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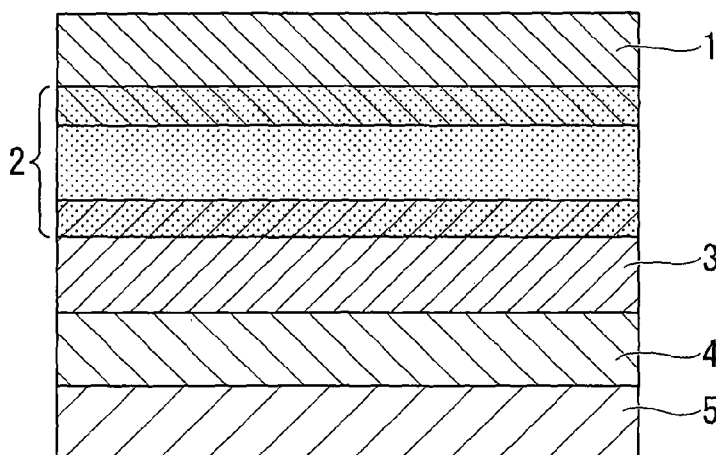
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(54) Title: MULTILAYERED SHEET FOR ABSORBING SWEAT

FIG. 1



(57) Abstract: The present invention relates to a multilayered sheet for absorbing sweat, comprising, at least: a porous hydrophilic layer having at least one open surface; a water-absorbable layer; a substrate layer; and at least one powdery deodorant agent and/or at least one powdery antiperspirant agent, wherein the open surface of the porous hydrophilic layer is capable of absorbing sweat and free from the powdery deodorant agent or the powdery antiperspirant agent. The present invention can avoid or reduce irritation by the deodorant agent and/or antiperspirant agent to the skin, in particular the underarm skin, and can be used for relatively a long time.



DESCRIPTION

MULTILAYERED SHEET FOR ABSORBING SWEAT

5 Technical Field

The present invention relates to a multilayered sheet for absorbing sweat, in particular suitable for absorbing sweat on skin, preferably the skin of an underarm.

10 Background Art

People tend to sweat from their underarms, and therefore, a cloth contacting an underarm can easily have stains due to the sweat from the underarm. Therefore, for example, a deodorant product or an antiperspirant product in the form of a stick, a spray or a lotion has been used. A pad for absorbing sweat from underarm has also been used by attaching the pad to the underarm or the inside of a cloth contacting the underarm, as shown in USP 6138276, US-A-2003-167550, US-A-2007-67888, US-A-2008-52802, and US-A-2008-86791.

In general, a conventional product such as a roll-on type product, the active agents contact the underarm, even when they do not need to work. The active agents have concerns to some or large extent about safety for human skin. Thus, the active agents irritate skin, in particular underarm, and can cause pruritus or itch. Accordingly, it is difficult to increase the amount of the active agents in the conventional product. In addition, the active agents which directly contact skin can be easily lost even when the skin does not sweat. Therefore, the conventional products cannot be used for a long period of time.

Disclosure of Invention

An objective of the present invention is to provide a multilayered sheet which can be used as a pad for absorbing sweat from skin, in particular, from underarm, reducing the risk of active agents in the pad causing irritation on the skin.

Another objective of the present invention is to provide a multilayered sheet which can be used as a pad for absorbing sweat from skin, in particular, from underarm, which can contain a relatively large amount of active agents, without the risk of the active agents causing irritation on the skin, and therefore, can be used for a long time.

The objectives of the present invention can be achieved by a multilayered sheet for absorbing sweat, comprising:

40 at least one porous hydrophilic layer having at least one open surface;

at least one water-absorbable layer;

at least one substrate layer; and

at least one powdery deodorant agent and/or at least one powdery antiperspirant agent, wherein

45 the open surface of the porous hydrophilic layer is capable of absorbing sweat and free from the

powdery deodorant agent or the powdery antiperspirant agent.

5 It is preferable that the multilayered sheet according to the present invention further comprise an adhesive layer between the water-absorbable layer and one surface of the substrate layer. It is furthermore preferable that the multilayered sheet according to the present invention comprise an adhesive layer on the other surface of the substrate layer.

10 In the multilayered sheet according to the present invention, the porous hydrophilic layer and/or the water-absorbable layer may be composed of at least one woven or non-woven fabric. In this case, the porous hydrophilic layer and/or the water-absorbable layer may comprise at least one selected from air-laid non-woven fabric, wet-laid nonwoven fabric, spunlace non-woven fabric and needle punched non-woven fabric. The fabric may comprise at least one selected from the group consisting of cottons, rayons and pulps.

15 In the multilayered sheet according to the present invention, the water-absorbable layer may comprise at least one water-absorbable polymer.

The adhesive layer may comprise at least one hot-melt adhesive.

20 The substrate layer may comprise at least one selected from polyurethanes and polyolefins.

It is preferable that the total amount of the powdery deodorant agent or the powdery antiperspirant agent be 0.1 g or more, preferably 0.3 g or more and more preferably 0.5 g or more, per unit of the multilayered sheet.

25 The deodorant agent may be selected from the group consisting of antibacterial agents, chelating agents, odor absorbers, substances which block the enzymatic reactions responsible for the formation of odorous compounds, and mixtures thereof.

30 The antiperspirant agent may be selected from the group consisting of aluminum salts, zirconium salts, silica-based inorganic materials, complexes of zirconium hydroxychloride of aluminum hydroxychloride with an amino acid, and mixtures thereof.

35 It is preferable that the multilayered sheet according to the present invention further comprise at least one fragrance. The fragrance may be coated or encapsulated.

It is preferable that the porous hydrophilic layer in the multilayered sheet according to the present invention be applied to the skin, in particular to the underarm of a user.

40 **Brief Description of Drawings**

Fig. 1 is a cross sectional view of an example of a multilayered sheet according to the present invention.

45 Fig. 2 is a cross sectional view of another example of a multilayered sheet according to the present

invention.

Fig. 3 is a cross sectional view of other examples of a multilayered sheet according to the present invention.

5

Best Mode for Carrying Out the Invention

After diligent research, the inventor has discovered that it is possible to provide a multilayered sheet, which can be used as a pad for absorbing sweat from skin, in particular, from the skin of an underarm, reducing the risk of active agents in the pad causing irritation on the skin, or which can contain a relatively large amount of active agents in the pad, without the risk of the active agents causing irritation on the underarm, and therefore, can be used for a long time, by making the open surface of the multilayered sheet to touch the skin wherein the open surface is free from the active agents (the active agents are present at least between a porous hydrophilic layer and a water-absorbable layer, and preferably in the water-absorbable layer). In other words, the active agents are used on a "on demand" basis. Thus, a multilayered sheet according to the present invention can avoid or reduce irritation by the active agents on skin, in particular the skin of an underarm, and can be used for relatively a long time.

20 Furthermore, the active agents in the multilayered sheet according to the present invention do not plug or seal the pores of the skin, because they cannot directly touch the skin, while the active agents in conventional products such as roll-on type anti-perspiration or deodorant products do so, because the active agents directly contact the skin.

25 (Porous Hydrophilic Layer)

The multilayered sheet according to the present invention includes at least one, preferably one, porous hydrophilic layer. Two or more porous hydrophilic layers may be used in combination. Thus, a single type of porous hydrophilic layer or a combination of different type of porous hydrophilic layers may be used. It is preferable that the porous hydrophilic layer is not water-soluble.

35 The porous hydrophilic layer has at least one open surface which can contact the skin, in particular the underarm. Thus, the open surface can absorb sweat from the skin. The other surface of the porous hydrophilic layer faces to the water-absorbable layer.

It is preferable that the porous hydrophilic layer be composed of at least one woven or non-woven fabric. The porous hydrophilic layer may comprise at least one selected from air-laid non-woven fabric, wet-laid non-woven fabric, spunlace non-woven fabric and needle punched non-woven fabric. The use of spunlace non-woven fabric is more preferable. The woven or non-woven fabric may comprise hydrophilic fibers such as cellulose fibers. Preferably, the woven or non-woven fabric may comprise at least one selected from the group consisting of cottons, rayons and pulps. Thus, for example, a cotton sheet may be used as the porous hydrophilic layer. The amount of the hydrophilic fibers may be from 50 to 100% by weight, preferably from 60 to 100% by weight, and more preferably from 70 to 100% by weight, relative to the total weight of the

45

porous hydrophilic layer.

The woven or non-woven fabric may include hydrophobic fibers such as synthetic fibers made from polyolefin such as polyethylene and polypropylene, polyester such as PET, polyamide such as Nylon®, as long as the hydrophobic fibers do not affect the hydrophilic properties of the porous hydrophilic layer. It is preferable that the hydrophobic fibers are made from thermoplastic resin. The amount of the hydrophobic fibers may be from 0 to 50% by weight, preferably from 0 to 40% by weight, and more preferably from 0 to 30% by weight, relative to the total weight of the porous hydrophilic layer.

The size of the pores of the porous hydrophilic layer is not limited, but is preferably from 1 to 60 μm , more preferably from 2 to 58 μm , and even more preferably from 3 to 55 μm . The pore size can be measured by any conventional method such as mercury intrusion porosimetry with, for example, AutoPore IV 9510 (Micrometrics) under the intrusion pressure range of about 3kPa to 400 MPa.. The "pore size" herein means a highest peak diameter in the pore size distribution.

It may be preferable that the $4V_p/S_p$ (μm) be less than 45 μm , more preferably less than 43 μm , and even more preferably less than 40 μm , wherein V_p denotes accumulated pore volume (cm^3/g), and S_p denotes accumulated pore surface area (m^2/g).

The weight per unit of the porous hydrophilic layer is not limited, but is preferably from 10 to 100 g/m^2 , more preferably from 20 to 80 g/m^2 , and even more preferably from 25 to 60 g/m^2 .

As the porous hydrophilic layer, commercially available products may be used. For example, a non-woven fabric prepared from cupra such as Bemliese® marketed by Asahi Kasei Fibers Corp., Japan may be used.

(Water-Absorbable Layer)

The multilayered sheet according to the present invention includes at least one, preferably one, water-absorbable layer. Two or more water-absorbable layers may be used in combination. Thus, a single type of water-absorbable layer or a combination of different type of water-absorbable layers may be used.

One surface of the water-absorbable layer faces to the porous hydrophilic layer, and the other surface of the water-absorbable layer faces to the substrate layer.

It is preferable that the water-absorbable layer be composed of at least one woven or non-woven fabric. The water-absorbable layer may comprise at least one selected from air-laid non-woven fabric, spunlace non-woven fabric and needle punched non-woven fabric. The use of air-laid non-woven fabric is more preferable. The woven or non-woven fabric may comprise hydrophilic fibers such as cellulose fibers. Preferably, the woven or non-woven fabric may comprise at least one selected from the group consisting of cottons, rayons and pulps. Thus, for example, a cotton sheet may be used as the porous hydrophilic layer. The amount of the hydrophilic fibers may be from 50 to 100% by weight, preferably from 60 to 100% by weight, and

more preferably from 70 to 100% by weight, relative to the total weight of the water-absorbable layer.

5 The woven or non-woven fabric may include hydrophobic fibers such as synthetic fibers made from polyolefin such as polyethylene and polypropylene, polyester such as PET, polyamide such as Nylon®, as long as the hydrophobic fibers do not affect the water-absorbability of the water-absorbable layer. It is preferable that the hydrophobic filers are made from thermoplastic resin. The amount of the hydrophobic fibers may be from 0 to 50% by weight, preferably from 0 to 40% by weight, and more preferably from 0 to 30% by weight, relative to the total weight of
10 the water-absorbable layer.

The weight per unit of the water-absorbable layer is not limited, but is preferably from 10 to 200 g/m², more preferably from 30 to 180 g/m², and even more preferably from 50 to 150 g/m².

15 As the water-absorbable layer, commercially available products may be used. For example, an air-laid non-woven fabric prepared from pulp such as Kinocloth® marketed by Oji Konocloth, Japan may be used.

20 The water-absorbable layer may comprise at least one water-absorbable polymer, which is preferably water-insoluble. As the water-absorbable polymer, mention may be made of at least partially neutralized, crosslinked acrylic homopolymers or copolymers, the polyacrylamidomethylpropanesulphonic acid (AMPS) homopolymers and mixtures thereof.

25 The water-absorbable polymer may preferably be selected from AMPS homopolymers, crosslinked sodium polyacrylates in non-particulate form, especially crosslinked acrylic polymers containing more than 90% of acrylic acid monomers, or even containing no nonionic monomer, water-superabsorbent acrylic polymers, especially crosslinked sodium polyacrylates in particulate form.

30 (1) AMPS Homopolymer

The AMPS homopolymers, which may be used in the present invention, may advantageously be water-soluble or water-dispersible or swellable in water. They may be in free form or in partially or totally neutralized form.

35 Preferentially, the AMPS homopolymers may be partially or totally neutralized by an inorganic base (sodium hydroxide, potassium hydroxide, ammonia) or an organic base such as mono-, di- or tri-ethanolamine, an aminomethylpropanediol, N-methylglucamine, basic amino acids such as arginine and lysine, and mixtures of these compounds. They are generally neutralized. For the
40 purposes of the present invention, "neutralized" refers to polymers which have been totally or near-totally neutralized, in other words neutralized to an extent of at least 90%.

45 The AMPS homopolymers generally have a number-average molecular weight of from 1,000 to 20,000,000 g/mol, preferably from 20,000 to 5,000,000 and more preferably from 100,000 to 1,500,000 g/mol.

These polymers may be crosslinked or non-crosslinked.

5 When the polymers are crosslinked, the crosslinking agents may be selected from the compounds containing olefinic polyunsaturation that are commonly used for the crosslinking of polymers obtained by free-radical polymerization.

10 Crosslinking agents include, for example, divinyl-benzene, diallyl ether, dipropylene glycol diallyl ether, polyglycol diallyl ethers, triethylene glycol divinyl ether, hydroquinone diallyl ether, ethylene glycol di(meth)acrylate or tetraethylene glycol di(meth)acrylate, trimethylolpropane triacrylate, methylenebisacrylamide, methylenebismethacrylamide, triallylamine, triallyl cyanurate, diallyl maleate, tetraallylethylenediamine, tetraallyloxyethane, trimethylolpropane diallyl ether, allyl (meth)acrylate, the allyl ethers of alcohols from the sugars series, or other allyl or vinyl ethers of polyfunctional alcohols, and also allyl esters of derivatives of phosphoric and/or
15 vinylphosphonic acid, or the mixtures of these compounds.

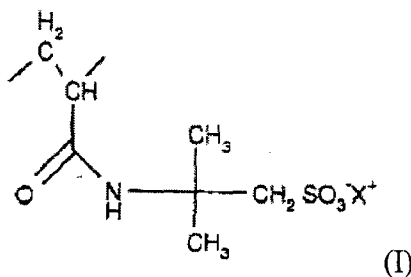
In one preferred embodiment, the crosslinking agent is selected from methylenebis-acrylamide, allyl methacrylate or trimethylolpropane triacrylate (TMPTA). The degree of crosslinking is in general from 0.01 to 10 mol % and more particularly from 0.2 to 2 mol %, relative to the polymer.
20

The homopolymer of monomers containing a sulphonic group may be crosslinked with one or more crosslinking agents.

25 These homopolymers are generally crosslinked and neutralized, and they may be obtained by the preparation process comprising the following steps:
(a) the monomer, such as 2-acrylamido-2-methylpropane-sulphonic acid, is dispersed or dissolved in free form in a solution of tert-butanol or water and tert-butanol;
(b) the solution or dispersion of monomer obtained in (a) is neutralized with one or more organic or inorganic bases, preferably ammonia NH₃, in an amount producing a degree of neutralization of
30 the sulphonic acid functions of the polymer of from 90% to 100%;
(c) the crosslinking monomer or monomers is or are added to the solution or dispersion obtained in (b); and
(d) a conventional free-radical polymerization is carried out in the presence of free-radical initiators at a temperature of from 10 to 150° C., the polymer precipitating the solution or
35 dispersion based on tert-butanol.

The preferred AMPS homopolymers are generally characterized in that they comprise, distributed at random:

a) from 90% to 99.9% by weight of units of general formula (I) below:



in which X^+ denotes a proton, an alkali metal cation, an alkaline-earth metal cation or the ammonium ion, not more than 10 mol % of the cations X^+ being protons H^+ ; and

- b) from 0.01% to 10% by weight of crosslinking units originating from at least one monomer
 5 having at least two olefinic double bonds; the proportions by weight are defined relative to the total weight of the polymer.

The homopolymers that are more particularly preferred contain from 98% to 99.5% by weight of units of formula (I) and from 0.2% to 2% by weight of crosslinking units.

- 10 Polymers of this type include in particular the crosslinked and neutralized homopolymer of 2-acrylamido-2-methylpropanesulphonic acid that is sold by Clariant under the trade name Hostacerin® AMPS (CTFA name: ammonium polyacryldimethyltauramide).

15 (2) Crosslinked Acrylic Homopolymers or Copolymers

The crosslinked acrylic homopolymers or copolymers suitable for the water-absorbable layer may be present in a particulate form (water-superabsorbent polymers) or non-particulate form.

- 20 In a first embodiment the at least partially neutralized, crosslinked acrylic homopolymer or copolymer is present in the water-absorbable layer in a non-particulate form.

- In another embodiment the at least partially neutralized, crosslinked acrylic homopolymer or copolymer is a water-superabsorbent polymer which is present in the water-absorbable layer in a
 25 particulate form.

(2a) Neutralized and crosslinked acrylic homopolymers or copolymers in non-particulate form

- 30 The crosslinked acrylic polymers are preferably neutralized prior to being used; that is to say, they are sold in neutralized form, in contrast to the acrylic polymers in non-neutralized form, which are neutralized by addition of a base.

- Examples of these crosslinked acrylic polymers which are already neutralized before being used, or otherwise, include: Cosmedia SP® or crosslinked sodium polyacrylate containing 90% of dry
 35 substance and 10% of water, Cosmedia SPL® or sodium polyacrylate in inverse emulsion containing approximately 60% of dry active substance, an oil (hydrogenated polydecene) and a surfactant (PPG-5 Laureth-5), both sold by Cognis; partially neutralized, crosslinked sodium polyacrylates which are in the form of an inverse emulsion containing at least one polar oil, an example being that sold under the name Luvigel® EM by BASF; and mixtures thereof.

A crosslinked acrylic acid polymer that has not been neutralized beforehand may be neutralized by any appropriate means, and in particular by addition of sodium hydroxide. This gives sodium polyacrylates. Potassium polyacrylates are also suitable.

5

In reality, the neutralization may be carried out, if the polymer in question is sold in a non-neutralized form. In contrast, for some of these compounds, the neutralization is inherent in the primary substance. This is the case in particular with Luvigel® EM and the products called Cosmedia® SP and SPL, which are already partially neutralized.

10

The neutralizing step, with sodium or potassium counterions for example, is preferable in order to give the crosslinked acid polymers their property of gelling and hence of stabilizing the water-absorbable layer. Said crosslinked acrylic polymers are converted into corresponding acrylate polymers during this neutralizing step. The acrylic monomers of the crosslinked acrylic polymer according to the invention may be neutralized to a degree of 5% to 80%.

15

In one particular embodiment, the crosslinked acrylic polymer may comprise ionic monomers. Ionic monomers which may be employed include acrylamide, methacrylamide, vinylpyrrolidone, vinylimidazole, vinylcarpolactam and hydroxyalkyl esters of carboxylic acids, such as hydroxyethyl acrylates. A particular instance of ionic monomers are unsaturated C₃-C₅ carboxylic acids. However, in the context of the present invention, preference is given to crosslinked acrylic polymers containing more than 90% of acrylic acid monomers, or even containing no nonionic monomer.

20

The polymers may be composed of a) from 35% to 100% by weight of ionic monomers, the ionic monomers being 5-80% neutralized; b) from 0% to 65% by weight of nonionic monomers; and c) from 0.3 to 1 mol %, relative to a) and b), of at least one at least difunctional monomer.

25

The acrylic acid may be crosslinked by any method known to a person skilled in the art, in particular as per the description of document U.S. Pat. No. 6,197,283 or as per the description of document U.S. Pat. No. 6,444,785, which refers to the crosslinking agents that can be used.

30

Among these, mention is made of the compounds containing an unsaturation that is soluble in water or in oil. Crosslinking agents of these kinds are, in particular, methylenebisacrylamide, divinylpyrrolidone, alkyl (meth)acrylate, triallylamine, ethylene glycol diacrylates (up to 50 EO), (meth)acrylic esters with dihydric or polyhydric alcohols, such as trimethylolpropane triacrylate or pentaerythritol tetraacrylate.

35

In one embodiment the crosslinking agent is soluble in water.

40

In another embodiment the crosslinking agent is triallylamine.

(2b) Neutralized and crosslinked, water-superabsorbent, acrylic homopolymers or copolymers in particulate form

45

In another embodiment the at least partially neutralized, crosslinked acrylic homopolymer or copolymer is used for the water-absorbable layer. The polymers in question are water-superabsorbent polymers.

5 A superabsorbent polymer is a polymer which swells in water, more particularly a crosslinked polymer. The superabsorbent polymer may be present in the form of particles which, when hydrated, swell to form soft beads having a number-average diameter of 10 μm to 1000 μm .

10 The water-superabsorbent polymer is capable in its dry state of spontaneously absorbing at least 20 times its own weight of aqueous fluid, in particular water, and especially distilled water. Superabsorbent polymers of this type are described in the work "Absorbent polymer technology, Studies in polymer science 8" by L. BRANNON-PAPPAS and R. HARLAND, Elsevier, 1990.

15 These polymers have a high capacity for absorption and retention of water and aqueous fluids. By spontaneous absorption is meant an absorption time of up to 30 minutes.

20 The superabsorbent polymer may have a water absorption capacity of from 20 to 2000 times its own weight (i.e. 20 g to 2000 g of water absorbed per gram of absorbent polymer), preferably from 30 to 1500 times, and more preferably from 50 to 1000 times. These water absorption characteristics are defined under standard conditions of temperature (25° C.) and pressure (760 mmHg or 100 000 Pa) and for distilled water.

25 Mention may be made in particular of the absorbent polymers such as those sold under the names Octacare X100, X110 and RM100 by Avecia, those sold under the names Flocare GB300 and Flosorb 500 by SNF, those sold under the names Luquasorb 1003, Luquasorb 1010, Luquasorb 1280 and Luquasorb 1110 by BASF, those sold under the names Water Lock G400 and G430 (INCI name: Acrylamide/Sodium acrylate copolymer) by Grain Processing, or else AQUA KEEP 10 SH NF, which is provided by Sumitomo Seika.

30 (Substrate Layer)

The multilayered sheet according to the present invention includes at least one, preferably one, substrate layer. Two or more substrate layers may be used in combination. Thus, a single type of substrate layer or a combination of different type of substrate layers may be used.

35 According to the present invention, a substrate layer is provided on one surface of the water-absorbable layer. The substrate layer functions as a back-sheet to support the porous hydrophilic layer and the water-absorbable layer.

40 The material of the substrate layer is not limited. However, in order to realize superior usability, a flexible material is preferable. As the flexible material, an organic polymer is preferable.

45 For example, an organic polymer, such as polyester such as PET, polyolefin such as polyethylene and polypropylene, polyamide, vinyl chloride, polyvinylalcohol, polyurethane and cellulose polymer, may be used as the material for the substrate layer. It is preferable that the substrate

layer comprises at least one selected from polyurethanes and polyolefins. Two or more organic polymers may be used in combination. Thus, a single type of organic polymer or a combination of different type of organic polymers may be used.

- 5 The thickness of the substrate layer is not limited. For example, the thickness of the substrate layer may be from 0.001 to 1 mm, preferably from 0.005 to 0.5 mm, and more preferably from 0.01 to 0.1 mm.

(Deodorant Agent and Antiperspirant Agent)

- 10 The multilayered sheet according to the present invention includes at least one powdery deodorant agent and/or at least one powdery antiperspirant agent. Two or more deodorant agents may be used in combination. Also, two or more antiperspirant agents may be used in combination. Thus, a single type of deodorant agent and/or antiperspirant agent, or a combination of different
15 type of deodorant agents and/or antiperspirant agents may be used.

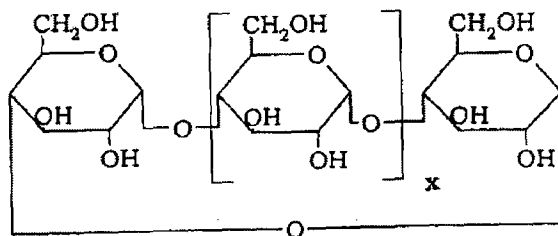
It is preferable that the deodorant agent is selected from the group consisting of antibacterial agents, chelating agents, odor absorbers, substances which block the enzymatic reactions responsible for the formation of odorous compounds, and mixtures thereof.

- 20 As examples of the antibacterial agent, mention may be made of 2,4,4'-trichloro-2'-hydroxydiphenyl ether (or triclosan), 3,4,4'-trichlorocarbanilide, phenoxyethanol, phenoxypropanol, phenoxyisopropanol, hexamidine isethionate, metronidazole and its salts, miconazole and its salts, itraconazole, terconazole, econazole, ketoconazole,
25 saperconazole, fluconazole, clotrimazole, butoconazole, oxiconazole, sulfaconazole, sulconazole, terbinafine, ciclopirox, ciclopiroxol-amine, undecylenic acid and its salts, benzoyl peroxide, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, phytic acid, N-acetyl-L-cysteine acid, lipoic acid, azelaic acid and its salts, arachidonic acid, resorcinol, octopirox, octoxyglycerol, octanolglycine, caprylyl glycol, 10-hydroxy-2-decanoic acid, dichlorophenyl imidazole dioxolane and its
30 derivatives described in Patent WO9318743, copper pidolate, salicylic acid, iodopropynyl butylcarbamate, farnesol, phytosphingosines and mixtures thereof. In addition, metal salts which can provide metal ions such as silver ions may be used.

- 35 As the antibacterial agent, mention may also be made of, zinc salts such as zinc gluconate, zinc pidolate and zinc salt of L-pyrrolidone carboxylic acid (zinc PCA), which can be obtained by the cyclization of L-glutamic acid. It should be noted that zinc is known to inhibit the enzyme that catalyzes the production of dihydroxytestosterone, which is a hormone controlling sebaceous gland activity (Zn inhibits 5-alpha reductases in hypersebhorhoea).

- 40 As examples of the chelating agents, mention may be made of EDTA and DPTA.

As examples of odor absorbers, mention may be made of cyclodextrins and derivatives thereof. Any type of cyclodextrins and derivatives thereof can be used. The cyclodextrin that can be used can be selected from, for example, oligosaccharides of formula:



wherein x is selected from 4 (corresponding to α -cyclodextrin), 5 (corresponding to β -cyclodextrin) and 6 (corresponding to γ -cyclodextrin). In one embodiment, the cyclodextrin can be selected from β -cyclodextrin and γ -cyclodextrin, for example, β -cyclodextrin. A β -cyclodextrin sold by the company WACKER under the name CAVAMAX W7 PHARMA and a γ -cyclodextrin sold by the company WACKER under the name CAVAMAX W8 can, for example, be used. In another embodiment, the derivatives of cyclodextrin can be selected from, for example, methylcyclodextrins such as the methyl- β -cyclodextrin sold by the company WACKER under the name CAVASOL W7.

As examples of substances which block the enzymatic reactions responsible for the formation of odorous compounds, mention may be made of inhibitors for enzymes involving the formation of malodor compounds, such as inhibitors for arylsulfatase, 5-lipoxygenase, aminoacylase, and beta-glucuronidase; zeolites; cyclodextrins; and metal oxide silicates.

As examples of the antiperspirant agent, mention may be made of aluminum salts, and zirconium salts and other inorganic material such as silica-based inorganic materials.

As the aluminum salts, mention may be made of, aluminum hydroxy chloride or aluminum chlorohydrate (ACH), marketed by, for example, Clariant Produkte GmbH in Germany as Locron®S.

Antiperspirant aluminum salts are preferable. As used herein, the term "antiperspirant aluminum salt" means any salt or any aluminum complex that has the effect of reducing or limiting the flow of sweat. The aluminum salt in accordance with the present disclosure may be, for example, selected from aluminum halohydrates; aluminum zirconium halohydrates; and complexes of zirconium hydroxychloride and of aluminum hydroxychloride with an amino acid, such as those described in U.S. Pat. No. 3,792,068, which are commonly known as "ZAG complexes".

Among the aluminum salts that may be mentioned, for example, are aluminum chlorohydrate in activated or unactivated form, aluminum chlorohydrate polyethylene glycol complex, aluminum chlorohydrate propylene glycol complex, aluminum dichlorohydrate, aluminum dichlorohydrate polyethylene glycol complex, aluminum dichlorohydrate propylene glycol complex, aluminum sesquichlorohydrate, aluminum sesquichlorohydrate polyethylene glycol complex, aluminum sesquichlorohydrate propylene glycol complex, and aluminum sulfate buffered with sodium aluminum lactate. Among the aluminum zirconium double salts that may be mentioned, for example, are aluminum zirconium octachlorohydrate, aluminum zirconium pentachlorohydrate, aluminum zirconium tetrachlorohydrate, and aluminum zirconium trichlorohydrate. An example of an aluminum zirconium double salt is the product sold by the company Reheis under the name Reach AZP-908-SUF. The complexes of zirconium hydroxychloride and of aluminum hydroxychloride with an amino acid are generally known under

the name AZG (when the amino acid is glycine: Aluminum Zirconium Tetrachlorohydrate Glycine). Among these products, mention may be made of the aluminum zirconium octachlorohydrate glycine, aluminum zirconium pentachlorohydrate glycine, aluminum zirconium tetrachlorohydrate glycine, and aluminum zirconium trichlorohydrate glycine complexes.

5

It is preferable that the antiperspirant agent is selected from the group consisting of aluminum salts, zinc salts, complexes of zirconium hydroxychloride of aluminum hydroxychloride with an amino acid, and mixtures thereof.

10 As the inorganic materials which can be used as an antiperspirant agent, mention may be made of perlite which is a chemically inert siliceous mineral consisting essentially of silicon, aluminum, sodium and potassium oxide, marketed by, for example, World Minerals as Optimat 2550 OR, Optimat 1430 OR and Harborlite 30X20S.

15 As the inorganic materials which can be used as an antiperspirant agent, mention may also be made of aerogel, which may be a silylated silica or silica silylate, marketed by, for example, Dow Corning as Dow Corning® VM-2270 Aerogel Fine Particles.

Talc, silica, and Nylon-12 may be used as an antiperspirant agent.

20

According to the present invention, the deodorant agent and the antiperspirant agent are in the form of a powder. The particle size of the particles constituting the powder is not limited.

25 Thus, in an embodiment of the present invention, the upper size of the particle size of the powder is not limited, and may be 5 mm or less due to the manufacturability thereof.

30 In another embodiment of the present invention, the volume average particle size of the powder may be 1 μm or more, preferably 20 μm or more, and more preferably 40 μm or more, while the volume average particle size may be 100 μm or less, preferably 80 μm or less, and more preferably 70 μm or less. The volume average particle size can be a mode particle size of the peak of particle size distribution based on volume. It is preferable that the volume average particle size be from 40 to 70 μm .

35 On the other hand, the number average particle size of the powder may be 1 μm or more, preferably 20 μm or more, and more preferably 40 μm or more, while the number average particle size may be 100 μm or less, preferably 80 μm or less, and more preferably 70 μm or less. The number average particle size can be a mode particle size of the peak of particle size distribution based on number. It is preferable that the number average particle size be from 40 to 70 μm .

40 The amount of the deodorant agent or the antiperspirant agent is not limited. For example the amount of the deodorant agent or the antiperspirant agent may be 0.1 g or more, such as from 0.1 to 10 g, preferably 0.3 g or more, such as from 0.3 to 5 g, and more preferably 0.5 g or more, such as from 0.5 to 2 g, per a multilayered sheet according to the present invention.

45 (Fragrance)

The multilayered sheet according to the present invention may include at least one fragrance. Two or more fragrances may be used in combination. Thus, a single type of fragrance or a combination of different types of fragrances may be used.

5

The fragrance may be in the form of liquid. It is preferable that liquid fragrance is coated or encapsulated, with a coating or a capsule.

As the fragrance, a natural or synthetic fragrance or aroma, or a mixture thereof can be employed.

10

As examples of natural fragrances and aromas, mention may be made of, for example, extracts of flowers (lily, lavender, rose, jasmine, or ylang-ylang), extracts of stems and of leaves (patchouli, geranium, or petit grain), extracts of fruits (coriander, anise, caraway, or juniper), extracts of fruit rinds (bergamot, lemon, or orange), extracts of roots (angelica, celery, cardamom, iris, or sweet flag), extracts of wood (pinewood, sandalwood, lignum vitae, or pink cedar), extracts of grasses and of gramineous plants (tarragon, lemon grass, sage, or thyme), extracts of needle leaves and of branches (spruce, fir, pine, or dwarf pine), extracts of resins and of balms (galbanum, elemi, benzoin, myrrh, olibanum, or opopanax), and the like.

15

As examples of synthetic fragrances and aromas, mention may be made of, for example, esters, ethers, aldehydes, ketones, aromatic alcohols, and hydrocarbon-based compounds.

20

As specified examples of the aforementioned esters, mention may be made of benzyl acetate, benzyl benzoate, phenoxyethyl isobutyrate, p-t-butylcyclohexyl acetate, citronellyl acetate, citronellyl formate, geranyl acetate, linalyl acetate, dimethylbenzylcarbonyl acetate, phenylethyl acetate, linalyl benzoate, benzyl formate, ethylmethylphenyl glycinate, alkylcyclohexyl propionate, styralyl propionate, benzyl salicylate, and the like.

25

As examples of the aforementioned ethers, mention may be made of benzyl ethyl ether and the like.

30

As examples of the aforementioned aldehydes, mention may be made of, for example, linear alkanals having 8 to 18 carbon atoms, citral, citronellal, citronellyl oxyacetaldehyde, cyclamen aldehyde, hydroxycitronellal, lillial, bourgeonal, and the like.

35

As examples of the aforementioned ketones, mention may be made of, for example, ionones such as α -isomethylionone and methyl cedryl ketone.

As examples of the aforementioned aromatic alcohols and in particular, terpene alcohols, mention may be made of anethole, citronellol, eugenol, isoeugenol, geraniol, linalol, phenylethyl alcohol, terpineol, and the like.

40

As examples of the aforementioned hydrocarbon-based compounds, mention may be made of, in particular, terpenes. The aforementioned compounds are often provided in the form of a blended product having two or more odorous substances in many cases.

45

An essential oil can also be employed as an aroma component. For example, sage oil, chamomile oil, clove oil, balm oil, mint oil, cinnamon leave oil, lime blossom oil, juniper oil, vetiver oil, olibanum oil, galbanum oil, labolanum oil, lavandin oil, and the like are employed.

5 In addition, perfumes described below can be employed alone or in combination. Bergamot oil, dihydromyrcenol, lillial, lylal, citronellol, phenylethyl alcohol, α -hexylcinnamaldehyde, geraniol, benzylacetone, cyclamen aldehyde, linalol, ambroxan, indole, hedione, sandelice, lemon oil, oils from mandarins and oranges, allyl amine glycolate, cyclovertal, lavender oil, sage oil,
10 β -damascone, geranium oil, cyclohexyl salicylate, phenylacetic acid, geranyl acetate, benzyl acetate, rose oxide, or the like, can be employed.

In accordance with a preferable mode for carrying out the present invention, various fragrances can be employed by blending the same. Thereby, a scent which is pleasing to the user can be
15 obtained.

It is preferable that at least one fragrance be present at least between the porous hydrophilic layer and the water-absorbable layer, and optionally in and/or on the porous hydrophilic layer. In this case, it is possible to sustain the release of the fragrance from the porous hydrophilic layer, and
20 therefore, body odor can be masked during the use of the multilayered sheet according to the present invention. Alternatively, the fragrance may be present on the open surface of the porous hydrophilic layer.

The amount of the fragrance is not limited. For example the amount of the fragrance may be
25 from 0.01 to 10 g/m², preferably from 0.05 to 5 g/m², and more preferably from 0.1 to 1 g/m², relative to the total weight of a multilayered sheet according to the present invention.

(Additional Ingredients)

30 According to one embodiment of the present invention, the multilayered sheet according to the present invention may include at least one additional ingredient except for fragrance. Two or more additional ingredients may be used in combination. Thus, a single type of additional ingredients or a combination of different types of additional ingredient may be used.

35 The additional ingredient may be selected from additional cosmetic active ingredients which are commonly used in cosmetics. Among the cosmetic active ingredients to be used, mention may be made of, for example, anti-oxidants, cleansing agents, free radical scavengers, moisturizers, depigmenting agents, liporegulators, anti-acne agents, antidandruff agents, anti-aging agents, softeners, antiwrinkle agents, keratolytic agents, anti-inflammatory agents, fresheners, healing
40 agents, vascular protectors, skin conditioners, anesthetics, immunomodulators, nourishing agents, and moisture absorbers.

The additional ingredient may be in the form of a powder. The particle size of the particles constituting the additional ingredient is not limited. Thus, in an embodiment of the present
45 invention, the upper size of the particle size of the additional ingredient is not limited, and may be

5 mm or less due to the manufacturability thereof.

The amount of the additional ingredient(s) is not limited. For example the amount of the additional ingredient(s) may be 0.1 g or more, such as from 0.1 to 10 g, preferably 0.3 g or more, such as from 0.3 to 5 g, and more preferably 0.5 g or more, such as from 0.5 to 2 g, per a multilayered sheet according to the present invention.

(Adhesive Layer)

10 According to the present invention, an adhesive layer may be provided between the water-absorbable layer and one surface of the substrate, as well as on the other surface of the substrate. The adhesive layer between the water-absorbable layer and the substrate functions to adhere both. The adhesive layer on the other surface of the substrate layer functions to adhere the substrate layer to a cloth contacting skin, in particular the skin of an underarm. The adhesive layer on the other surface of the substrate layer should not leave any adhesive on the cloth, when the adhesive layer is peeled off from the cloth.

The material of the adhesive layer is not limited. The adhesive layer may be made from conventional adhesives such as an aqueous solution of water-soluble adhesive polymer (e.g., acrylic polymer), an aqueous emulsion of water-insoluble adhesive polymer, and an anhydrous adhesive polymer (e.g., hot-melt adhesive). Two or more adhesives may be used in combination. Thus, a single type of adhesive or a combination of different type of adhesives may be used.

It is preferable that the adhesive layer include at least one hot-melt adhesive.

25

(Release Layer)

As explained above, an adhesive layer may be provided on the other surface of the substrate layer. According to the present invention, in this case, a release layer may be provided on the open surface of the adhesive layer. The release layer functions to protect the adhesive surface of the adhesive layer, until the attachment of the adhesive layer to a cloth and the like.

The material of the release layer is not limited. However, in order to realize superior usability, a flexible material is preferable. As the flexible material, an organic polymer is preferable.

35

For example, an organic polymer such as a cellulose polymer, polyester such as PET, polyolefin such as polyethylene and polypropylene, polyamide, vinyl chloride, polyvinylalcohol, polyurethane may be used as the material for the release layer. Two or more organic polymers may be used in combination. Thus, a single type of organic polymer or a combination of different type of organic polymers may be used.

40

It is preferable that the surface of the release layer has been treated with at least one releasing agent. Two or more releasing agents may be used in combination. Thus, a single type of releasing agent or a combination of different type of releasing agents may be used. As the releasing agent, mention may be made of a silicone in the form of a solution or an emulsion.

45

It is preferable that the release layer is a paper treated with a releasing agent such as a silicone.

(Multilayered Sheet)

5 The multilayered sheet according to the present invention includes at least one porous hydrophilic layer having at least one open surface which is capable of absorbing sweat, at least one water-absorbable layer and at least one substrate layer. In addition, the multilayered sheet according to the present invention includes at least one powdery deodorant agent and/or at least
10 one powdery antiperspirant agent. The multilayered sheet according to the present invention is characterized in that the open surface of the porous hydrophilic layer is free from the powdery deodorant agent or the powdery antiperspirant agent.

The term "free from" means that a substantial amount of the powdery deodorant agent or the
15 powdery antiperspirant agent is not present on the open surface of the porous hydrophilic layer. The substantial amount means, for example, 15% by weight or less, preferably 10% by weight or less, and more preferably 5% by weight or less, furthermore preferably 3% by weight or less, and furthermore preferably 1% by weight or less, of the total amount of the powdery deodorant agent or the powdery antiperspirant agent. It is most preferable that neither powdery deodorant agent
20 nor powdery antiperspirant agent is present on the open space of the porous hydrophilic layer.

The powdery deodorant agent and/or the powdery antiperspirant agent can be present in the multilayered sheet according to the present invention except for the surface of the porous hydrophilic layer. Preferably, the powdery deodorant agent and/or the powdery antiperspirant
25 agent can be present in the water-absorbable layer. The powdery deodorant agent and/or the powdery antiperspirant agent may be distributed evenly in the water-absorbable layer in a direction of the thickness of the water-absorbable layer. Alternatively, the powdery deodorant agent and/or the powdery antiperspirant agent may be present unevenly in the porous hydrophilic layer. For example, a layer of the powdery deodorant agent and/or the powdery antiperspirant
30 agent may be present in the porous hydrophilic layer.

It is possible that a part of the powdery deodorant agent and/or the powdery antiperspirant agent may be present in the porous hydrophilic layer. Thus, a part of the powdery deodorant agent and/or the powdery antiperspirant agent may be present between the porous hydrophilic layer and
35 the water-absorbable layer.

It is preferable that the multilayered sheet according to the present invention include an adhesive layer between the water-absorbable layer and one surface of the substrate layer, in order to adhere
40 both to integrate.

It is preferable that the multilayered sheet according to the present invention include an adhesive layer on the other side of the substrate. It is preferable that the release layer be present on the open surface of the adhesive layer, in particular before the use of the multilayered sheet.

45 Figure 1 shows an embodiment of the present invention. In this embodiment, a layer 2 of

powdery deodorant agent(s) and/or powdery antiperspirant agent(s) is present between a porous hydrophilic layer 1 and a water-absorbable layer 3. In addition, an adhesive layer 4 is provided on the water-absorbable layer 3, and a substrate layer 5 is provided on the adhesive layer 4. In this embodiment, an adhesive layer 6 is further provided on the substrate layer 5. In addition, a
5 release layer 7 is further provided on the adhesive layer 6 to protect the adhesive layer 6.

In this embodiment, the layer 2 is sandwiched or covered by the porous hydrophilic layer 1 and the water-absorbable layer 3. Therefore, the deodorant agent(s) and/or the antiperspirant agent(s) in the layer 2 cannot pass through the porous hydrophilic layer 1. As shown in Figure 1, a part of
10 the deodorant agent(s) and/or the antiperspirant agent(s) may penetrate into the porous hydrophilic layer 1 and the water-absorbable layer 3. It is preferable that a part of the deodorant agent(s) and/or the antiperspirant agent(s) penetrate into only the water-absorbable layer 3. In any event, the open surface of the porous hydrophilic layer 1 is free from the deodorant agent(s) or the antiperspirant agent(s). It is preferable that the deodorant agent(s) or the antiperspirant agent(s)
15 be not present on the surface of the porous hydrophilic layer 1, such that the deodorant agent(s) or the antiperspirant agent(s) is/are kept as a powder in the multilayered sheet, when unused.

Accordingly, the deodorant agent(s) and/or the antiperspirant agent(s) in the multilayered sheet according to the present invention do not work when it or they do(es) not contact sweat.
20

On the other hand, when the multilayered sheet according to the present invention is used by being contacted with skin, in particular underarm, to absorb sweat, the sweat will penetrate into the layer 2, through the pores of the porous hydrophilic layer 1, and a part of the deodorant agent(s) and/or the antiperspirant agent(s) in the layer 2 will dissolve in the sweat, and will move
25 through the pores of the porous hydrophilic layer 1 to reach the skin. Thus, the deodorant agent(s) and/or the antiperspirant agent(s) in the multilayered sheet according to the present invention work(s) only when it or they contact(s) sweat. The above realize that the above agent(s) in the layer 2 only work when it or they are supposed to work.

30 Since the deodorant(s) agent and/or the antiperspirant agent(s) do not directly contact skin when it or they do not work, the multilayered sheet according to the present invention can avoid or reduce the risk of causing irritation to skin, in particular the skin of an underarm. However, the deodorant agent(s) and/or the antiperspirant agent(s) can work when it or they become(s) necessary (when perspiration occurs).
35

Thus, a multilayered sheet according to the present invention can be used as a pad for absorbing sweat from skin, in particular, from the skin of an underarm, reducing the risk of deodorant agent(s) and/or antiperspirant agent(s) in the pad causing irritation of the skin, in particular the skin of an underarm.
40

Also, since the deodorant agent(s) and/or the antiperspirant agent(s) do(es) not directly contact skin when it or they do(es) not work, the multilayered sheet according to the present invention can contain a relatively large amount of the deodorant agent(s) and/or the antiperspirant agent(s), without the risk of the active agent(s) causing irritation of the skin, in particular the skin of an
45 underarm.

In addition, since the deodorant agent(s) and/or the antiperspirant agent(s) is/are not consumed when it or they do(es) not work, the multilayered sheet according to the present invention can be used for a long time. Furthermore, the capacity of the relatively large amount of the deodorant agent(s) and/or the antiperspirant agent(s) can further lengthen the usable time period of the multilayered sheet according to the present invention.

Thus, the multilayered sheet according to the present invention can be used as a pad for absorbing sweat from skin, in particular, from underarm, which can contain a relatively large amount of active agent(s) in the pad, without the risk of the active agents causing irritation of the skin, preferably the skin of an underarm, and therefore, can be used for a long time.

Figure 2 shows another embodiment of the present invention. In this embodiment, a layer 2 of powdery deodorant agent(s) and/or powdery antiperspirant agent(s) is present between a porous hydrophilic layer 1 and a water-absorbable layer 3. In this case, the porous hydrophilic layer 1 and the water-absorbable layer 3 contact each other. In addition, an adhesive layer 4 is provided on the water-absorbable layer 3, and a substrate layer 5 is provided on the adhesive layer 4. In this embodiment, an adhesive layer 6 is further provided on the substrate layer 5. In addition, a release layer 7 is further provided on the adhesive layer 6 to protect the adhesive layer 6.

In this embodiment as well, the layer 2 is sandwiched or covered by the porous hydrophilic layer 1 and the water-absorbable layer 3. Therefore, the deodorant agent(s) and/or the antiperspirant agent(s) in the layer 2 cannot pass through the porous hydrophilic layer 1. As shown in Figure 2, in this case, all the deodorant agent(s) and/or the antiperspirant agent(s) may penetrate into the porous hydrophilic layer 1 and the water-absorbable layer 3. It is preferable that all the deodorant agent(s) and/or the antiperspirant agent(s) penetrate into only the water-absorbable layer 3. In any event, the open surface of the porous hydrophilic layer 1 is free from the deodorant agent(s) or the antiperspirant agent(s). It is preferable that the deodorant agent(s) or the antiperspirant agent(s) be not present on the surface of the porous hydrophilic layer 1, such that the deodorant agent(s) or the antiperspirant agent(s) is/are kept as a powder in the multilayered sheet, when unused.

Figure 3 shows other embodiments of the present invention. In the embodiment shown in Figure 3(a), a layer 2 of powdery deodorant agent(s) and/or powdery antiperspirant agent(s) is present in a part of a water-absorbable layer 3. In this case, the porous hydrophilic layer 1 and the water-absorbable layer 3 contact each other. In addition, an adhesive layer 4 is provided on the water-absorbable layer 3, and a substrate layer 5 is provided on the adhesive layer 4. In this embodiment, an adhesive layer 6 is further provided on the substrate layer 5. In addition, a release layer 7 is further provided on the adhesive layer 6 to protect the adhesive layer 6.

In this embodiment, the layer 2 is embedded completely in the water-absorbable layer 3. Therefore, the deodorant agent(s) and/or the antiperspirant agent(s) in the layer 2 cannot pass through the water-absorbable layer 3 and the porous hydrophilic layer 1. As shown in Figure 3(a), in this case, all the deodorant agent(s) and/or the antiperspirant agent(s) are present completely in the water-absorbable layer 3. Therefore, the risk of the presence of the deodorant

agent(s) and/or the antiperspirant agent(s) on the porous hydrophilic layer 1 is further reduced. In any event, the open surface of the porous hydrophilic layer 1 is free from the deodorant agent(s) or the antiperspirant agent(s). It is preferable that the deodorant agent(s) or the antiperspirant agent(s) be not present on the surface of the porous hydrophilic layer 1, such that the deodorant agent(s) or the antiperspirant agent(s) is/are kept as a powder in the multilayered sheet, when
5 unused.

The embodiment shown in Figure 3(b) is different from the embodiment shown in Figure 3(a) in the point that a layer 2 of powdery deodorant agent(s) and/or powdery antiperspirant agent(s) is present in the entire of a water-absorbable layer 3.
10

In this embodiment, the layer 2 is embedded in the entire of the water-absorbable layer 3. The deodorant agent(s) and/or the antiperspirant agent(s) in the layer 2 cannot pass through the porous hydrophilic layer 1. As shown in Figure 3(b), in this case, a relatively large amount of deodorant agent(s) and/or the antiperspirant agent(s) can be present in the water-absorbable layer 3.
15 Therefore, it is possible to use the multilayered sheet according to the present invention for a longer period of time. In any event, the open surface of the porous hydrophilic layer 1 is free from the deodorant agent(s) or the antiperspirant agent(s). It is preferable that the deodorant agent(s) or the antiperspirant agent(s) be not present on the surface of the porous hydrophilic layer
20 1, such that the deodorant agent(s) or the antiperspirant agent(s) is/are kept as a powder in the multilayered sheet, when unused.

The multilayered sheet according to the present invention can be prepared as follows.

For example, with regard to the embodiments shown in Figures 1 and 2, at least one powdery deodorant agent and/or at least one powdery antiperspirant agent is/are spread to form a layer 2 on a porous hydrophilic layer 1. It is preferable that the agent(s) is/are evenly spread on the porous hydrophilic layer 1. The amount of the powdery deodorant agent and/or the powdery antiperspirant agent is not limited. The amount may be from 0.1 to 10 g, preferably from 0.3 to 5
30 g, and more preferably from 0.5 to 2 g.

After the spread of the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s) on the porous hydrophilic layer 1, a water-absorbable layer 3 is placed on the layer 2 of the agent(s).

If necessary, at least one thermoplastic resin such as polyethylene in the form of a powder may be provided on or in the porous hydrophilic layer 1 or the water-absorbable layer 3, and/or may be provided in the layer 2 by mixing the thermoplastic resin with the agent(s) before being spread on the water-absorbable layer 3.
35

The thermoplastic resin may be in the form of a fiber. The thermoplastic resin in the form of a fiber may be a binder fiber or a bi-component fiber wherein a core of a first thermoplastic resin such as polypropylene or PET is coated with a second thermoplastic resin such as polyethylene.
40

Then, an adhesive layer 4 is provided on the water-absorbable layer 3, and a substrate layer 5 is placed on the adhesive layer 4.
45

Next, a combination of an adhesive layer 6 and a release layer 7 is placed on the substrate layer 5, and then the laminated layers are pressed, preferably with heat, to integrate the laminated layers. The press can be performed by any conventional means such as an iron and a compression machine. It is preferable that the press is performed by using a heat emboss process. In a case of using a relatively large amount of the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s), the multilayered sheet as shown in Figure 1 can be prepared. If the amount of the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s) is relatively small, the porous hydrophilic layer 1 may directly contact the water-absorbable layer 3. In this case, the multilayered sheet as shown in Figure 2 can be prepared.

The multilayered sheet shown in Figures 1 and 2 can be used by, first, peeling off the release layer 7 from the adhesive layer 6. Then, the adhesive layer 6 is attached to an article such as a cloth, in order to fix the laminated sheet comprising the porous hydrophilic layer 1, the water-absorbable layer 3, the adhesive layer 4 and the substrate layer 5.

With regard to the embodiment shown in Figure 3, for example, a porous hydrophilic layer 1 such as a spunlace non-woven is provided. On the porous hydrophilic layer 1, materials for forming the water-absorbable layer 3 are distributed. During the distribution, the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s) can be added. Then, the distributed product is subjected to a conventional air-laid non-woven preparation process to form the water-absorbable layer 3 made basically from an air-laid non-woven. Thus, the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s) can form a layer 2 in the water-absorbable layer 3.

If necessary, at least one thermoplastic resin such as polyethylene in the form of a powder may also be mixed with the materials for forming the water-absorbable layer 3. In addition, at least one thermoplastic resin in the form of a powder may be distributed on the porous hydrophilic layer 1, or may have been mixed in the porous hydrophilic layer 1.

The thermoplastic resin may be in the form of a fiber. The thermoplastic resin in the form of a fiber may be a binder fiber or a bi-component fiber wherein a core of a first thermoplastic resin such as polypropylene or PET is coated with a second thermoplastic resin such as polyethylene. Then, an adhesive layer 4 is provided on the water-absorbable layer 3, and a substrate layer 5 is placed on the adhesive layer 4.

Next, a combination of an adhesive layer 6 and a release layer 7 is placed on the substrate layer 5, and then the laminated layers are pressed, preferably with heat, to integrate the laminated layers. The press can be performed by any conventional means such as an iron and a compression machine. It is preferable that the press is performed by using a heat emboss process.

In a case of using a relatively small amount of the powdery deodorant agent(s) and/or the powdery antiperspirant agent(s), or using a relatively large amount of the materials for the water-absorbable layer 3, the multilayered sheet as shown in Figure 3(a) can be prepared. If the amount of the

powdery deodorant agent(s) and/or the powdery antiperspirant agent(s) is relatively large, the agent(s) may be evenly distributed in the water-absorbable layer 3 as shown in Figure 3(b).

5 The multilayered sheet according to the present invention can be used in the form of or as a pad for absorbing sweat from skin, in particular from underarm. The planar shape of the multilayered sheet according to the present invention can be changed by, for example, trimming unnecessary portions to prepare a pad adapted for a cloth or underarm.

10 The multilayered sheet according to the present invention and a pad prepared therefrom can be used by attaching the sheet or pad to, for example, a cloth which will contact the skin to sweat, such that the porous hydrophilic layer is applied to the skin, in particular the skin of an underarm.

15 If the multilayered sheet according to the present invention and a pad prepared therefrom has an adhesive layer, the adhesive layer is protected by a release layer, when unused, but the release layer is removed when used, and the adhesive layer can be attached to, for example, a cloth which will contact the skin, in particular the skin of an underarm.

20 It is preferable that the edge of the multilayered sheet according to the present invention is heat-sealed. If the edge of the multilayered sheet according to the present invention is heat-sealed, the spread of powdery deodorant agent and/or powdery antiperspirant agent from the edge will be prevented, so that the migration of the powdery deodorant agent and/or powdery antiperspirant agent can be prevented.

Examples

25 The present invention will be described in more detail by way of examples, which however should not be construed as limiting the scope of the present invention.

[Examples 1 to 7]

30 A multilayered sheet with the structure of a porous hydrophilic layer 1/a water-absorbable layer 3 (including a layer 2 of deodorant and/or antiperspirant agent(s)) /an adhesive layer 4/a substrate layer 5/an adhesive layer 6/a release layer 7 as shown in Figure 3(a) was prepared.

35 As the porous hydrophilic layer 1, a spunlace non-woven cotton fabric with 30 g/m² (gram per square meter) was used. As the deodorant and/or antiperspirant agent(s) in the layer 2, the specific active agent(s) shown in Table 1 was/were used. As the water-absorbable layer 3, an air-laid non-woven fabric based on wood pulp 50% and polyethylene/PET or polyethylene/polypropylene bi-component fibers 50% with 40 g/m² was used. As the substrate layer 5, a polyethylene film was used. As the adhesive layers 4, and 6, a hot melt adhesive was used. As the release layer 7, a conventional releasing paper was used.

40 On a porous hydrophilic layer 1, the wood pulp, and the polyethylene/PET or polyethylene/polypropylene bi-component fibers were distributed and mixed together with the specific active agent. Then, the distributed and mixed product was sucked or aspirated through

the porous hydrophilic layer 1 to form a water-absorbable layer 3, including a layer 2 of the specific active agent. Then, a hot melt adhesive and a thin polyethylene film were layered to form the adhesive layer 4 and the substrate layer 5, respectively. Then, a hot melt adhesive and a releasing paper were layered on the substrate layer 5 to form the adhesive layer 6 and the release layer 7, respectively. Thus, the multilayered sheet shown in Figure 3(a) was prepared.

Table 1

	Zinc Gluconate	Aluminum Chlorohydrate	Perlite
Example 1	1 g	-	-
Example 2	0.5 g	0.5 g	-
Example 3	0.5 g	-	0.5 g
Example 4	0.25 g	0.25 g	0.5
Example 5	-	0.5 g	0.5 g
Example 6	-	1 g	-

10 The active agent in the active agent layer 2 was not present on the surface of the multilayered sheets according to Examples 1 to 6. The multilayered sheet according to Examples 1 to 6 can be used for a long time with comfort, without irritating the skin of an underarm.

CLAIMS

1. A multilayered sheet for absorbing sweat, comprising:
at least one porous hydrophilic layer having at least one open surface;
5 at least one water-absorbable layer;
at least one substrate layer and
at least one powdery deodorant agent and/or at least one powdery antiperspirant agent,
wherein
the open surface of the porous hydrophilic layer is capable of absorbing sweat, and free
10 from the powdery deodorant agent or the powdery antiperspirant agent.
2. The multilayered sheet according to Claim 1, further comprising an adhesive layer between
the water-absorbable layer and one surface of the substrate layer.
- 15 3. The multilayered sheet according to Claim 1 or 2, further comprising an adhesive layer on
the other surface of the substrate layer.
4. The multilayered sheet according to any one of Claims 1 to 3, wherein the porous
hydrophilic layer and/or the water-absorbable layer is/are composed of at least one woven
20 or non-woven fabric.
5. The multilayered sheet according to Claim 4, wherein the porous hydrophilic layer and/or
the water-absorbable layer comprise(s) at least one selected from air-laid non-woven fabric,
wet-laid non-woven fabric, spunlace non-woven fabric and needle punched non-woven
25 fabric.
6. The multilayered sheet according to Claim 4 or 5, wherein the fabric comprises at least one
selected from the group consisting of cottons, rayons and pulps.
- 30 7. The multilayered sheet according to any one of Claims 1 to 6, wherein the water-absorbable
layer comprises at least one water-absorbable polymer.
8. The multilayered sheet according to any one of Claims 1 to 7, wherein the substrate layer
comprises at least one selected from polyurethanes and polyolefins.
- 35 9. The multilayered sheet according to any one of Claims 2 to 8, wherein the adhesive layer
comprises at least one hot-melt adhesive.
10. The multilayered sheet according to any one of Claims 1 to 9, wherein the total amount of
40 the powdery deodorant agent or the powdery antiperspirant agent is 0.1 g or more,
preferably 0.3 g or more and more preferably 0.5 g or more, per unit of the multilayered
sheet.
11. The multilayered sheet according to any one of Claims 1 to 10, wherein the deodorant agent
45 is selected from the group consisting of antibacterial agents, chelating agents, odor

absorbers, substances which block the enzymatic reactions responsible for the formation of odorous compounds, and mixtures thereof.

- 5 12. The multilayered sheet according to any one of Claims 1 to 11, wherein the antiperspirant agent is selected from the group consisting of aluminum salts, zirconium salts, silica-based inorganic materials, complexes of zirconium hydroxychloride of aluminum hydroxychloride with an amino acid, and mixtures thereof.
- 10 13. The multilayered sheet according to any one of Claims 1 to 12, further comprising at least one fragrance.
14. The multilayered sheet according to Claim 13, wherein the fragrance is coated or encapsulated.
- 15 15. The multilayered sheet according to any one of Claims 1 to 14, wherein the porous hydrophilic layer is applied to the skin, in particular the underarm skin of a user.

FIG. 1

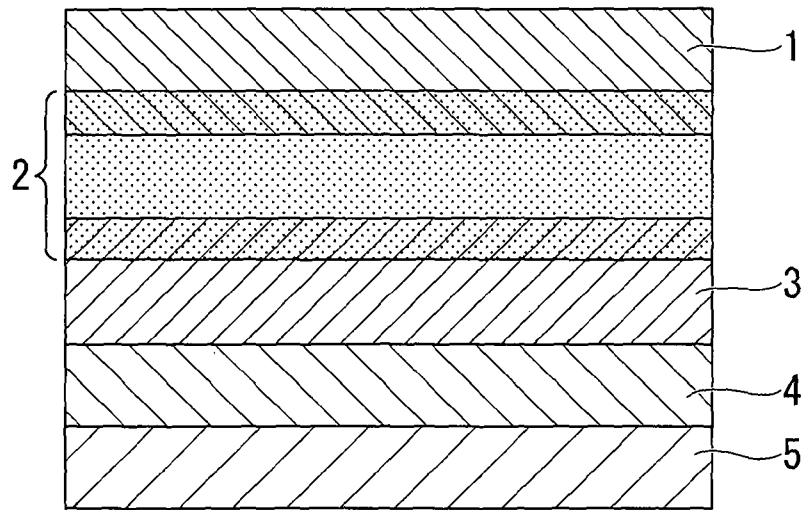


FIG. 2

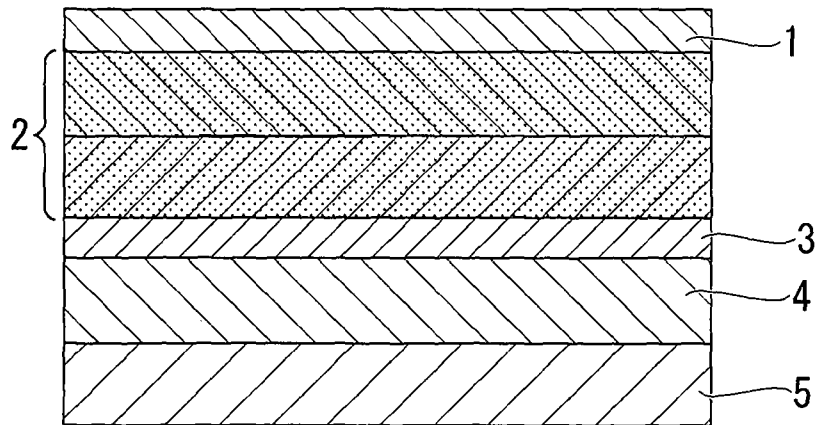
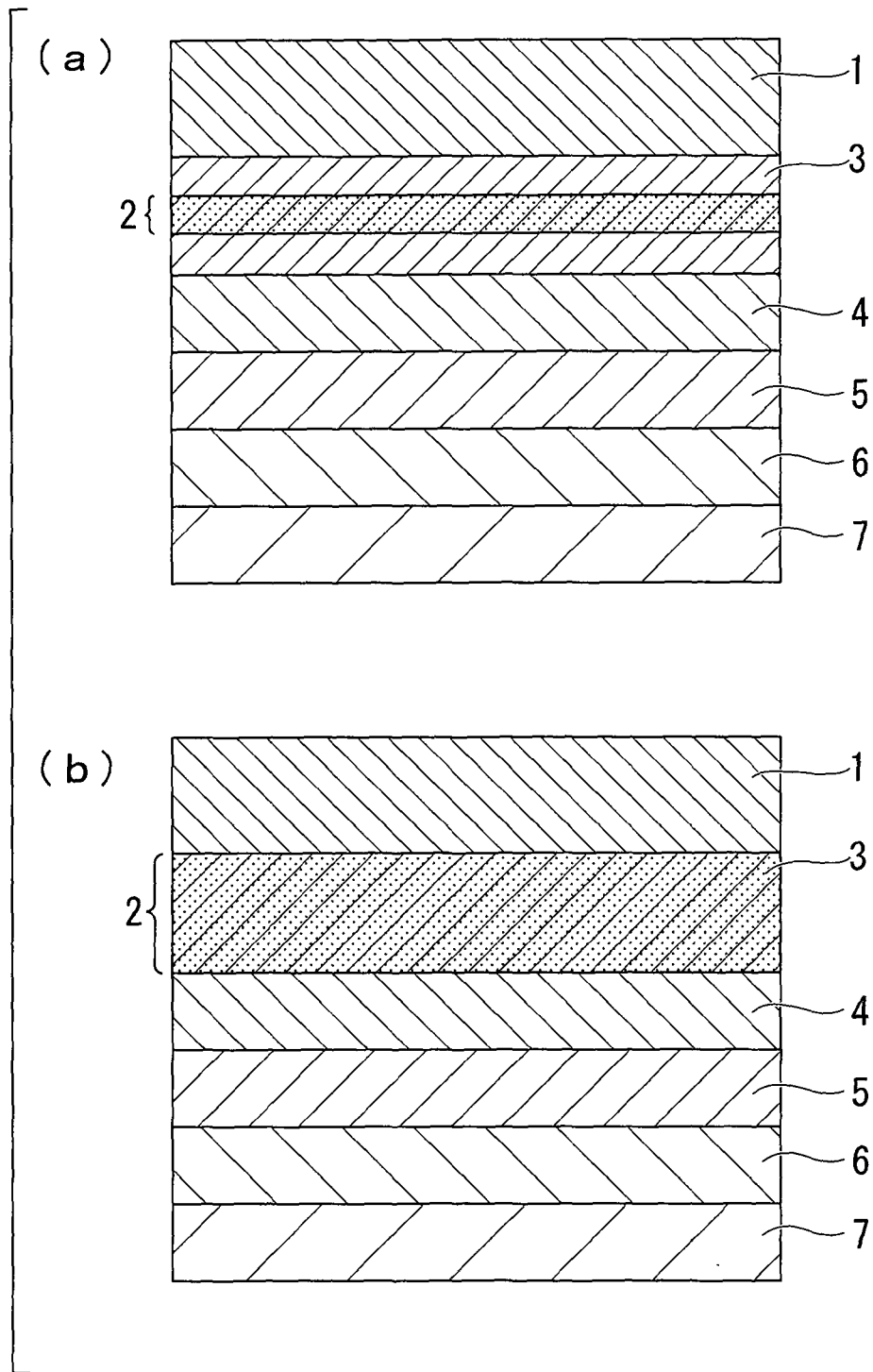


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2014/051871

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A41D27/13 B32B5/02 B32B5/08 B32B5/26 B32B27/12
 B32B27/32 B32B27/40
 ADD.
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 A61F B32B A41D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 2006/251609 A1 (SOJKA MARCI E [US] ET AL) 9 November 2006 (2006-11-09) paragraphs [0004] - [0005], [0027] - [0030], [0032] - [0037], [0039] - [0052]; figures 1-6 -----	1-6,8,9, 11-15
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 30 May 2014	Date of mailing of the international search report 06/06/2014
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Joly, Florence
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INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2014/051871

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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