

**TISSUE PAPER PRODUCT, AND PROCESS FOR MAKING THE PRODUCT**

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The present invention relates to tissue paper products comprising a tissue paper substrate and an enzyme inhibiting composition, and to a process for making the product.

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Tissue paper products have been disclosed which comprise a substrate and a soothing lotion. US-A-4 513 051, issued on 23<sup>rd</sup> April 1985, and US-A-5 525 345, issued on 11<sup>th</sup> June 1996, disclose such tissue paper products comprising lotion for use as facial tissues and toilet tissues. Tissues are rubbed against the skin when used and this can cause a painful raw or red skin to develop. This is particularly the case when someone is afflicted with a cold and needs to blow their nose frequently. The soothing lotion is intended to reduce the rawness and redness of the skin by making the surface of the tissue paper substrate less harsh and sometimes by also applying an emollient to the skin.

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EP-A-0 117 613, published on 5<sup>th</sup> September 1984, discloses agents for the treatment and prophylaxis of diaper rash and diaper dermatitis. The disposable absorbent articles which are disclosed are diapers, incontinence pads and wipes. Various agents are disclosed including petrolatum, zinc oxide and other metal salts, and triacetin.

The object of the present invention is to provide a tissue paper product, which comprises a tissue paper substrate, which reduces painful skin conditions,

in particular in the nasal area and in the perianal area, by providing a tissue paper product which delivers an active agent on to the skin when it is used.

### Summary of the Invention

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The object of the invention is achieved by means of an enzyme inhibiting composition, the enzyme inhibiting composition being transferable from the tissue paper substrate onto the skin and being present in an amount sufficient to inhibit enzyme activity upon the skin. Preferably the tissue paper product  
10 comprises a tissue paper substrate and a topically applied lotion, the topically applied lotion comprising the enzyme inhibiting composition. A preferred use of the tissue paper of the present invention is as a facial handkerchief.

In a preferred process, the tissue paper product of the present invention is  
15 made by a wet-laying process.

### Detailed Description of the Invention

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The tissue paper substrate useful in the present invention may be made by common methods well-known to the person skilled in the art, such as by dewatering suitable pulp furnishes using, for example, papermakers felt. This process may be carried out in batch, but commercially it is usually carried out on continuous papermaking machines. Highly preferred tissue paper may be made  
25 by the processes described in US-A-3 301 746, published on January 31<sup>st</sup> 1967, or EP-A-0 140 404, published on May 8<sup>th</sup> 1985. Paper made according to EP-0 140 404 is composed of first and second regions, the first region having a macroscopically monoplanar, patterned, continuous network having a high density and a low basis weight relative to the second region, and the second  
30 region being composed of a high basis weight and plurality of discrete domes having low densities relative to the first region. The preferred average density of the first, network, region is from 0.4 to 0.8 gram per cubic meter and the average

density of the domes of the second region is from 0.04 to 0.15 gram per cubic centimeter. Optional steps for the process of making the web, or for subsequent processing, include foreshortening, or creping; embossing and printing.

5       A suitable pulp furnish for the process of making the tissue paper substrate preferably contains papermaking fibres consisting essentially of cellulose fibres (commonly-known as wood pulp fibres) or cellulose-derived fibres (including, for example, rayon, viscose). Fibres derived from soft woods (gymnosperms or coniferous trees) and hard woods (angiosperms or deciduous trees) are  
10       contemplated for use in this invention. The particular species of tree from which the fibres are derived is immaterial. The wood pulp fibers can be produced from the native wood by any convenient pulping process. Chemical processes such as sulfite, sulphate (including the Kraft) and soda processes are suitable. Mechanical processes such as thermochemical (or Asplund) processes are also  
15       suitable. In addition, the various semi-chemical and chemi-mechanical processes can be used. Bleached as well as unbleached fibers are contemplated for use.

      The tissue paper product of the present invention preferably has a basis weight of from 10 to 100 grams per square metre, more preferably from 25 to 60  
20       grams per square meter, and may, optionally, consist of multiple plies. Preferably the tissue paper product consists of between 2 and 4 plies. The term "tissue paper substrate" as used herein refers to one or more plies of tissue paper.

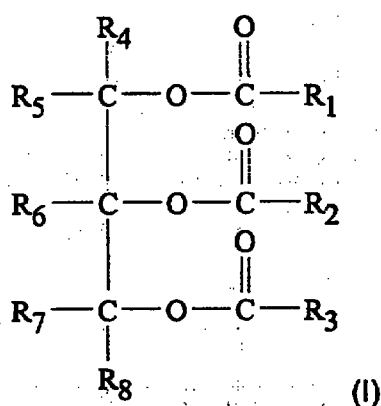
      By "enzyme inhibiting composition" what is meant herein is any composition  
25       which comprises an active component to inhibit enzyme activity on the human skin. Preferred active components of enzyme inhibiting compositions include lipase inhibitors, protease inhibitors.

      Painful or irritating "red nose" conditions are reduced or alleviated by  
30       transferring on to the nasal area an enzyme inhibiting composition which inhibits the activity of one or more enzymes which are present in human mucus. Similarly painful or irritating conditions caused by damaged or weakened skin in the

perianal region are reduced or alleviated by transferring an enzyme inhibiting composition to the perianal region which inhibits the activity of one or more enzymes which are present in human faeces or urine. Particularly suitable active components of enzyme inhibiting compositions may be selected from the ester

5 compounds, including:

(a) a triester compound of the formulation:



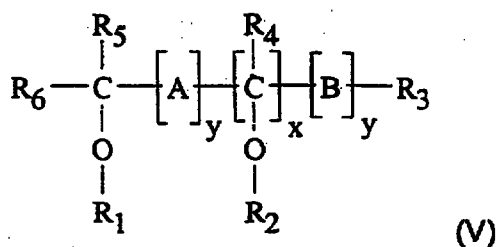
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wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are independently an alkyl or alkenyl or hydroxyalkyl group with from 1 to 22 carbon atoms, and R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are independently selected from the group consisting of C<sub>1</sub>-C<sub>10</sub> linear or branched alkyl, alkenyl or hydroxyalkyl groups, hydroxy, chloride, bromide, amine or hydrogen ;

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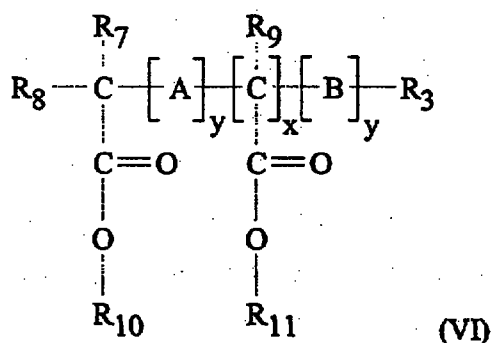
A highly preferred additional ester compound for use in, or for preparation of the compositions of the invention is of the formulation:

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or

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- wherein R<sub>1</sub> and each R<sub>2</sub> independently are an acyl group with from 2 to 22 carbon atoms, or an alkyl, alkenyl, arylalkyl, hydroxyalkyl group with from 1 to 24 carbon atoms or hydrogen, whereby at least one of R<sub>1</sub> and R<sub>2</sub> is such an acyl group, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub> are independently an alkyl, alkenyl, arylalkyl, hydroxyalkyl, alkoxy groups of from 1 to 24 carbon atoms, hydroxy group or hydrogen; R<sub>10</sub> and R<sub>11</sub> are independently an alkyl, alkenyl, arylalkyl, hydroxyalkyl, alkoxy groups of from 2 to 24 carbon atoms, hydroxy group or hydrogen; A and B are independently a C<sub>1</sub>-C<sub>6</sub> linear or branched alkylene, alkenylene, alkoxy, hydroxyalkylene groups; the values of x are independently from 0 to 15; the values of y are independently 0 or 1, with the proviso that when x = 2 and y = 0, at least one R<sub>2</sub> is an alkyl, alkenyl, arylalkyl, hydroxyalkyl group with from 1 to 24 carbon atoms or hydrogen

It should be understood that for the purpose of this invention, the groups  $R_1$ - $R_{11}$  of formulations (V) and (VI) above can be substituted by any appropriate substituent group.

5 Preferred are the ester compounds as defined above, wherein the compound is of formula (V) or (VI) wherein  $x$  is 1 or 2,  $y$  is 0;  $R_1$  and one  $R_2$  are a  $C_2$ - $C_{16}$  acyl group,  $R_{10}$  and one or more  $R_{11}$  are a  $C_2$ - $C_{16}$  alkyl group;  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$  and  $R_8$  are hydrogen

10 It is highly preferred that the additional ester compound is a mono or diester of formula (VI), most preferably a mono or diester of citric acid or tartaric acid (or salts thereof), or a triester of citric acid.

Another highly preferred component of the enzyme inhibiting composition is triacetin. Triacetin, (1,2,3-propanetriol triacetate), is a colourless, oily liquid which  
15 is known as a topical anti-fungal. The Merck Index, 9<sup>th</sup> Edition, page 1232, Merck and Co. (1976). The "self-regulating" action of triacetin is known, i.e. it is known that at the neutral or higher pH of the affected skin glycerol and free fatty acid (acetic acid) are rapidly liberated from triacetin as a result of the action of the  
20 esterase enzymes found abundantly in skin, serum, and fungi. The growth of the fungi is inhibited by the free fatty acid.

The enzyme inhibiting composition is present in an amount sufficient to inhibit enzyme activity upon the skin, preferably from 0.05% to 10%, and more  
25 preferably from 0.5% to 5%, by weight of the tissue paper product.

The preferred process for the manufacture of the tissue paper substrate is a wet laying process comprising the steps of:

30 wet-laying a pulp to form a web, the pulp containing fibres consisting essentially of cellulose fibres or cellulose-derived fibres;

drying the web to form a ply of a tissue paper substrate;

optionally combining two or more plies to provide the tissue paper substrate;

5 topically applying an enzyme inhibiting composition, the enzyme inhibiting composition being transferable from the tissue paper substrate onto the skin and being present in an amount sufficient to inhibit enzyme activity upon the skin.

One preferred way of topically applying the enzyme inhibiting agent is to  
10 apply it to the surface of the tissue paper substrate, for example in the form of a lotion. In addition to the enzyme inhibiting composition, the lotion may optionally also comprises softening/debonding agents, emollients, immobilizing agents and mixtures thereof. Suitable softening/debonding agents include quaternary ammonium compounds, polysiloxanes, and mixtures thereof. Suitable emollients  
15 include propylene glycol, glycerine, triethylene glycol, spermaceti or other waxes, fatty acids, fatty alcohols and fatty alcohol ethers having from 12 to 28 carbon atoms in their fatty acid chain, and mixtures thereof. Suitable immobilizing agents include polyhydroxy fatty acid esters, polyhydroxy fatty acid amides and mixtures thereof. Other optional components include perfumes, antibacterial actives,  
20 antiviral actives, disinfectants, pharmaceutical actives, film formers, deodorants, opacifiers, astringents, solvents and the like.

One preferred way of topically applying the enzyme inhibiting agent or lotion is to apply it to the surface of the tissue paper substrate by any of a number of  
25 conventional methods including spraying, printing (for example, flexographic printing), coating (for example, gravure coating), extrusion or combinations of these application techniques, for example spraying the lotion on to a rotating surface, such as a calendar roll, that then transfers the composition to the surface of the tissue paper substrate. The lotion composition can be applied to  
30 one surface of the tissue paper substrate, or both surfaces. Preferably, the lotion is applied to both surfaces of the paper web.

The manner of applying the lotion composition to the tissue paper web should be such that the web does not become saturated with the lotion composition. If the web becomes saturated with the lotion composition, there is a greater potential for debonding of the paper to occur, thus leading to a decrease in the tensile strength of the paper. Also, saturation of the paper is not required to obtain the softness and lotion-like feel benefits from the lotion composition.

### Examples

#### Example 1

A four-ply tissue paper product is made having a total basis weight of 60.4 g/m<sup>2</sup> for the product, which is a facial handkerchief. The tissue paper plies are made by removing water from a pulp furnish using a commercially available paper making machine. The furnish composition is based on 40% Northern Softwood Kraft long fibre pulp (provenience Soedra, chlorine free bleached) and 60% hard wood fibre (Eucalyptus, provenience Ponte Vedra, chlorine free bleached). The paper is creped and dried to 5.5% of residual moisture. The tensile strength in the machine direction is about 23 Newtons per 50 millimetres, and the tensile strength in the cross-machine direction is about 12 Newtons per 50 millimetres. Four essentially identical plies, each with a basis weight of 15.1 g/m<sup>2</sup>, are converted to form the four-ply tissue paper substrate.

Onto this substrate a lotion is printed from both outer surface sides. The total amount of lotion printed onto the tissue is 4.5% of its dry weight.

The composition of the lotion is: 3.8% by weight of triacetin, 7% by weight of a quaternised fatty acid ester (C18 alkyl), 3.5% by weight of alkylpolyglycol (Alkyl being C2, MW 18 - 20000), 0.1% by weight of silicon oil defoamer of low viscosity, and water to balance to 100%.

#### Example 2

A three-ply paper product is made having a total basis weight of 48.6 g/m<sup>2</sup> for the product, which is a toilet paper. The tissue paper plies are made by removing water from a pulp furnish using a commercially available, through-air-drying paper making machine. The furnish composition is based on 35% Northern Softwood Kraft fiber pulp, 12% of CTMP (chemothermo mechanical pulp) and 45% hard wood eucaluptus pulp and 8% of machine broke. The paper is creped and dried to 6% of residual moisture content. The tensile strength in the machine direction is about 15 Newtons per 50 millimeters and in the cross-machine direction the tensile strength is about 8 Newtons per 50 millimetres. Three essentially identical plies, each with a basis weight of 16.2 g/m<sup>2</sup> are converted to form the three-ply tissue paper substrate.

Onto this substrate a lotion is applied by rotogravure printing onto the outer surface (the surface that comes to the outside of the final roll of toilet paper). The quantity applied is 8.5 % based on the air dry paper weight. The application temperature is 58°C.

The lotion consists of 5.7% by weight of triacetin, 16% by weight of stearyl alcohol, 7.1 % by weight of cetyl alcohol, 10.5% by weight of paraffin, 9.3% by weight of steareth-2, and mineral oil to balance to 100%.



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## WHAT IS CLAIMED IS:

1. A tissue paper product comprising a tissue paper substrate and an enzyme inhibiting composition, the enzyme inhibiting composition being transferable from the tissue paper substrate onto the skin and being present in an amount sufficient to inhibit enzyme activity upon the skin.
2. A tissue paper product according to claim 1 comprising a tissue paper substrate and a topically applied lotion, the topically applied lotion comprising the enzyme inhibiting composition.
3. A tissue paper product according to either of claims 1 or 2 wherein the enzyme inhibiting composition comprises inhibitors of enzymes present in human mucus.
4. A tissue paper product according to claim 3 wherein the enzyme inhibiting composition comprises inhibitors selected from the group consisting of lipase inhibitors, protease inhibitors, and mixtures thereof.
5. A tissue paper product according to any of claims 1 to 4 wherein the enzyme inhibiting composition comprises one or more ester compounds.
6. A tissue product according to claim 2 wherein the topically applied lotion further comprises a softening agent selected from the group consisting of quaternary ammonium compounds, polysiloxanes and mixtures thereof.

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7. A tissue paper product according to any of the previous claims wherein the tissue paper product has a basis weight of from 10 to 100 grams per square metre, preferably from 25 to 70 grams per square meter.
- 5 8. Use of an enzyme inhibiting agent in the manufacture of a facial handkerchief for the inhibition of enzyme activity upon the skin of the nasal region.
9. A process for the manufacture of a tissue paper product comprising the  
10 steps of:  
wet-laying a pulp to form a web, the pulp containing fibres consisting essentially of cellulose fibres or cellulose-derived fibres;  
drying the web to form a ply of a tissue paper substrate;  
optionally combining two or more plies to provide the tissue paper  
15 substrate;  
topically applying a lotion;  
characterised in that the lotion comprises an enzyme inhibiting composition, the enzyme inhibiting composition being transferable from the tissue paper substrate onto the skin and being present in an amount sufficient to inhibit  
20 enzyme activity upon the skin.
10. A process according to claim 9 wherein the lotion is either sprayed or printed on to the tissue paper substrate.