PROCESS FOR COATING A WATER-SOLUBLE PACKAGE AND PACKAGE COATED BY THAT PROCESS

VERFAHREN ZUR BESCHICHTUNG VON WASSERLÖSLICHER VERPACKUNG UND BESCHICHTETE VERPACKUNG

CONDITIONNEMENT SOLUBLE DANS L’EAU ET PREPARATION DE CELUI-CI

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(30) Priority: 27.09.2000 GB 0023713

(43) Date of publication of application: 16.07.2003 Bulletin 2003/29

(73) Proprietors:
• Unilever House
  London EC4P 4 BQ (GB)
  Designated Contracting States:
  CY GB IE
• UNILEVER N.V.
  3013 AL Rotterdam (NL)
  Designated Contracting States:
  AT BE CH DE DK ES FI FR GR IT LU MC NL PT SE TR

(72) Inventors:
• CROPPER, James Dawson
c/o Lever Faberge Limited
  Wirral, Merseyside CH62 4ZD (GB)
• HARBOUR, Richard
  Upton-by-Chester, Cheshire CH2 1NN (GB)

(74) Representative: Elliott, Peter William
  Unilever PLC
  Unilever Intellectual Property Group
  Colworth House
  Sharnbrook Bedford, MK44 1LQ (GB)

(56) References cited:
• DATABASE WPI Section Ch, Week 198910
  Derwent Publications Ltd., London, GB; Class A14, AN 1989-074741 XP002209044 & JP 01
  029438 A (KAO CORP), 31 January 1989
  (1989-01-31) cited in the application

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

Introduction

[0001] The invention relates to a water-soluble package and to its preparation. In particular, the invention relates to liquid detergent enclosed within a water-soluble film.

[0002] Water-soluble packages are known and are disclosed, for example in GB-A-2305931 and WO89/04282. In the agrochemical industry, known water-soluble packages generally comprise either vertical form-fill-seal (VFFS) envelopes or thermoformed envelopes. In one of the VFFS processes, a roll of water-soluble film is sealed along its edges to form a tube, which tube is the heat sealed intermittently along its length to form individual envelopes which are filled with product and heat sealed. The thermoforming process generally involves moulding a first sheet of water-soluble film to form one or more recesses adapted to retain a composition, such as for example a solid agrochemical composition, placing the composition in the at least one recess, placing a second sheet of water-soluble material over the first so as to cover the or each recess, and heat sealing the first and second sheets together at least around the recesses so as to form one or more water-soluble packages.

[0003] JP-1029438 discloses a polyvinyl alcohol type film useful as a packaging material which has a coating of fine powder obtained by spraying an aqueous dispersion containing the powder on the surface of the PVA film. Suitable powders include calcium carbonate, magnesium carbonate, clay, talc, silicic acid and kaolin. The coating is said to provide excellent slip and anti-blocking properties while retaining heat sealability and the film does not release the fine powder.

[0004] Generally, water-soluble packages suffer a number of disadvantages. First, as the packages are susceptible to moisture, the composition, which can be contained within the package, is limited. Secondly, the storage and transport of such packages must be carefully controlled as humidity in the atmosphere can weaken the structural integrity of the formed packages.

[0005] It is an object of the present invention to overcome at least some of the above disadvantages.

Statements of Invention

[0006] It has been surprisingly discovered that water-soluble packages have a tendency to stick together when a number of them are stored in close proximity over a period of time. A further discovery of the applicants is that when a secondary package containing a plurality of such stuck-together packages is subjected to external impact, then the likelihood of the packages maintaining their integrity, i.e., not rupturing or breaking, is greater when compared with the situation where the packages have not stick together.

[0007] Accordingly, the invention provides a water-soluble package comprising a composition, such as for example a liquid detergent composition, enclosed within a water-soluble film, wherein at least a portion of a surface of the package includes a dusting of powder. Thus, when a plurality of such water-soluble packages are stored or transported in close proximity they will be less prone to stick together. Further, the invention provides a plurality of the water-soluble packages according to the invention packaged within a secondary pack.

[0008] In one embodiment of the invention, the powder has an average particle size of between 0.1 and 20 microns, suitably between 5 and 15 microns. Typically, a powder such as talc could be used, such a powder being well known. Other suitable materials include calcium stearate and zinc stearate. Alternatively, a suitable fine grade of starch may be used. Generally, the powder will be inert, and ideally easily dispersible in water.

[0009] The powder is generally applied at a rate of from 0.5 to 10mg/100cm², preferably not more than 5mg/100cm², more preferably in the range 1.25 to 2.5mg/100cm².

[0010] In a preferred embodiment of the invention the film is a polyvinyl alcohol, or modified polyvinyl alcohol film. Typically, the composition is a fluent composition such as for example a liquid, gel or paste. Preferably, each package will contain up to one litre of composition, ideally between 10 and 50 ml, most preferably between 15 and 30 ml. In an envisaged embodiment, the composition will include detergent suitable for use in the machine washing of laundry or dishes. The composition may include from 1 to 15%, generally up to 10% by weight water, ideally between 3 and 7% by weight water. Generally the packages of the invention will be resiliently deformable, and the powder will ideally coat or dust a substantial portion of the package surface.

[0011] Preferably, the water-soluble package of the invention comprises a first sheet of water-soluble material moulded to form a body portion of the capsule, and a second sheet of water-soluble material superposed on the first sheet and sealed thereto by a closed seal along a continuous region of the superposed sheets, wherein at least a portion of the formed package includes an external coating or dusting of a powder. Typically, the fluent composition is a detergent liquid or gel suitable for use in the machine washing of fabrics or dishes.

[0012] The invention further relates to a process for producing a water-soluble package by thermoforming or vertical form fill seal (VFFS) techniques, the process being characterised in that the formed package is brought into contact
with a powder such that a dusting of fine powder is applied to at least a portion of a surface of the package. Typically, the powder is applied using a fluidised bed, by spraying or using a falling curtain.

**Detailed Description of the Invention**

[0013] The invention will be more clearly understood from the following description of an embodiment thereof, given by way of example only.

**EXAMPLE**

[0014] In this Example a thermoforming process is described where a number of packages according to the invention are produced from a single sheet of water-soluble material. In this regard recesses are formed in the sheet using a forming die having a plurality of cavities with dimensions corresponding generally to the dimensions of the packages to be produced. Further, a single heating plate is used for moulding the film for all the cavities, and in the same way a single sealing plate is described.

[0015] A first sheet of polyvinyl alcohol film is drawn over a forming die so that the film is placed over the plurality of forming cavities in the die. Each cavity is generally dome shape having a round edge, the edges of the cavities further being radiussed to remove any sharp edges which might damage the film during the forming or sealing steps of the process. Each cavity further includes a raised surrounding flange. In order to maximise package strength, the film is delivered to the forming die in a crease free form and with minimum tension. In the forming step, the film is heated to 100 to 120 degrees C, preferably approximately 110 degrees C, for up to 5 seconds, preferably approximately 700 micro seconds. A heating plate is used to heat the film, which plate is positioned to superpose the forming die. The plate includes a plurality concave depressions which correspond to the recesses on the forming die. During this pre-heating step, a vacuum is pulled through the pre-heating plate to ensure intimate contact between the film and the pre-heating plate, this intimate contact ensuring that the film is heated evenly and uniformly (the extent of the vacuum is dependant of the thermoforming conditions and the type of film used, however in the present context a vacuum of less than 0.6 bar was found to be suitable) Non-uniform heating results in a formed package having weak spots. In addition to the vacuum, it is possible to blow air against the film to force it into intimate contact with the preheating plate.

[0016] The thermoformed film is thus moulded into the cavities forming a plurality of recesses which, once formed, are retained in their thermoformed orientation by the application of a vacuum through the walls of the cavities. This vacuum is maintained at least until the packages are sealed. Once the recesses are formed and held in position by the vacuum, the composition, in this case a liquid detergent, is added to each of the recesses. A second sheet of polyvinyl alcohol film is then superposed on the first sheet covering the filled recesses and heat-sealed thereto using a heating plate. In this case the heat sealing plate, which is flat, preferably operates at a temperature of about 140 to 160 degrees centigrade, and ideally contacts the films for 1 to 2 seconds and with a force of 8 to 30kg/cm2, preferably 10 to 20kg/cm2. The raised flanges surrounding each cavity ensures that the films are sealed together along the flange to form a continuous closed seal. The radiussed edge of each cavity is typically at least partly formed by a resiliently deformable material, such as for example silicone rubber. This results in reduced force being applied at the inner edge of the sealing flange to avoid heat/pressure damage to the film.

[0017] Once sealed, the packages formed are separated from the web of sheet film using cutting means. At this stage it is possible to release the vacuum on the die, and eject the formed packages from the forming die. In this way the packages are formed, filled and sealed while nesting in the forming die. In addition they may be cut while in the forming die as well.

**Experimental**

[0018] 25g hemispherical shaped capsules produced as described above were used in the following tests. 40 capsules were introduced into a plastic bag having a moisture vapour transmission rate (MVTR) in the range 1 to 20 g/m²/24 hours.

[0019] A weighed amount of powder, either 14mg, 28mg or 56mg, is introduced onto the top of the capsules and mixed by closing and shaking the bag for 1 minute.

[0020] After mixing, the 40 capsules were divided into two lots of twenty and each lot placed in a smaller plastic bag having a MTVR in the range 1 to 20 g/m²/24 hours, which bag was left either open or closed and placed into a cardboard outer container designed to accommodate twenty capsules.

[0021] The top of the outer box was closed. The boxes were stored at either:

1. 20°C and 60% relative humidity (RH) or
2. 37°C and 70% RH
The samples were assessed at 1, 2, 4, 8 and 12 weeks respectively.

The samples were assessed according to the following scoring system:

- 0 - No sticking
- 1 - less than 5 sticking
- 2 - less than 20 but more than 4
- 3 - less than 40 but more than 19
- 4 - all sticking, but no damage when pulled apart
- 5 - all sticking, severe damage when pulled apart

The following powders were tested as anti-blocking agents:

**Zinc Stearate**
- Bulk Density 300g/l
- Sieve Residue 200 mesh - 0.5%
- Median Particle Size Diameter - 14.63µ

**Calcium Stearate**
- Bulk Density 150g/l
- Sieve Residue 200 mesh - 0.5%
- Median Particle Size Diameter - 3.63µ

**Starch**
- Having a comparable particle size to the calcium stearate
- **Talc(Mistron Flair HT MM commercially available from LUZENAC NV)**
- Median Particle Size Diameter - 11µ (approximately)
- Particle Range 100µ to 0.4µ
- Tapped Density 0.92kg/dm³
- Loose Density 0.50kg/dm³
- Pass Through 200 mesh - 99%
Table 1 reports the results of the assessments.

<table>
<thead>
<tr>
<th>Powder</th>
<th>Level/mg</th>
<th>Bag Open/Closed</th>
<th>Storage conditions</th>
<th>1 week</th>
<th>2 week</th>
<th>5 week</th>
<th>8 week</th>
<th>12 week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (none)</td>
<td></td>
<td>open</td>
<td>20/60 rh</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Control (none)</td>
<td></td>
<td>closed</td>
<td>20/60 rh</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Control (none)</td>
<td></td>
<td>open</td>
<td>37/70 rh</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Control (none)</td>
<td></td>
<td>closed</td>
<td>37/70 rh</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Talc</td>
<td>14</td>
<td>open</td>
<td>20/60 rh</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Talc</td>
<td>14</td>
<td>closed</td>
<td>20/60 rh</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Talc</td>
<td>14</td>
<td>open</td>
<td>37/70 rh</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Talc</td>
<td>14</td>
<td>closed</td>
<td>37/70 rh</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Talc</td>
<td>28</td>
<td>open</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>28</td>
<td>closed</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>28</td>
<td>open</td>
<td>37/70 rh</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>28</td>
<td>closed</td>
<td>37/70 rh</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Talc</td>
<td>56</td>
<td>open</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>56</td>
<td>closed</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>56</td>
<td>open</td>
<td>37/70 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Talc</td>
<td>56</td>
<td>closed</td>
<td>37/70 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>14</td>
<td>open</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>14</td>
<td>closed</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>14</td>
<td>open</td>
<td>37/70 rh</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>14</td>
<td>closed</td>
<td>37/70 rh</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>28</td>
<td>open</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>28</td>
<td>closed</td>
<td>20/60 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>28</td>
<td>open</td>
<td>37/70 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Zinc Stearate</td>
<td>28</td>
<td>closed</td>
<td>37/70 rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>14 open</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>14 closed</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>14 open</td>
<td>37/70rh</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>14 closed</td>
<td>37/70rh</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>28 open</td>
<td>20/60rh</td>
<td>leaker</td>
<td>leaker</td>
<td>leaker</td>
<td>leaker</td>
<td>leaker</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>28 closed</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>28 open</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>28 closed</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>56 open</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>56 closed</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>56 open</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Calcium Stearate</td>
<td>56 closed</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>14 open</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>14 closed</td>
<td>20/60rh</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>14 open</td>
<td>37/70rh</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>14 closed</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>28 open</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>28 closed</td>
<td>20/60rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>28 open</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td>28 closed</td>
<td>37/70rh</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
The results show that all powders provide an improvement over the control. At 37°C/70% RH at a dosage level of 28mg per 40 capsules, calcium stearate, zinc stearate and starch prevent blocking for up to 5 weeks. Some blocking occurs however with talc at this dosage level. Talc is effective under all conditions at a dosage of 56mg per 40 capsules for at least 12 weeks. Obvious differences between open or closed bags during storage were observed. At the higher levels of application both stearate powders are visible on the surface of the capsules, this is particularly so at 56mg dosage for calcium stearate. The zinc stearate is not nearly so obvious. Starch behaves more like the talc than the stearates. Considering issues of safety, ease of machine handling and performance, talc is the preferred powder. An alternative process of powder coating the capsules is schematically illustrated in the accompanying drawing. Powder is held in hopper (2) which is provided with an agitator (not shown) to ensure the powder is deagglomerated and free flowing. The powder is fed from the hopper (2) by a screw conveyor (4) to a sealed tundish (6). Powder is fed from the tundish (6) to spray nozzles (8) where powder is sprayed into a spray chamber (10) by compressed air from line (12). A fluidised bed or cloud of powder is formed in the spray chamber. Capsules are fed to the top of the spray chamber (10) by a vacuum conveyor (not shown). Capsules are dropped off the end of the conveyor in three streams having a staggered relationship with the dropping sequence alternating from the outer pair of capsules to the inner. The capsules fall vertically under gravity through the spray chamber (10) as shown by the three arrows (14) and are powder coated as they pass through the cloud of particles. The powder coated capsules are collected from the base of the spray chamber and packaged. Powder from the spray chamber is pneumatically extracted via lines (16) and fed to an extraction unit (18) where it is collected and recycled to the hopper (2). A series of tests were conducted using the capsules and talc of the previous tests. The powder spray was adjusted to provide different coating levels:

- 13.80 mg/100cm²
- 8.05 mg/100cm²
- 4.60 mg/100cm²
- 4.21 mg/100cm²
- 1.53 mg/100cm²

Storage stability tests were conducted as described above. All levels of talc proved to be effective after 12 weeks at both 20°C/60%RH and 37°C/70%RH. Typically, the packaging step comprises packing a plurality of the dusted capsules in an intermediate pack having a suitable moisture barrier and sealing or closing the intermediate pack before placing the bag within a secondary pack such as a carton. Generally the intermediate pack will be a plastic bag having a moisture vapour transmission rate (MVTR) of between 1 and 20g/m2/24hours. Suitable packaging substrates having MVTR values in this range will be known to those skilled in the art. Alternatively, a plurality of packages may be placed in a carton which carton includes an integral moisture barrier within the above MVTR range. The invention is not limited to the embodiment hereinbefore described which may be varied in both detail and process step without departing from the spirit of the invention.

Claims

1. A method of powder coating a water-soluble package comprising a composition enclosed within a water-soluble film which method comprises dusting the package with a powder thereby depositing powder on at least a portion of an exposed surface of the package.

2. A method as claimed in Claim 1 in which the powder is sprayed to form a cloud, or distributed as a falling curtain and the water-soluble packages passed through the cloud or falling curtain.

3. A method as claimed in Claim 2 which comprises dropping said water-soluble package through said cloud of powder under gravity thereby depositing powder on at least a portion of an exposed surface of the package.

4. A method as claimed in any one of Claims 1 to 3 in which the cloud of powder is maintained as a fluidised bed.
5. A method as claimed in any preceding Claim in which the powder has an average particle size of between 5 and 15 microns.

6. A method as claimed in any preceding claim in which the powder is selected from talc, starch, zinc stearate, calcium stearate and any combination thereof.

7. A method as claimed in claim 5 in which the powder is talc.

8. A method as claimed in any preceding claim in which the powder is deposited in an amount of from 0.5 to 10mg/100cm² on the exposed surface of the package.

9. A method as claimed in any preceding claim in which the water-soluble film comprises polyvinyl alcohol or modified polyvinyl alcohol and the composition is a liquid detergent comprising between 1 and 15% water.

10. A method as claimed in any preceding claim in which the package is formed by thermoforming envelopes or by a vertical form fill seal technique.

11. A water-soluble package comprising a composition enclosed within a water-soluble film, wherein at least a portion of an exposed surface of the package is dusted with powder.

12. A package as claimed in Claim 10 in which the composition is a liquid detergent comprising between 1 and 15% water.

13. A package as claimed in Claims 11 or 12 in which the water-soluble film comprises polyvinyl alcohol or modified polyvinyl alcohol.

14. A package as claimed in any one of Claims 11 to 13 in which the powder has an average particle size of between 5 and 15 microns and is selected from talc, starch, zinc stearate, calcium stearate and any combination thereof.

15. A package as claimed in Claim 14 in which the powder is talc.

16. A package as claimed in any one of Claims 11 to 15 in which the powder is present in an amount of from 0.5 to 10mg/100cm² on the exposed surface of the package.

17. A package as claimed in Claim 15 in which the powder is present in an amount of from 1.25 to 2.5mg/100cm².

Patentansprüche

1. Verfahren zur Pulverbeschichtung einer in Wasser löslichen Verpackung, umfassend eine Zusammensetzung, die in einer in Wasser löslichen Folie eingehüllt ist, wobei das Verfahren Bestäuben der Verpackung mit einem Pulver, wodurch sich das Pulver auf mindestens einem Teil einer freiliegenden Oberfläche der Verpackung abscheidet, umfasst.

2. Verfahren nach Anspruch 1, wobei das Pulver unter Bildung einer Wolke versprüht wird oder als ein Fallstrom verteilt wird und die in Wasser löslichen Verpackungen durch die Wolke oder den Fallstrom geleitet werden.

3. Verfahren nach Anspruch 2, das Fallenlassen der in Wasser löslichen Verpackung durch die Pulverwolke unter Schwerkraft, wodurch sich das Pulver auf mindestens einem Teil einer freiliegenden Oberfläche der Verpackung abscheidet, umfasst.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei die Pulverwolke als eine Wirbelschicht gehalten wird.

5. Verfahren nach einem vorangehenden Anspruch, wobei das Pulver eine mittlere Teilchengröße zwischen 5 und 15 Mikrometern aufweist.

6. Verfahren nach einem vorangehenden Anspruch, wobei das Pulver aus Talkum, Stärke, Zinkstearat, Calciumstearat und beliebiger Kombination davon ausgewählt ist.
7. Verfahren nach Anspruch 5, wobei das Pulver Talkum darstellt.

8. Verfahren nach einem vorangehenden Anspruch, wobei das Pulver in einer Menge von 0,5 bis 10 mg/100 cm² auf der freiliegenden Oberfläche der Verpackung abgeschieden wird.

9. Verfahren nach einem vorangehenden Anspruch, wobei die in Wasser lösliche Folie Polyvinylalkohol oder modifizierten Polyvinylalkohol umfasst und die Zusammensetzung ein flüssiges Waschmittel darstellt, das zwischen 1 und 15% Wasser umfasst.

10. Verfahren nach einem vorangehenden Anspruch, wobei die Verpackung durch Warmformen von Umhüllungen oder durch eine vertikale Form-Füll-Verschluss-Technik gebildet wird.


12. Verpackung nach Anspruch 10, wobei die Zusammensetzung ein flüssiges Waschmittel darstellt, das zwischen 1 und 15% Wasser umfasst.

13. Verpackung nach Ansprüchen 11 oder 12, wobei die in Wasser lösliche Folie Polyvinylalkohol oder modifizierten Polyvinylalkohol umfasst.


15. Verpackung nach Anspruch 14, wobei das Pulver Talkum ist.

16. Verpackung nach einem der Ansprüche 11 bis 15, wobei das Pulver in einer Menge von 0,5 bis 10 mg/100 cm² der freiliegenden Oberfläche der Verpackung vorliegt.

17. Verpackung nach Anspruch 15, wobei das Pulver in einer Menge von 1,25 bis 2,5 mg/100 cm² vorliegt.

Revdendications

1. Procédé pour revêtir avec de la poudre un emballage soluble dans l'eau comprenant une composition enfermée à l'intérieur d'un film soluble dans l'eau, ledit procédé comprenant le fait de saupoudrer l'emballage avec une poudre ce qui a pour effet de déposer la poudre sur au moins une partie d'une surface exposée de l'emballage.

2. Procédé selon la Revendication 1, dans lequel la poudre est vaporisée de telle sorte qu'elle forme un nuage, ou est distribuée sous la forme d'un rideau, et dans lequel on fait passer les emballages solubles dans l'eau au travers du nuage ou du rideau.

3. Procédé selon la Revendication 2, qui comprend le fait de faire tomber ledit emballage soluble dans l'eau au travers dudit nuage de poudre sous l'effet de la gravité ce qui a pour effet que de la poudre est déposée sur au moins une partie d'une surface exposée de l'emballage.

4. Procédé selon l'une quelconque des Revendications 1 à 3, dans lequel le nuage de poudre est maintenu sous la forme d'un lit fluidisé.

5. Procédé selon l'une quelconque des Revendications précédentes, dans lequel la poudre a une taille de particules qui se situe dans la gamme allant de 5 à 15 microns.

6. Procédé selon l'une quelconque des Revendications précédentes, dans lequel la poudre est sélectionnée à partir du talc, de l'amidon, du stéarate de zinc, du stéarate de calcium et de n'importe quelle combinaison de ceux-ci.

7. Procédé selon la Revendication 5, dans lequel la poudre est du talc.
8. Procédé selon l'une quelconque des Revendications précédentes, dans lequel la poudre est déposée dans une quantité allant de 0,5 à 10 mg/100 cm² sur la surface exposée de l'emballage.

9. Procédé selon l'une quelconque des Revendications précédentes, dans lequel le film soluble dans l'eau est composé d'alcool de polyvinylyle ou d'alcool de polyvinyle modifié, et la composition est une composition détergente liquide comprenant entre 1 et 15 % d'eau.

10. Procédé selon l'une quelconque des Revendications précédentes, dans lequel l'emballage est formé par thermo scellage d'enveloppes ou par une technique de remplissage en forme vertical et de scellage.

11. Emballage soluble dans l'eau comprenant une composition enfermée à l'intérieur dans un film soluble dans l'eau, dans lequel au moins une partie d'une surface exposée de l'emballage est saupoudrée de poudre.

12. Emballage selon la Revendication 10, dans lequel la composition est un détergent liquide comprenant entre 1 et 15 % d'eau.

13. Emballage selon les Revendications 11 ou 12, dans lequel le film soluble dans l'eau comprend de l'alcool de polyvinylyle ou de l'alcool de polyvinyle modifié.

14. Emballage selon l'une quelconque des Revendications 11 à 13, dans lequel la poudre a une taille de particules comprise entre 5 et 15 microns et est sélectionnée à partir du talc, de l'amidon, du stéarate de zinc, du stéarate de calcium et de n'importe quelle combinaison de ceux-ci.

15. Emballage selon la Revendication 14, dans lequel la poudre est du talc.

16. Emballage selon l'une quelconque des Revendications 11 à 15, dans lequel la poudre est présente sur la surface exposée de l'emballage dans une quantité allant de 0,5 à 10 mg/100 cm².

17. Emballage selon la Revendication 15, dans lequel la poudre est présente dans une quantité allant de 1,25 à 2,5 mg/100 cm².