Antimicrobial Wiping Article

The use of an antimicrobial agent in the manufacture of a disposable wiping article capable of reducing the number of microbes transferred to the hand when wiping a surface with the disposable wiping article is described. A disposable wiping article having an antimicrobial agent in an antimicrobially effective amount capable of inhibiting such transfer is also provided.
Antimicrobial Wiping Article

This invention relates to wiping articles, in particular, single use disposable wiping articles such as toilet tissue, baby wipes and kitchen wipes.

It is well known that diseases may be spread through the transfer of bacteria and other microbes via the hands. In particular, bacteria such as *Escherichia coli*, present in human faeces, and *Salmonella*, present in uncooked meat, both of which are a source of food poisoning, are easily transferred in this manner.

In view of this, the maintenance of hygiene standards, particularly in the food preparation industry, is of great importance. Surfaces on which uncooked meat has been prepared should be cleaned after use. Typically, this may be done by using a wiping article. Single-use disposable wiping articles, such as kitchen paper, and multiple-use wiping articles, such as cloths made from woven and non-woven fabrics, are all well known in the art.

However, many such wiping articles do not present a significant barrier to the transfer of microbes. Therefore, the use of such wiping articles allows a significant proportion of microbes to transfer to the hands. Similarly, the use of conventional toilet tissues allows a significant level of bacteria such as *Escherichia coli* to transfer to the hands. There therefore exists the possibility of reinfection via this route.

Standard hygienic practices, such as washing one’s hands after situations where microbes have been transferred, such as going to the toilet and handling of uncooked meats, will obviously reduce by a significant extent the numbers of microbes present.

However, it would be advantageous to prevent or at least reduce the transfer of microbes in the first place, therefore reducing the level of contamination on the hands (the
‘bioburden’) that needs to be removed by standard hygienic practice such as hand washing.

Therefore, it is an object of the present invention to provide a wiping article which reduces the level of microbes transferred from the surface being cleaned by the wiping article to the wiping hands.

It is known in the art to apply antimicrobial agents to wiping articles such as dishcloths and wet wipes, usually to inhibit the growth of microbes on the wiping article and thereby preserve the article for further use. Wiping articles having an antimicrobial agent applied thereto are disclosed in, for example, GB-A-2323784, WO 97/16066, WO 96/24329, WO 95/17175, WO 93/25077, WO 87/06470, WO 87/01400, US 5656361, US 5334388 and US 4929498. However, none of these documents disclose that the antimicrobial agent may inhibit the transfer of microbes from the surface being cleaned by the wiping article to the wiping hands.

According to a first aspect of the invention, there is provided the use of an antimicrobial agent in the manufacture of a disposable wiping article in order to reduce the number of microbes transferred to the hand when wiping a surface with said disposable wiping article.

By ‘disposable wiping article’ is meant any article conventionally used for the wiping of surfaces, particularly surfaces which are likely to be contaminated with microbes, and which are generally disposed of after a single use. The disposable wiping articles may be made from a wide variety of materials, such as paper or woven or non-woven fabric materials. Examples of the disposable wiping articles according to the invention include disposable toilet wiping articles such as toilet tissue, moistened toilet wipes and baby wipes, and disposable wiping articles for use in the kitchen such as kitchen roll or towel.

The disposable wiping article may take the form of a single sheet, in particular a sheet of suitable dimension so that it may easily be held in the hand. Typically, a plurality of
such sheets may be packaged and sold together. Alternatively, the disposable wiping article may be an elongated article, for example a roll or strip; the required amount of material for each use may be removed from the elongated article, for example by tearing. The elongated article may be further provided with points of weakness to enable the user to tear material off it.

According to a second aspect of the invention, there is provided a disposable wiping article having an antimicrobially effective amount of an antimicrobial agent so as to reduce the number of microbes transferred to the hand when wiping a surface with said disposable wiping article.

According to a third aspect of the invention, there is provided a method of reducing the number of microbes transferred to a hand through a disposable wiping article when wiping a surface with said wiping article by means of an antimicrobially effective amount of an antimicrobial agent present in or on said wiping article.

The antimicrobial agent may be any agent commonly known in the art to have a microbicidal effect, *i.e.* known to kill or otherwise inactivate microbes such as bacteria, viruses and fungi. A single antimicrobial agent or mixtures of two or more antimicrobial agents may be used.

Ideally, the antimicrobial agent should fulfil as many as possible of the following criteria:

1. It must have low toxicity, in particular when in contact with the skin.
2. It must be effective at low dosages.
3. It must have a broad spectrum of antimicrobial activity.
4. It must be active in the presence of soiling matter.
5. It must not be neutralised by the material of the wiping article.
6. It must not bind with the material of the wiping article.
Many antimicrobial agents known in the art fulfil these criteria. Examples of suitable antimicrobial agents include but are not limited to: phenols such as phenol itself, 2-methyl-5-isopropylphenol (carvacrol), 4-chloro-3,5-dimethylphenol (chloroxylenol), 4-chloro-2-benzylphenol (chlorophene), 2,4-dichloro-3,5-dimethylphenol (dichlorometaxylenol or DCMX), 1,2,4-trichlorophenol (TCP®,) methyl p-hydroxybenzoate (methyl paraben), butyl p-hydroxybenzoate (butyl paraben); isothiazolinone compounds such as 1,2-benzisothiazoline-3-one; pyrazole compounds such as dimethylhydroxymethylpyrazole; oxidising agents, including peroxides such as hydrogen peroxide, urea hydrogen peroxide, and succinyl peroxide; quinolines such as aminoquinuride, benzoxiquine, broxyquinoline, chloroxine, chlorquinaldol, cloxyquin, ethlylyhydrocupreine, euprocin, halquinol, hydrastine, 8-hydroxyquinoline, 8-hydroxyquinoline sulfate and iodochlorhydroxyquin; quaternary ammonium compounds such as amantanium bromide, benzethonium chloride, benzoxonium chloride, cetalkonium chloride, cetethonium chloride, cetetylpyridinium chloride, dequalinium acetate, dequalinium chloride, dodecylarylammonium chloride (Halimide®), laurolinium acetate, methyl benzethonium chloride, phenoctide, tibezonium iodide, triclobisonium chloride; guanidines such as alexidine, ambazone, chlorhexidine and picloxyidine; and aldehydes such as methanal (formaldehyde) and 1,5-pentanial (glutaraldehyde).

The means by which the antimicrobial agent inhibits the transfer of microbes through the article to the hands is not fully understood. However, it is believed that the antimicrobial agent acts as a barrier to the transfer of microbes through the wiping article.

A hydrophobic antimicrobial agent is preferred. Such an agent is believed to be particularly effective in that a layer in, or on the surface of, the wiping article provides a hydrophobic barrier which inhibits the movement of microbes (which are generally hydrophilic) through the wiping article. The term “hydrophobic” as used herein refers to a substance which is incapable of completely dissolving in an excess of water (a
suitable test in this regard may be to allow the agent to stand in an excess of water for a period of 24 hours).

Preferably, the antimicrobial agent is a phenolic compound selected from phenol and phenols substituted on the aromatic ring by 1 to 5 substituents selected from the group consisting of alkyl groups having 1 to 6 carbon atoms, alkoxy groups having 1 to 6 carbon atoms, hydroxy groups, halogen atoms, carboxy groups, alkoxy carbonyl groups having from 1 to 8 carbon atoms and aralkyl groups in which the aryl part has from 6 to 10 carbon atoms in a carboxyclic ring and the alkyl part has from 1 to 4 carbon atoms. More preferably, the antimicrobial agent is a phenol substituted on the aromatic ring with from 1 to 4 substituents selected from the group consisting of alkyl groups having 1 to 4 carbon atoms, alkoxy carbonyl groups having from 1 to 6 carbon atoms and halogen atoms. A particularly preferred example of an antimicrobial agent is 2,4-dichloro-3,5-dimethylphenol (hereinafter referred to as dichlorometaxylenol or DCMX).

The dosage of antimicrobial agent to be applied to the disposable wiping article depends on various factors such as the size, weight and absorbency of the wiping article and the efficacy and toxicity of the antimicrobial agent. Typically, a dosage of between 0.001 to 1 g antimicrobial agent could be used, preferably 0.002 to 0.1 g, more preferably 0.005 to 0.5 g, still more preferably 0.01 to 0.2 g.

When the disposable wiping article is toilet tissue, a dosage of 0.002 to 0.1 g antimicrobial agent per sheet is typically used; a dosage of 0.01 to 0.1 g is preferred. In a particularly preferred example, 0.04 g of antimicrobial agent may be applied to a standard sheet of toilet paper of dimensions 125 x 110 mm to give a concentration of 0.29 mg/cm².

In a preferred embodiment of the invention, a solvent or other carrier or diluent is used to disperse the antimicrobial agent and facilitate its distribution on the surface of the wiping article. The solvent is preferably a non aqueous solvent, as many of the antimicrobial agents referred to above are more soluble in such solvents than in water.
It is particularly preferred that the solvent is a hydrophobic solvent, as residual solvent (particularly in combination with a hydrophobic antimicrobial agent) may present a hydrophobic barrier to hydrophilic microbes.

Examples of suitable solvents include but are not limited to: alkanes having from 5 to 30 carbon atoms such as pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane, tridecane, tetradecane, pentadecane, hexadecane etc. and mixtures thereof, in particular mixtures such as mineral oil; monohydric alcohols having from 1 to 6 carbon atoms such as methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-butanol, 1-pentanol, 2-pentanol, 3-pentanol, 1-hexanol, 2-hexanol, 3-hexanol, 2-methyl-1-propanol, 2-methyl-2-propanol and mixtures thereof; dihydric alcohols having from 2 to 6 carbon atoms, particularly vicinal dihydric alcohols (glycols) having from 2 to 4 carbon atoms such as ethylene glycol, propylene glycol, butylene glycol and mixtures thereof; trihydric alcohols having from 3 to 6 carbon atoms such as 1,2,3-propanetriol (glycerol), mono-, di- and tri-esters in which the part containing the or each alkanoyl group has from 1 to 20 carbon atoms and the part containing the or each alkoxy group has from 1 to 20 carbon atoms, particularly glyceryl esters such as glyceryl caprate and glyceryl caprylate; and mixtures thereof.

Preferred solvents include ethanol, 1-propanol, 2-propanol, ethylene glycol, propylene glycol, glyceryl caprate and glyceryl caprylate; more preferred solvents are ethanol and propylene glycol. Propylene glycol is particularly preferred as it exhibits antimicrobial activity in its own right, therefore enhancing the antimicrobial activity of the impregnated wiping article.

Alternatively, the diluent may take the form of a grease or wax. This would be particularly advantageous where the wiping article is intended for infants, as if suitable waxes were used, the wiping article would also be useful in the prevention of nappy rash. Examples of suitable grease or wax diluents include, but are not limited to: natural waxes including vegetable waxes such as carnauba wax, cuassu wax, candelilla wax, ouricuri wax, raffia wax, palm wax, esparto wax, sugar cane wax and cotton wax;
animal waxes such as beeswax and lanolin; mineral waxes such as paraffin waxes, microcrystalline waxes and petroleum wax; synthetic waxes such as fatty acid esters of di- or trihydric alcohols, including but not limited to glyceryl distearate, glyceryl monostearate, ethylene glycol monostearate; polyethylene glycol waxes such as Carbowax® and polypropylene glycol waxes.

A surfactant may also be used to further facilitate the distribution of the antimicrobial agent on the surface of the disposable wiping article. Any surfactant known in the art may be used; however, it is preferred that the surfactant does not adversely affect the inhibition of microbial transfer through the wiping article. Any of the known classes of surfactants, for example anionic surfactants, cationic surfactants, amphoteric surfactants, zwitterionic surfactants or non-ionic surfactants may be used; of these, anionic surfactants and non-ionic surfactants are preferred.

Preferred classes of anionic surfactants include fatty acid soaps (ie soaps derived from the saponification of fatty acid triglycerides with an alkali), of which soap derived from the saponification of castor oil with sodium hydroxide is particularly preferred; other possible examples of anionic surfactants include alkylbenzene sulphonates such as sodium dodecylbenzene sulphonate.

Preferred classes of non-ionic surfactants include alkoxylated primary and secondary alcohols, especially ethoxylated alcohols, polyoxyethylene ethers of alkyl phenols, polyoxyethylene ethers of fatty acid alcohols, and glycol esters.

Examples of further ingredients which may be present include, but are not limited to olfactory compounds, emollients or other commonly used cosmetic ingredients such as aloe vera, calendula and the like.

The antimicrobial agent may be applied to the disposable wiping article by any method commonly known in the art. Examples of application processes include, but are not limited to: spraying the antimicrobial agent, optionally diluted with a solvent or other
carrier or diluent, onto the wiping article; dipping or soaking the wiping article into a solvent or other carrier or diluent containing the antimicrobial agent, or supplying the antimicrobial agent during the process for manufacturing the disposable wiping article. Preferably, the antimicrobial agent is applied to the disposable wiping article by spraying a solution of the antimicrobial agent onto the wiping article.

The development of the invention will now be described by way of the following, non-limiting examples.

**Experiment 1 - Bacterial Transfer Risk Assessment**

A series of experiments were undertaken to investigate the transfer possibility, and if proven, the development of toilet paper products and moist toilet wipes with antibacterial properties as an aid to hygiene.

Due to the nature of the products under investigation and their intended use, *Escherichia coli* NCIMB 9517 was chosen as the experimental bacterial organism as it is similar to the strains frequently present in human faeces. The media chosen was MacConkey No. 3 agar, commonly used for coliform isolation.

MacConkey agar was prepared as per the manufacturer’s instructions and autoclaved at 121°C for 20 minutes. The agar when cooled to 45°C was then poured aseptically into petri dishes and allowed to set. Individual product sheets were aseptically cut to fit inside a petri dish. The product circle was then placed on top of a pre set agar plate. A square area was cut with a sterile scalpel from a separate agar plate; this was then placed on top of the product circle creating a sandwich effect.

To the top agar square 24hr culture was stabbed through the agar to the product every 1 cm, across and down to create a dotted effect. With this stabbing method care was taken not to penetrate the surface of the product with the platinum wire used.
The products tested were as follows:
A. Soft Toilet Paper
B. Standard Moist Toilet Wipes

Control plates were performed as follows:
C. Method as above without culture added to the top agar
D. Without the toilet paper

All petri dishes were incubated and then inverted at 37°C for 24 hours.

The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Test</th>
<th>Product/Control</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Toilet paper/culture</td>
<td>Bacterial growth present on both top and base agar</td>
</tr>
<tr>
<td>B</td>
<td>Moist Wipes/culture</td>
<td>Bacterial growth present on both top and base agar</td>
</tr>
<tr>
<td>C</td>
<td>Toilet paper without culture</td>
<td>No growth on top or base agar</td>
</tr>
<tr>
<td>D</td>
<td>Agar on agar without paper</td>
<td>Bacterial growth present in both top and base agar</td>
</tr>
</tbody>
</table>

As the bacterial contamination of the base agar for both the toilet paper and moist wipe product were of a similar level to that of the stabbed agar on agar this demonstrates that transfer of bacteria through these products occurs readily.

The results of Experiment 1 show that it would be advantageous to apply an antimicrobial agent to the above products for the protection of the user.

The invention will now be described below in relation by the following, non-limiting example of toilet paper coated with an antibacterial agent.
Experiment 2 - Antibacterial Toilet Paper

To produce an antibacterial toilet paper a chosen antibacterial agent would need to be either incorporated into the paper manufacturing process or applied to the paper after manufacture.

2,4-dichloro-3,5-dimethylphenol (dichlormetaxylenol or DCMX) was chosen as the test antimicrobial agent.

A solvent was used to facilitate even distribution of the DCMX on the tissue. As DCMX is not water soluble and water would also create a wet layer on the surface, ethanol was used as an alternative as it would evaporate from the tissue leaving only the antimicrobial agent on the product. The antimicrobial agent was applied by using a fine mist spray; the dosage was determined by weighing before and after application.

Both single layer and double layer trials were performed as Europeans tend to fold toilet paper prior to use.

Experiment 1 was repeated using a range of strengths of DCMX solutions dosed onto the toilet paper at 0.17g / sheet to determine an active level of antimicrobial agent. The active level of DCMX would be represented by the point at which the transfer of the culture was prevented indicated by negative growth on the base agar.

Growth of the culture was prevented at 0.0034g DCMX per sheet for single layer paper. Less was required for double layer usage.

The experimented was repeated using propylene glycol as the solvent. Similar results to those of ethanol were achieved.
Experiment 3 - Introduction of a reduced contact time

All trials performed to date had an antimicrobial agent / culture contact time of 24 hours. As the practical user would be in contact with the product for approximately 4-6 seconds the method was adjusted to 4 seconds to create a more realistic contact time.

An applied pressure was also introduced into the method simulating the pressure applied by the hand ‘in use’. This was determined by mimicking the wiping action on the surface of a balance. The maximum pressure applied was recorded by weight and the average result taken (approximately 650g).

The previous DCMX dosage levels were repeated on both single layer and double layer tissue using this modified method (see Experiment 4 below).

Experiment 4 - Reduced contact time and applied weight

Pre set MacConkey agar plates were prepared as in Experiment 1. The plates were then stabbed with a 24 hr culture and incubated for 24 hrs at 37°C.

After incubation a pre-dosed tissue was gently laid across the surface where the organism growth was present. A pre-sterilised glass flask was then placed on the tissue pressing it down onto the surface of the plate and the culture. This was held down with a weight of 650g for 4 seconds. The weight and flask were then removed and the tissue peeled carefully from the surface of the agar.

The tissue was then placed with the side that had been in contact with the culture face up onto a separate MacConkey agar plate. The flask and weight were reapplied for a further four seconds after which the tissue was removed and destroyed. The second agar plate was then incubated for 24hrs at 37°C. The results are shown in Figure 1 and Table 2.
Table 2 - Inhibition of Bacterial Transfer by Administration of DCMX

<table>
<thead>
<tr>
<th>Test No</th>
<th>Dosage DCMX, g/sheet</th>
<th>Inhibition of Bacterial Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0.01</td>
<td>Negligible</td>
</tr>
<tr>
<td>9</td>
<td>0.015</td>
<td>Negligible</td>
</tr>
<tr>
<td>10</td>
<td>0.02</td>
<td>Negligible</td>
</tr>
<tr>
<td>11</td>
<td>0.025</td>
<td>Slight</td>
</tr>
<tr>
<td>12</td>
<td>0.03</td>
<td>Slight</td>
</tr>
<tr>
<td>13</td>
<td>0.035</td>
<td>Significant</td>
</tr>
<tr>
<td>14</td>
<td>0.04</td>
<td>Almost total</td>
</tr>
<tr>
<td>15</td>
<td>0.045</td>
<td>Total</td>
</tr>
</tbody>
</table>

The results obtained for single layer tissue demonstrated that the application of DCMX to toilet paper at a level of 0.04g per sheet was required. This is greater than the previous method due to the reduced contact time and the applied weight pressure. All double layer tissue results of the same DCMX concentration level demonstrated negative transfer.

The above results demonstrates that the application of DCMX to toilet paper at a level of 0.04g per sheet would protect the user by preventing the transfer of bacteria through the paper in use.

Experiment 5 - Antibacterial Moist Toilet Wipes

For the development of antibacterial moist toilet wipes experiment 1 was performed with a range of moist wipe products including a current standard moist toilet wipe. Also included was an antibacterial surface wipe product.

All the product types tested resulted in positive transfer of culture onto the base agar. The results indicated that the water in the formulation was acting as a carrier for the culture through the wipe products faster than the active ingredients were able to take
effect (proven by the results for the antibacterial wipes). As such the water would have to be replaced by a fluid that would create a barrier to slow / prevent the process of transfer, *ie* an oil.

Several trial fluids (including water as a control) were dosed at the recommended weight on to air laid fabric at 2.7 x dry weight without the addition of actives or preservatives. Each of the fluids was then tested by the reduced contact time and applied pressure method to determine which fluid without the presence of any preservatives would reduce the transfer greatest. The results can be seen in Figure 2 and Table 3.

**Table 3 - Base Fluid Bacterial Transfer Assessment**

<table>
<thead>
<tr>
<th>Test No</th>
<th>Fluid</th>
<th>Inhibition of Bacterial Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water</td>
<td>Negligible</td>
</tr>
<tr>
<td>2</td>
<td>50% water, 50% propylene glycol</td>
<td>Slight</td>
</tr>
<tr>
<td>3</td>
<td>100% propylene glycol</td>
<td>Significant</td>
</tr>
<tr>
<td>4</td>
<td>100% lotion concentrate</td>
<td>Negligible</td>
</tr>
<tr>
<td>5</td>
<td>50% water / 50% lotion concentrate</td>
<td>Slight</td>
</tr>
<tr>
<td>6</td>
<td>50% propylene glycol, 50% lotion concentrate</td>
<td>Significant</td>
</tr>
<tr>
<td>7</td>
<td>100% mineral oil</td>
<td>Slight</td>
</tr>
</tbody>
</table>

As shown above, the fluid with the least amount of transfer was 100% propylene glycol with a similar result by the propylene glycol / lotion concentrate fluid. The water dosed wipe had extensive levels transferred and those with water at 50% had to a lesser extent transferred.

These results demonstrated that a hydrophobic fluid base would help reduce the transfer possibility enabling any incorporated antimicrobial agent increased chance of activity.
The above results show that the wiping articles of the present invention display excellent inhibition of bacterial transfer for a wide range of wiping articles.

While the invention has been described hereinabove with relation to various preferred embodiments and examples, the skilled reader would understand that various modifications could be made without departing from the spirit and scope of the invention as defined in the claims.
CLAIMS:

1. The use of an antimicrobial agent in the manufacture of a disposable wiping article to reduce the number of microbes transferred to the hand when wiping a surface with the disposable wiping article.
2. The use according to claim 1, wherein the wiping article is made from material selected from the group consisting of paper and woven or non-woven fabric materials.
3. The use according to claim 1 or claim 2, wherein the wiping article is selected from the group consisting of toilet tissues, moistened toilet wipes and baby wipes.
4. The use according to any of claims 1 to 3, wherein the wiping article takes the form of a single sheet.
5. The use according to any of claims 1 to 3, wherein the wiping article takes the form of an elongated article.
6. The use according to any of claims 1 to 5, wherein the antimicrobial agent is hydrophobic.
7. The use according to any of claims 1 to 6, wherein the antimicrobial agent is selected from the group consisting of phenolic compounds, isothiazolinone compounds, pyrazole compounds, oxidising agents, quinolines, quaternary ammonium compounds, guanidines and aldehydes.
8. The use according to any of claims 1 to 7, wherein the antimicrobial agent is a phenolic compound selected from phenol and phenols substituted on the aromatic ring by 1 to 5 substituents selected from the group consisting of alkyl groups having 1 to 6 carbon atoms, alkoxy groups having 1 to 6 carbon atoms, hydroxy groups, halogen atoms, carboxy groups, alkoxy carbonyl groups having from 1 to 8 carbon atoms and aralkyl groups in which the aryl part has from 6 to 10 carbon atoms in a carbocyclic ring and the alkyl part has from 1 to 4 carbon atoms.
9. The use according to any of claims 1 to 8, wherein the antimicrobial agent is 2,4-dichloro-3,5-dimethylphenol.
10. The use according to any of claims 1 to 9, wherein a dosage of between 0.001 to 1g of the antimicrobial agent is applied to the wiping article.
11. The use according to any of claims 1 to 10, wherein a dosage of between 0.002 to 0.1 g of the antimicrobial agent is applied to the wiping article.

12. The use according to any of claims 1 to 11, wherein a carrier is used to disperse the antimicrobial agent.

13. The use according to claim 12, wherein the carrier is a non-aqueous solvent.

14. The use according to claim 12 or claim 13, wherein the carrier is hydrophobic.

15. The use according to any of claims 11 to 14, wherein the carrier is selected from alkanes having from 5 to 30 carbon atoms; monohydric alcohols having from 1 to 6 carbon atoms; dihydric alcohols having from 2 to 6 carbon atoms; trihydric alcohols having from 3 to 6 carbon atoms; mono-, di- and tri-esters in which the part containing the or each alkanoyl group has from 1 to 20 carbon atoms and the part containing the or each alkoxy group has from 1 to 20 carbon atoms; and mixtures thereof.

16. The use according to any of claims 11 to 15, wherein the carrier is selected from ethanol, propylene glycol, glyceryl caprate and glyceryl caprylate.

17. The use according to any of claims 1 to 15, wherein the carrier takes the form of a grease or wax.

18. The use according to claim 17, wherein the carrier is paraffin wax.

19. A disposable wiping article having an antimicrobially effective amount of an antimicrobial agent so as to reduce the number of microbes transferred to the hand when wiping a surface with the disposable wiping article.

20. A method of reducing the number of microbes transferred to a hand through a disposable wiping article when wiping a surface with said wiping article by means of an antimicrobially effective amount of an antimicrobial agent present in or on the wiping article.
All dosages are of DCMX solubilised in Propylene Glycol

8. 0.01g / sheet DCMX
9. 0.015g / sheet DCMX
10. 0.02g / sheet DCMX
11. 0.025g / sheet DCMX
12. 0.03g / sheet DCMX
13. 0.035g / sheet DCMX
14. 0.04g / sheet DCMX
15. 0.045g / sheet DCMX

Fig. 1
Fig. 2

1. 100% Water
2. 50% Water / 50% Propylene Glycol
3. 100% Propylene Glycol
4. 100% Lotion Conc.
5. 50% Water / 50% Lotion Conc.
6. 50% Propylene Glycol / 50% Lotion Conc.
7. 100% Mineral Oil

BASE FLUID BACTERIAL TRANSFER ASSESSMENT

SUBSTITUTE SHEET (RULE 26)
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K7/50 A61L15/00 A01N25/34

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)
IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Electronic database consulted during the international search (name of data base and, where practical, search terms used)
CHEMABS Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<td>X</td>
<td>US 5 762 948 A (P. BLACKBURN ET AL.) 9 June 1998 (1998-06-09) column 6, line 45-47; claim 1; example 4</td>
<td>1, 19</td>
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<td>X</td>
<td>US 4 259 383 A (H. EGGENSPERGER ET AL.) 31 March 1981 (1981-03-31) claim 1</td>
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<td>X,P</td>
<td>US 6 107 261 A (T. TAYLOR ET AL.) 22 August 2000 (2000-08-22) example 17</td>
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Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
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- "****" document member of the same patent family

Date of the actual completion of the international search: 15 February 2001

Date of mailing of the international search report: 28/02/2001

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Glikman, J-F

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