-	-
Al-Zr-tetrachloro- hydrex gly* (USP)	17.6	17.6	17.6	17.6	-	-
Water of crystallization and (if present) glycine	4.4	4.4	4.4	4.4	6	3
Talc	3	3	3	3	3	3
Perfume	1	1	1	1	0.3	1.3
Eumulgin B1***	-	-	3	5	5	5
Cetyl alcohol	-	-	-	-	5	5
Aerosil R 972****	-	-	-	-	2	2
Aluminum chlorohydrate (USP)	-	-	-	-	24	12

* number average particle size 3 – 20 µm

** INCI: Cocoglycerides, melting point 30 – 32°C

*** INCI: Ceteareth-12

*** [sic] INCI: Silica Dimethyl Silylate

The sticks were subjected to different storage conditions and subsequently examined. The examination results are presented in the following tables.

Table 3: Stick properties after one week of storage at 20°C

Stick No.	Oil outside	Oil on the body	Oil-binding property	†	Stick body after cooling
1 (Comp)	No	Yes - slight	Moderate	1.5	Slightly yellowish; fine, smooth surface
2 (Comp)	No	Yes - slight	Satisfactory	2.0	Slightly yellowish; fine, smooth surface
3 (Inv)	Yes - moderate	Yes - moderate	Slight	2.5	Satisfactory; slight oil separation with pressure
4 (Comp)	Yes - heavy	No	Slight	2.3	Satisfactory; slight oil separation with pressure, gritty, rough
5 (Comp)	No	No	Satisfactory	1.5	Satisfactory; slight oil separation with pressure, gritty, rough
6 (Comp)	No	No	Moderate	2.5	Satisfactory; slight oil separation with pressure, creamy

† Overall score for firmness, melting behavior and delivery properties

The overall score for firmness, melting behavior and delivery properties is determined by a group of trained test personnel using the criteria given in Table 4. Optimum sticks received a score of 2. A change in this assessment toward 1 or 0 means an increasing hardness in the stick surface, while a change in this assessment toward 3 means that the stick surface becomes softer.

Table 4: Evaluation of melting behavior and delivery properties

Overall Score	Melting	Delivery
0	No melting, no film formation	No delivery, rough glide
1	Slow melting, too hard, slight film	Slight delivery, slight glide
2	Good melting, formation of a silky film	Good delivery, easy glide
3	Very easy melting, too soft	Too much delivery, too creamy, smears

Table 5: Stick properties after 1 day of storage at 40°C followed by 2 days at 45°C

Stick No.	Oil outside	Oil on the body	Oil-binding property	†	Stick body after cooling
1 (Comp)	Yes - heavy	Yes - moderate	Very poor	1.5	Slightly yellowish; medium fine, crystalline surface
2 (Comp)	Yes - moderate	Yes - moderate	Poor	1.5	Slightly yellowish; slightly fine, crystalline surface
3 (Inv)	No	No	Moderate	2.3	Oil separation with pressure
4 (Comp)	Yes - heavy	Yes - moderate	Satisfactory	2.5	Slight oil separation with pressure, gritty
5 (Comp)	No	No	Satisfactory	1.3	Hard, rough, smears
6 (Comp)	Yes - moderate	Yes - slight	Satisfactory	2.8	Too soft, smears

The test results of examinations of the test sticks for their long-term stability to moisture are presented in Table 6 below. The sensory analysis of unused sticks that had been stored for 1 week at 20°C (= aging period) after production was compared with the sensory analysis of equally aged sticks for which 20 application cycles had been simulated (simulation of the transfer of moisture and sweat to the stick).

Table 6: Long-term stability to moisture

	Unused stick after aging period		Aged stick after 20 simulated application cycles	
Stick No.	†	Comments	†	Comments
1 (Comp)	2.3	Satisfactory; oil separation with pressure	1.3	Hard surface with pinholing, oil separation with pressure
2 (Comp)	1.8	Satisfactory; oil separation with pressure, gritty	1.0	Hard surface, oil separation with pressure, gritty, rough
3 (Inv)	2.0	Satisfactory; slight oil separation with pressure, creamy	1.8	Oil separation with pressure
4 (Comp)	2.0	Satisfactory; slight oil separation with pressure, creamy	1.3	Hard surface with pinholing, oil separation with pressure
5 (Comp)	1.5	Slight oil separation with pressure, rough	0.5	Very hard and rough stick
6 (Comp)	2.3	Slight oil separation with pressure, creamy, very soft	1.3	Oil separation with pressure, rough surface

All comparison examples exhibited severe impairment and worsening of the stick surface under the influence of moisture. Only the stick surface of the stick according to the invention exhibited satisfactory long-term stability.

The test results of examinations of the test sticks for changes in the hardness of the stick surface under the influence of moisture are presented in Table 7 below. The hardness of the stick surface of unused sticks that had been stored for 1 week at 20°C (= aging period) after production was compared with the hardness of the stick surface of equally aged sticks for which 20 application cycles had been simulated (simulation of the transfer of moisture and sweat to the stick). The hardness measurement was carried out by puncturing the surface with a standardized steel cone at 45°. The weight with which the cone was loaded in order to indent the stick surface to the standard penetration depth of 5 mm was recorded. The TEXTURE ANALYZER-1545 from Stable Micro Systems was used. The feed rate was 2.0 mm/s, trigger value 1.0 g, PPS = 200.0, penetration depth 5 mm, product temperature 23.0°C, atmospheric relative humidity 30%.

Table 7: Change in the hardness of the stick surface under the influence of moisture

	Unused stick after aging period	Aged stick after 20 simulated application cycles
Stick No.	Weight for standardized cone puncture of the stick surface [g] (Average value from 5 measurements)	Weight for standardized cone puncture of the stick surface [g] (Average value from 5 measurements)
1 (Comp)	456 ± 10	440 ± 14
2 (Comp)	645 ± 36	664 ± 35
3 (Inv)	463 ± 27	448 ± 39
4 (Comp)	572 ± 27	458 ± 8
5 (Comp)	1107 ± 52	967 ± 15
6 (Comp)	471 ± 26	432 ± 22

The comparison examples 2 and 5 already had too great a hardness directly after manufacture.

The softening of the stick surface measured for comparison example 4 was actually attributed to an embrittlement of the stick surface. The stick surface was crumbly, which caused a low weight value in the penetration measurement. The measurement on comparison example 6 was in the range of example 3 according to the invention, but comparison example 6 did not have a satisfactory overall score for sensory properties, see Table 6.

Claims

1. Antiperspirant wax stick, containing
 - a) in total 3 – 27% by weight, with respect to the total weight of the anhydrous active substance (USP) in the total composition, of antiperspirant active agent(s),
 - b) 0 to maximum 8% by weight of free water,
 - c) in total 30 – 70% by weight of at least one cosmetic oil that is liquid under normal conditions, therein
 - ci) 10 – 50% by weight of at least one volatile oil that is selected from volatile cyclic silicones, volatile linear silicones and volatile aliphatic hydrocarbons, as well as mixtures thereof, and
 - cii) in addition to the at least one volatile oil, in total 1 – 30% by weight of at least one nonvolatile oil,
 - d) in total 15 – 25% by weight of at least one wax component that is solid under normal conditions,
 - d)i.[sic]therein 12 – 22% by weight of at least one linear and saturated C₁₄-C₂₂ alkanol,
 - d)ii. 0.5 – 5% by weight of at least one wax with a melting point in the range from 65 – 150°C,
 - d)iii. 0.5 – 8% by weight of at least one wax with a melting point in the range from 25 to < 50°C,
 - e) 0.5 – 6% by weight of at least one water-insoluble particulate filler,
 - f) 1 – 4% by weight, preferably 2 – 3.5% by weight, especially preferably 2.5 – 3% by weight, of at least one oil-in-water emulsifier, selected from ethoxylates of C₁₀-C₂₂ alkanols with 8 to 16 ethylene oxide units in the molecule, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick unless otherwise noted.
2. Antiperspirant wax stick according to claim 1, characterized in that the at least one volatile oil is included in a total amount of 15 – 40% by weight, especially preferably 20 – 35% by weight, extremely preferably 25 – 30% by weight, in each case with respect to the total weight of the stick.

3. Antiperspirant wax stick according to claim 1 or 2, characterized in that the at least one volatile oil is selected from cyclopentasiloxane.
4. Antiperspirant wax stick according to claim 1, 2 or 3, characterized in that the at least one nonvolatile oil is included in a total amount of 5 – 25% by weight, preferably 8 – 20% by weight, especially preferably 10 – 15% by weight, wherein all specifications of % by weight relate to the total weight of the antiperspirant wax stick.
5. Antiperspirant wax stick according to claim 1, 2, 3 or 4, characterized in that the at least one nonvolatile oil has a refractive index n_D^{20} of at least 1.44, preferably from 1.445 to 1.54.
6. Antiperspirant wax stick according to claim 1, 2, 3, 4 or 5, characterized in that the at least one nonvolatile oil is selected from at least one addition product of 6 to 20, preferably 9 to 15, propylene oxide units with a mono- or polyvalent C_{3-22} alkanol, especially preferably is selected from PPG-14 butyl ether.
7. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5 or 6, characterized in that the at least one nonvolatile oil is included in a total amount of 5 – 25% by weight, preferably 8 – 20% by weight, especially preferably 10 – 15% by weight, in each case with respect to the total weight of the stick.
8. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6 or 7, characterized in that the at least one linear and saturated $C_{14}-C_{22}$ alkanol is selected from stearyl alcohol alone.
9. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7 or 8, characterized in that the at least one oil-in-water emulsifier, which represents an ethoxylate of $C_{10}-C_{22}$ alkanols with 8 to 16 ethylene oxide units in the molecule, is selected from mixtures of ceteth-12 and steareth-12.
10. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8 or 9, characterized in that the at least one oil-in-water emulsifier, which represents an ethoxylate of $C_{10}-C_{22}$ alkanols with 8 to 16 ethylene oxide units in the molecule, is selected from mixtures of ceteth-12 and steareth-12, wherein no additional oil-in-water emulsifiers are included.

11. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, characterized in that the antiperspirant active agent is selected from aluminum chlorohydrate and aluminum zirconium chlorohydrates, in particular from aluminum zirconium tetrachlorohydrate glycine complexes.
12. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11, characterized in that the at least one wax with a melting point from 25 to < 50°C is selected from mixtures of coconut fatty acid glycerol mono-, di- and triesters, mixtures of partially hardened or fully hardened coconut fatty acid glycerol mono-, di- and triesters, partially hardened or fully hardened vegetable oils, *Butyrospermum Parkii* (shea butter), stearyl laurate, cetearyl stearate, cetyl palmitate and myristyl myristate, as well as mixtures thereof.
13. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12, characterized in that, in each case with respect to its total weight, in total 1 – 6% by weight, preferably 3 – 4% by weight, of at least one wax with a melting point from 25 to < 50°C is included.
14. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or 13, characterized in that the at least one nonvolatile oil is selected from benzoic acid C₁₂-C₁₅ alkyl esters.
15. Antiperspirant wax stick according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14, characterized in that, in each case with respect to its total weight, in total 1 – 4% by weight, preferably 1.5 – 2% by weight, of at least one wax with a melting point from 65 – 150°C is included that especially preferably is selected from hydrogenated castor oil.



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