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(54) Title: PROCESS FOR COVERING A TOILET CARE PRODUCT WITH A WATER-SOLUBLE COATING

(57) Abstract: A process for covering a toilet care product with a water-soluble coating, comprising the steps of: (a) applying to the outer surface of the toilet care product a solution selected from the group constituted by: a solution of polyvinyl alcohol, a solution of polyvinyl acetate, a solution of urea, a solution of one or more carbohydrates, a solution of one or more inorganic salts, and mixtures thereof; and (b) evaporating the solvent that is present in the solution applied in step (a).



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PROCESS FOR COVERING A TOILET CARE PRODUCT WITH A WATER-SOLUBLE COATING

The present invention relates to a process for covering toilet care products with a particular water-soluble coating and to the toilet care
5 products covered with said water-soluble coating.

The market currently offers two types of product for cleaning toilets when flushing water flows inside them: toilet bowl bars and blocks for flushing water cisterns. Most of these products, in addition to a toilet cleaning action, also have a foaming, deodorizing and/or coloring effect,
10 which gives the user a greater feeling of cleanliness. Furthermore, many products also have a sanitizing effect.

The bars (also known as "tablets") are inserted in the toilet bowl itself: they can be arranged inside a basket-like container which is attached to the rim of the toilet bowl or applied directly to the internal wall of the
15 toilet bowl by means of adapted dispensers. The bars can have a solid or gelatinous consistency.

Flushing water cistern blocks instead are inserted directly in the external cisterns that contain the water for rinsing the toilet bowl.

Both bars and cistern blocks described briefly above are generally
20 wrapped in a water-soluble protective film, typically made of polyvinyl alcohol (PVA). This film, which can be clear or colored, limits the dispersion of the fragrances and colors contained in the formulation of these toilet care products and offers greater safety in their handling on the part of consumers when the bars are inserted in the basket-like container or in the
25 dispenser or when the blocks are placed in the flushing water cisterns. The protective film in fact does not need to be removed by the consumer, who therefore does not make direct contact with the detergent formulation of the product. In contact with the flushing water, the PVA water-soluble film progressively dissolves, allowing the bars or cistern blocks to release the
30 detergent formulation.

The toilet care products cited above are currently prepared by mixing in adapted mixers the solid and liquid components that constitute the detergent formulation; the resulting mixture is then extruded by pushing it within extruders and cut into segments having the desired shape, dimension and weight by passing through appropriate openings.

At this point the water-soluble PVA film is applied to the toilet care products by means of adapted film wrapping machines; as an alternative, the film can be pleated. It is also possible to utilize the heat-shrink properties of the PVA film so as to make it adhere better to the surface of the toilet care products to be covered: by subjecting a heat-shrink film to a heat source (for example in adapted heat-shrinking ovens), it shrinks by up to approximately 50% of the initial size, thus adhering to the object around which it has been wrapped; once it cools, the film retains the shape and size assumed during heating. The workable PVA film currently used to cover toilet care products is commercially available wound in rolls.

The coating with a film (often termed "film wrapping") of toilet care products is very important both to preserve the products themselves and to protect the consumer against direct contact with the detergent formulation, but it entails some drawbacks.

First of all, with the methods for applying the water-soluble film currently used and referenced above, scarcely satisfactory results from the aesthetic standpoint are obtained when toilet care products having particular shapes are covered. Furthermore, the purchase of PVA film spools and the process for applying the film to the bars or blocks significantly affects the final cost of the resulting product. Finally, following the entry into force of regulation CE 1272/2008 on classification, labeling and packaging of chemical substances and mixtures ("CLP regulation": Classification Labeling, Packaging), the protective PVA film is considered primary packaging, which must mandatorily be labeled.

Labeling, which can occur by applying to the film a tag with the

necessary information (such as the name of the product and the danger symbols) or by printing this information directly on the film, entails additional costs, which obviously affect the price of the final product.

The aim of the present invention is therefore to overcome the
5 limitations of the background art described above, by devising a new process for covering toilet care products (such as the above cited bars for toilet bowls and blocks for flushing cisterns) with a water-soluble coating, wherein said process allows to obtain better results than those obtainable with known solutions and/or comparable results at a lower cost.

10 Within this aim, an object of the invention is to provide a process for covering toilet care products with a water-soluble coating that allows to cover even products that have irregular and/or complex shapes with a good aesthetic result.

Another object of the present invention is to provide a process for
15 covering toilet care products with a water-soluble coating that limits the dispersion of the fragrances and colors contained in the formulation of said products.

A further object of the present invention is to provide a process for covering toilet care products with a water-soluble coating that protects
20 consumers in the handling of said products, avoiding direct contact with the detergent formulation of the product.

Another object of the present invention is to provide a process for covering toilet care products with a water-soluble coating that allows dissolution of the applied coating in a time that is comparable to the time
25 required for the dissolution of a common PVA film.

Another object of the invention is to provide a process for covering toilet care products as mentioned above that is highly reliable, can be provided on the same production line as said products and the provision of which is easy and requires modest costs.

30 This aim, as well as these and other objects that will become better

apparent hereinafter, are achieved by a process for covering a toilet care product, such as bars to be placed in toilet bowls and blocks to be inserted in flushing water cisterns, with a water-soluble coating, comprising the steps of:

5 (a) applying to the outer surface of the toilet care product a solution selected from the group constituted by: a solution of polyvinyl alcohol (PVA), a solution of polyvinyl acetate, a solution of urea, a solution of one or more carbohydrates, a solution of one or more inorganic salts, and mixtures thereof; and

10 (b) evaporating the solvent that is present in the solution applied in step (a), with consequent forming of a water-soluble coating on the outer surface of the toilet care product.

This aim and these objects are also achieved by a toilet care product provided with a water-soluble external surface layer which comprises one or
15 more substances selected from the group constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts.

Further characteristics and advantages of the invention will become better apparent from the detailed description that follows.

20 In the context of the present invention, the expression "toilet" references a sanitary fixture that comprises a container designed to collect and convey to appropriate disposal biological excretions, predominantly of human origin. The expression "toilets" comprises traditional "bowl" toilets (commonly termed "water closets"), "squat" toilets and wall-mounted toilets
25 ("urinals").

It has been mentioned that a solution (selected from a very specific group) or a mixture of these solutions is applied on the outer surface of the toilet care products treated according to the process described herein. Hereinafter, therefore, the term "solution", used in the context cited above
30 for reasons of simplicity and brevity, is understood to reference also a

mixture of two or more of the indicated solutions.

Polyvinyl acetate (or acetate of polyvinyl), i.e., the polymer of vinyl acetate, is a substance that has adhesive properties, a water-based mixture of which is commonly known as "vinyl glue" or "white glue". The adhesives
5 produced by Vinavil® and distributed commercially under the trade names "Vinavil 59®" or "Vinavil l'adesivo universale®" are examples of vinyl glues which can be used to prepare the solutions used in the process described herein.

As mentioned, after the application of the solution to the surface of
10 the toilet care products, the solvent that is present in this solution is removed by evaporation. Once the solvent has evaporated, a water-soluble coating forms on the outer surface of the products and therefore comprises one or more substances selected among polyvinyl alcohols, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts,
15 depending on the solution used. This coating represents the outermost layer of the toilet care product since it adheres perfectly to its surface and therefore can be considered part of the product itself.

Application of the solution occurs once the production of the toilet care products (which typically, for bars and blocks, occurs by extrusion) has
20 ended and obviously prior to their packaging. Application of the solution can be performed in various manners. In one embodiment, the solution can be spread, sprayed, atomized or poured onto the outer surface of the toilet care products to be covered. The spreading, spraying, atomizing and pouring are provided by means of conventional apparatuses for these uses
25 which are known to the person skilled in the art. In another embodiment, the toilet care products to be covered can be immersed in the solution so that it deposits on their surface. Application of the solution can occur for example by means of centrifugal or drum systems.

The fact that a solution (therefore a more or less viscous liquid) is
30 used entails that it can be applied to the entire surface of the products to be

covered homogeneously and continuously even if they have an irregular or complex shape.

Once the solution has been applied to the surface of the toilet care products to be covered, they must be dried so that the solvent that is present in the solution evaporates, leaving on the outer surface of said products a water-soluble layer that comprises the one or more solutes that are present in the applied solution.

In one embodiment, evaporation of the solvent can be provided by exposing the toilet care products to the air. In another embodiment, evaporation can be provided by means of a heating device, which advantageously reduces the time required for the evaporation of the solvent. Preferably, said heating device can be selected from the group constituted by an oven, a hot air blower and an infrared lamp.

The solvent evaporation step can be performed preferably at a temperature comprised between 50°C and 90°C, more preferably comprised between 70°C and 80°C. The evaporation of the solvent by means of a heating device can be provided by performing one or more drying cycles, each of which can have a duration generally comprised between 5 and 10 minutes, depending on the type of solvent, on the heating device used, on the temperature applied, on the quantity of solution deposited on the surface of the toilet care products and on the shape and dimension of said products. The assessment of the most appropriate manner and time for completing the evaporation of the solvent from the products, as well as the assessment of their complete drying, are part of the common knowledge of the person skilled in the art.

The water-soluble coating applied to the outer surface of the toilet care products can have a lower minimum thickness than that of the workable PVA films that are commercially available and commonly used to cover these products. In particular, while the minimum thickness of PVA films is at least 20 µm, the process according to the invention allows to apply a

protective coating that has a thickness typically comprised between 1 μm and 10 μm .

At the end of the evaporation of the solvent, the toilet care products are covered with a water-soluble outer coating layer that adheres perfectly to the surface of said products, avoids any product leaks and protects the consumer who makes direct contact with it in a manner that is fully comparable to a traditional PVA coating. Once the solvent evaporation step has ended, the toilet care products can be sent to packaging.

In one embodiment of the process according to the invention it is possible to provide micro-perforations at the level of the water-soluble coating applied to the outer surface of the toilet care products prior to their packaging. The micro-perforation of the external water-soluble surface coating can be performed with various technologies, for example by means of mechanical systems, laser systems or ultrasound.

Micro-perforation accelerates the dissolution of the water-soluble coating following its contact with the flushing water of the toilet. The provision of micro-perforations is useful in the case of covered toilet care products in which the surface that makes contact with the water is reduced due to a particularly complex or irregular shape; in this case, the time required to dissolve the coating of the product might be longer than the time required to dissolve a traditional PVA film. The presence of micro-perforations allows to obviate this problem and allows the dissolution of the water-soluble coating in a time that is comparable to the time for the dissolution of a traditional film even in the case of products having particular shapes.

In another embodiment of the process according to the invention it is possible to provide printing on the water-soluble outer surface coating of the toilet care products prior to their packaging. Printing can occur by means of a series of systems that are known to the person skilled in the art; preferably, printing can occur by tampographic printing, screen printing or

inkjet printing. Surface printing allows to obtain particular aesthetic effects simply and rapidly.

In one embodiment of the process according to the invention, the solution used in step (a) can comprise water. In another embodiment, the solution used in step (a) can comprise one or more solvents selected from the group constituted by polar solvents, nonpolar solvents and mixtures thereof. Preferably, the solvent can be selected from the group constituted by an alcohol, a glycol and mixtures thereof. In a particularly preferred embodiment, the solvent can be ethyl alcohol. In another particularly preferred embodiment, the solvent can be dipropylene glycol (DPG). In another embodiment, the solution can comprise both water and one or more of the solvents indicated above. More preferably, the solution can comprise a mixture of water and ethyl alcohol, or a mixture of water and DPG, or a mixture of water, ethyl alcohol and DPG. In an even more preferred embodiment, the total content of the one or more alcohols and/or of the one or more glycols can be comprised between 1% and 90% by weight on the total weight of the solvents that form the solution; even more preferably, the content of ethyl alcohol and/or DPG can be comprised between 20% and 50% by weight on the total weight of the solvents that form the solution.

It has been mentioned that in step (a) of the process according to the invention it is possible to apply a solution of one or more carbohydrates. In one embodiment, these carbohydrates can be cellulose; in another embodiment, these carbohydrates can be one or more low molecular weight carbohydrates. Preferably, the low molecular weight carbohydrates can be dextrins and more preferably amylopectin. Dextrins are polymeric structures obtained by chemical or enzyme hydrolysis of starch, constituted by a number of glucose units that can vary from a few units to approximately one thousand. Moreover, low molecular weight carbohydrates can preferably be disaccharides, and more preferably saccharose (a disaccharide constituted by a glucose unit and a fructose unit).

A solution of one or more inorganic salts can also be applied in step (a) of the process according to the invention. Preferably, these one or more inorganic salts can be selected from the group constituted by sodium chloride, sodium sulfate and magnesium sulfate. In a more preferred embodiment, the inorganic salt can be sodium chloride. In another more preferred embodiment, the inorganic salt can be a mixture of sodium chloride and magnesium sulfate.

The polyvinyl alcohol solution used in step (a) of the process can preferably comprise 10% to 80% by weight of polyvinyl alcohol; more preferably, the polyvinyl alcohol solution can comprise 15% to 30% by weight of polyvinyl alcohol. The polyvinyl acetate solution can comprise preferably 20% to 90% by weight of polyvinyl acetate; more preferably, the polyvinyl acetate solution can comprise 50% to 75% by weight of polyvinyl acetate. The urea solution can preferably comprise 1% to 50% by weight of urea; more preferably, the urea solution can comprise 2% to 15% by weight of urea. Moreover, the solution of one or more carbohydrates can preferably comprise 1% to 50% by weight of said one or more carbohydrates; more preferably, the solution of one or more carbohydrates can comprise 1% to 5% by weight of said one or more carbohydrates. The solution of one or more inorganic salts can preferably comprise 1% to 50% by weight of said one or more inorganic salts. In one embodiment, the solution of one or more inorganic salts can be saturated. More preferably, the saturated solution of one or more inorganic salts can have a concentration of at least 500 g/l of said one or more inorganic salts. Preferably, it is possible to use a saturated solution of sodium chloride, and even more preferably a saturated solution of sodium chloride having a concentration of at least 500 g/l. It should be noted that the saturated solution of sodium chloride is highly corrosive for metals and therefore, if one works with this type of solution, it is necessary to use adequate instruments, as is known to the person skilled in the art.

The water-soluble coating applied with the process according to the

invention is stable even in high temperature (up to 60°C) and high humidity (up to 85%) conditions and interferes neither with the formulation of the toilet care products nor with their solubilization capacity; in particular, the dissolution of the water-soluble coating in contact with the flushing water of the toilet is complete and entails no forming of residues.

In another aspect, the present invention relates to a toilet care product that has a water-soluble external surface layer which comprises one or more substances selected from the group constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts.

In a preferred embodiment, said water-soluble outer surface layer of the toilet care product can be constituted essentially by one or more substances selected from the group constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts. In an even more preferred embodiment, said water-soluble outer surface layer can be constituted by one or more substances selected from the group constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts.

Preferably, the toilet care product provided with a water-soluble outer surface layer comprising one or more substances selected from the group constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more carbohydrates and one or more inorganic salts can be obtained by means of the process described herein.

Furthermore, said toilet care product can be selected preferably from the group constituted by a bar for toilet bowls and a block for flushing water cisterns.

It should be understood that the characteristics of the embodiments described with reference to the process for covering toilet care products according to the present invention are to be considered valid, where applicable, also with reference to toilet care products according to the

invention described herein, even though they are not repeated explicitly.

Some examples of formulation of the solution (or mixture of solutions) used to cover the toilet care products according to the process of the invention are given hereinafter; these examples obviously are not to be understood as limiting the scope of the invention.

EXAMPLE 1: solution constituted by:

polyvinyl alcohol (PVA) in powder form: 20% by weight

mains water: 80% by weight

EXAMPLE 2: mixture of solutions constituted by:

10 Solution 1 (80% by weight on the total weight of the mixture) constituted by:

Vinavil 59: 93.75% by weight

mains water: 6.25% by weight

15 Solution 2 (20% by weight on the total weight of the mixture) constituted by:

polyvinyl alcohol (PVA) in powder form: 20% by weight

mains water: 80% by weight

EXAMPLE 3: mixture of solutions constituted by:

20 Solution 1 (70% by weight on the total weight of the mixture) constituted by:

Vinavil 59®: 92.8% by weight

mains water: 7.2% by weight

Solution 2 (30% by weight on the total weight of the mixture) constituted by:

25 polyvinyl alcohol (PVA) in powder form: 30% by weight

mains water: 70% by weight

EXAMPLE 4: mixture of solutions constituted by:

Solution 1 (30% by weight on the total weight of the mixture) constituted by:

Vinavil 59®: 83.3% by weight

mains water: 16.7% by weight

Solution 2 (70% by weight on the total weight of the mixture) constituted by:

5 polyvinyl alcohol (PVA) in powder form: 15% by weight

mains water: 85% by weight

EXAMPLE 5: solution constituted by:

Vinavil 59®: 75% by weight

urea: 20% by weight

10 mains water: 5% by weight

EXAMPLE 6: solution constituted by:

Vinavil 59®: 70% by weight

urea: 3% by weight

mains water: 27% by weight

15 EXAMPLE 7: solution constituted by:

Vinavil 59®: 75% by weight

crystalline cellulose: 5% by weight

mains water: 20% by weight

EXAMPLE 8: solution constituted by:

20 polyvinyl alcohol (PVA) in powder form: 15-30% by weight

ethyl alcohol: 20-30% by weight

mains water: 40-65% by weight

In practice it has been found that the process according to the invention achieves fully the intended aim, since it makes it possible to form
 25 a water-soluble protective coating that adheres perfectly to the outer surface of toilet care products and is therefore aesthetically more pleasant and more practical than an ordinary film. Furthermore, the process according to the invention allows to cover, with an excellent aesthetic effect, even toilet care products having irregular or complex shapes (flowers, stars, hearts, logos or

trademarks of the manufacturer), for which covering with a traditional film offers an aesthetically poor result. Moreover, the coating applied with the process described herein ensures a protection that is fully comparable to the protection offered by a traditional PVA film, both for the formulation of the
5 toilet care product and for the consumer who makes contact with it. Furthermore, the time required for dissolution of the coating applied with the process according to the invention is comparable to the time required for the dissolution of a common PVA film.

The process for coating toilet care products, as well as said toilet care
10 products, conceived as described herein, are susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other equivalent elements the correspondence of which is known to the person skilled in the art.

15 The disclosures in Italian Patent Application no. 102015000084943 (UB2015A009349), from which this application claims priority, are incorporated herein by reference.

CLAIMS

1. A process for covering a toilet care product with a water-soluble coating, comprising the steps of:

(a) applying to the outer surface of said toilet care product a solution
5 selected from the group constituted by: a solution of polyvinyl alcohol, a solution of polyvinyl acetate, a solution of urea, a solution of one or more carbohydrates, a solution of one or more inorganic salts, and mixtures thereof; and

(b) evaporating the solvent that is present in the solution applied in
10 step (a), forming a water-soluble coating on the outer surface of said toilet care product.

2. The process according to claim 1, wherein the application of the solution in step (a) occurs by means of a method selected from the group constituted by spreading, spraying, atomizing, pouring of the solution onto
15 the outer surface of the toilet care product, and immersion of the toilet care product in the solution.

3. The process according to claims 1 or 2, wherein the evaporation of the solvent in step (b) occurs by means of a heating device that is selected from the group constituted by an oven, a hot air blower and an infrared
20 lamp.

4. The process according to any one of the preceding claims, wherein the evaporation of the solvent in step (b) occurs at a temperature comprised between 50°C and 90°C.

5. The process according to any one of the preceding claims, wherein
25 the solution applied in step (a) comprises a solvent selected from the group constituted by water, one or more alcohols, one or more glycols and mixtures thereof.

6. The process according to any one of the preceding claims, wherein
30 said one or more carbohydrates are selected from the group constituted by cellulose and one or more carbohydrates with low molecular weight.

7. The process according to claim 6, wherein said one or more carbohydrates with low molecular weight are selected from the group constituted by one or more dextrans and one or more disaccharides, preferably saccharose.

5 8. The process according to any one of the preceding claims, wherein said one or more inorganic salts are selected from the group constituted by sodium chloride, sodium sulfate and magnesium sulfate.

9. The process according to any one of claims 1-8, wherein the polyvinyl alcohol solution comprises 10% to 80% by weight of polyvinyl
10 alcohol.

10. The process according to any one of claims 1-8, wherein the polyvinyl acetate solution comprises 20% to 90% by weight of polyvinyl acetate.

11. The process according to any one of claims 1-8, wherein the urea
15 solution comprises 1% to 50% by weight of urea.

12. The process according to any one of claims 1-8, wherein the solution of one or more carbohydrates comprises 1% to 50% by weight of said one or more carbohydrates.

13. The process according to any one of claims 1-8, wherein the
20 solution of one or more inorganic salts comprises 1% to 50% by weight of said one or more inorganic salts.

14. The process according to any one of the preceding claims, further comprising a step of micro-perforation of the outer water-soluble coating of the toilet care product.

25 15. The process according to any one of the preceding claims, further comprising a step of printing the outer water-soluble coating of the toilet treatment product.

16. A toilet care product, provided with a water-soluble outer surface layer comprising one or more substances selected from the group
30 constituted by polyvinyl alcohol, polyvinyl acetate, urea, one or more

carbohydrates and one or more inorganic salts.

17. The toilet care product according to claim 16, wherein said product can be obtained by means of the process according to any one of claims 1-15.

5 18. The toilet care product according to claims 16 or 17, wherein said product is selected from the group constituted by a bar for toilets and a block for flushing water cisterns.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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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)
C11D

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)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP 1 223 113 A1 (BUCK CHEMIE GMBH [DE]) 17 July 2002 (2002-07-17) paragraph [0009]; claims -----	1-5,10, 12,16-18
X	EP 0 875 558 A2 (ECOLAB INC [US]) 4 November 1998 (1998-11-04) column 5, line 10 - column 6, line 14; claims -----	1-5,8, 13,16-18
X	US 3 324 038 A (HOMET CHAFFEE ROBERT ET AL) 6 June 1967 (1967-06-06) claims; examples I-III,V -----	16-18
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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