

EUROPEAN QUALIFYING EXAMINATION 2017

Paper A

This paper comprises:

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| * Letter from the applicant | 2017/A/EN/1-9 |
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| * Document D2 | 2017/A/EN/13-14 |



Letter from the applicant

Clean Dish PLC
Port Moonlight
United Kingdom

Dear Mr Wash,

[001] We are a company working in the field of dishwashers. Over the years, we have been constantly improving our dishwashers. However, we feel that the dishwashing compositions used in our dishwashers have not improved as much as our dishwashers have.

[002] In particular the delivery of the dishwashing compositions is not as controlled as we would like. We have, therefore, started to research the delivery of dishwashing compositions during the dishwashing cycle. As a result, we have now developed new dishwashing products.

[003] We would like you to draft a set of claims and the introductory part of the description for a European patent application for the subject-matter we present in this letter. We would like the claims to cover, as far as possible, everything that is described in this letter. Please note that we are not willing to pay any claims fee or any fees for further patent applications. For your information, we have attached documents D1 and D2.

[004] As you may know, a dishwashing cycle comprises several steps: a pre-wash, a main wash, intermediate rinsing cycles, a final rinse and a drying cycle.

[005] During the pre-wash, water is sprayed onto the dishes to loosen solid particles. No detergent is used in the pre-wash and the water is cold. During the main wash, once the water reaches a desired temperature, a detergent dispenser opens. Detergent, for example in the form of powder, is released and dissolves. The water is continuously heated to temperatures between 40°C and 70°C, depending on the chosen dishwashing program.



[006] During the intermediate rinse cycles, food residues remaining on the dishes are rinsed off with clean water. During the final rinse, rinse aid is added and the water is heated up to a temperature of between 60°C and 71°C. Rinse aids contain additives to help water drain from surfaces.

[007] Dishwashing tablets are well-known. A tablet may contain detergent only, or it may additionally contain further dishwashing components, like salt and rinse aid.

[008] There are several problems with dishwashing tablets. First of all, the different components of a tablet are often glued together and the glue does not always hold the different components together properly. Sometimes the components are merely pressed together. Therefore, a tablet can fall apart before it is used and becomes unusable. Secondly, tablets are not stable for very long periods of time and therefore, they do not have a very long shelf life. This instability is caused by components in the tablets that react with moisture from the air. A third problem is that consumers do not like to touch dishwashing tablets. Finally, and possibly most importantly, it is difficult to control the solubility of the tablets. This means that some components of the tablets get released too early and others too late. For example, it is very important that the main detergent is entirely dissolved during the main wash, whereas the rinse aid should only be released during the final rinse and not before. This is difficult to attain with tablets.

[009] It is also known to package dishwashing tablets in plastic pouches in order to keep them stable for a longer period of time (see D2). The pouches need to be removed before use, which is not very practical.



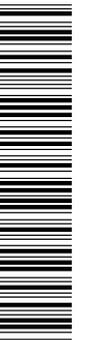
[010] We have come up with a very versatile dishwashing product, in which the dishwashing components are packaged in a polymer film. We have found that certain films made from polyvinyl alcohol (PVA) are very suitable for packaging dishwashing components. PVA films dissolve in water, especially at the temperatures (40°C to 70°C) used in a dishwasher. As an example of our research, we have packaged a commercially available dishwashing tablet in a PVA film. Other water-soluble polymer films are known, but are unsuitable for use with dishwashing components.

[011] For packaged components to be dissolved at the right time during a dishwashing cycle, the PVA film must have a thickness of 50 µm or less, preferably less than 40 µm. If the PVA film has a thickness below 10 µm, it is not strong enough and already breaks during storage. A minimum thickness of 20 µm is preferred.

[012] The average molecular weight of PVA is not critical for our invention. The average molecular weight gives an indication of the average length of the polymer molecules and is measured in the unit g/mol. PVA usually has an average molecular weight lying within the range of from 1 000 to 1 000 000 g/mol. Preferred average molecular weights lie between 10 000 and 300 000 g/mol, more preferably between 20 000 and 150 000 g/mol.

[013] In the simplest example of our invention, we package a commercially available dishwashing tablet in a film as described above. The resulting product is advantageous because the film increases the stability of the tablet. Therefore, the product has a longer shelf life. Furthermore, the resulting product is easier to use than a commercially available tablet. In particular, it is not necessary to remove the film.

[014] Our invention is not limited to any particular dishwashing composition. We have tested several compositions comprising different solid detergents, liquid detergents and rinse aids. All of these components turned out to be compatible with our invention.

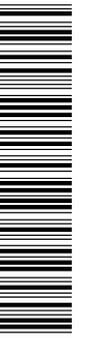


[015] An advantage of packaging a dishwashing composition in a film is that the components need not be solid. As mentioned above, our dishwashing products can also contain liquid components. In one of the preferred examples, a combination of liquid and solid components, packaged in different connected pouches, is used. This results in a very versatile product.

[016] Our dishwashing products can be specifically adapted to the requirements of a dishwashing cycle. We have found that, by varying the thickness of a film, we can tailor at what point in time during the dishwashing cycle the film is dissolved. Based on this property, we package the different components of a dishwashing composition into pouches made from films of different thicknesses. The resulting product can be designed to release each component at the right time during the dishwashing cycle. The product can be much more efficient than dishwashing products that are currently available on the market. Thus, it is possible to use less detergent to obtain a similar dishwashing efficiency.

[017] Suitable PVA films are commercially available in different thicknesses. Films of different thicknesses can be attached to one another by heat sealing. Rolling films is known from the food packaging industry. Films for our dishwashing products can be made by rolling different parts of a single film to different thicknesses. This film is then used to make the dishwashing product. Thinner parts of the film are achieved by rolling parts of the film for longer periods of time or with a higher intensity. Such PVA films having variable thicknesses are available on the market, but they are too expensive for use in a dishwashing product.

[018] Figs. 1a and 1b show a dishwashing product 1 in which pouches 2, 3 and 4 are arranged next to each other. Fig. 1a shows the product 1 from above, whereas Fig. 1b shows the product 1 in perspective. Fig. 2 shows a dishwashing product 1 in perspective, in which pouches 2, 3 and 4 are arranged on top of each other.

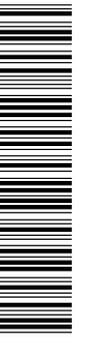


Experimental part

Experiment 1

[019] In this experiment, a dishwashing tablet of D1 was packaged in a PVA film having a thickness of 40 µm. The film was available from Reyab Inc. and had an average molecular weight of 60 000 g/mol. The performance of packaged tablets and non-packaged tablets was compared. The tablets were tested as freshly prepared and after 30 days, 60 days and 90 days of storage. In the table below, results are given in DWE, which stands for Dish Washing Efficiency. This parameter allows the comparison of relative dishwashing performances.

	Non-packaged tablet DWE	Packaged tablet DWE
Freshly prepared product	100	98
After 30 days storage	97	98
After 60 days storage	89	97
After 90 days storage	70	95



[020] According to the table, for fresh products, a non-packaged tablet has a slightly better performance. However, after only 30 days of storage, a packaged tablet has a better performance. After 90 days of storage, the performance of a packaged tablet is about 35% better.



Experiment 2

[021] In this experiment, we describe a process of making a dishwashing product having three pouches. PVA films having a respective thickness of 20 μm , 30 μm and 50 μm were chosen. A different dishwashing component was placed onto each film: a first detergent was placed onto the PVA film having a thickness of 20 μm , a second detergent was placed onto the PVA film having a thickness of 30 μm and a rinse aid was placed onto the PVA film having a thickness of 50 μm . The films were closed by heat sealing to form the pouches. The pouches were then joined together, also by heat sealing, resulting in a product according to Figs. 1a and 1b.

[022] During testing in a dishwasher, it was determined that the first detergent was released at the start of the dishwashing cycle and the second detergent was released near the end of the dishwashing cycle. The second detergent was more aggressive to the dishes than the first detergent. Due to the greater thickness of the film in which it was packaged, the second detergent released later during the dishwashing cycle. The second detergent was able to remove difficult residues, but only contacted the dishes for a short time and thus did not damage them. The rinse aid was released only during the final rinse.

Experiment 3

[023] In this experiment, we describe a preferred process of making a product according to the invention. In this process, a commercially available PVA film was rolled into three parts of different thicknesses. The thicknesses were the same as in experiment 2. The same components as in experiment 2 were placed onto the parts of the film, which were then closed by heat sealing to form three pouches enclosing the components just as in experiment 2.



[024] Products made according to the process of this experiment were compared with products of experiment 2. It was found that 99% of the products of this experiment were of good quality. Only 93% of the products of experiment 2 were of good quality. We believe that this difference is due to the fact that less heat sealing is needed for making the product of experiment 3. A product is considered to be of good quality if all of its pouches are closed properly. Everything over 90% is considered to be acceptable.

Yours sincerely,

Dr. C. U. P Plate



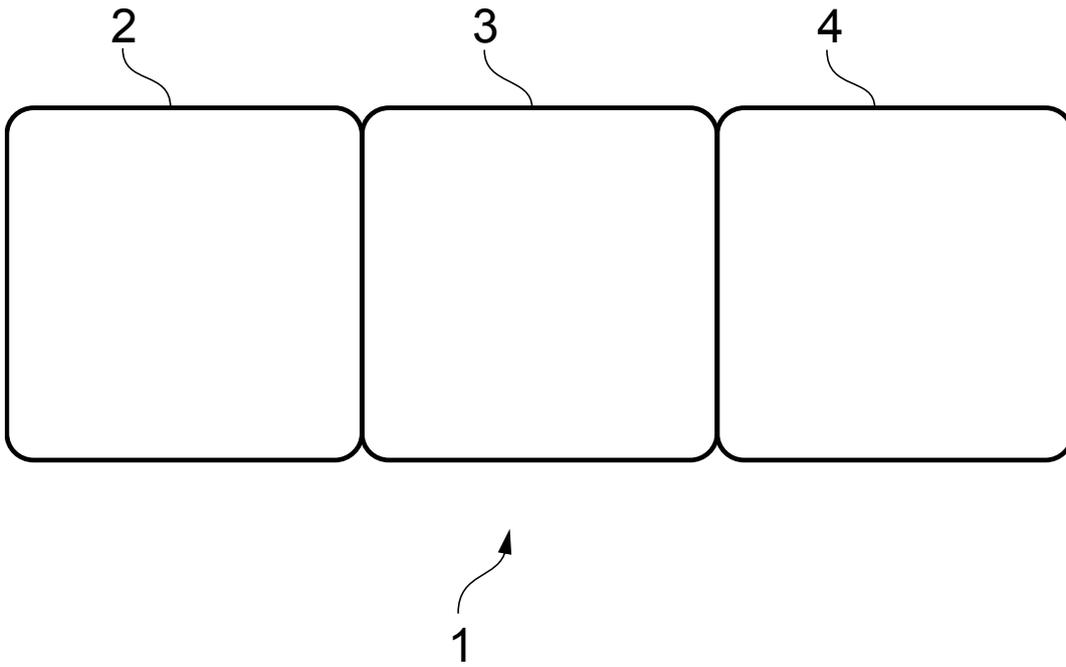


Fig. 1a

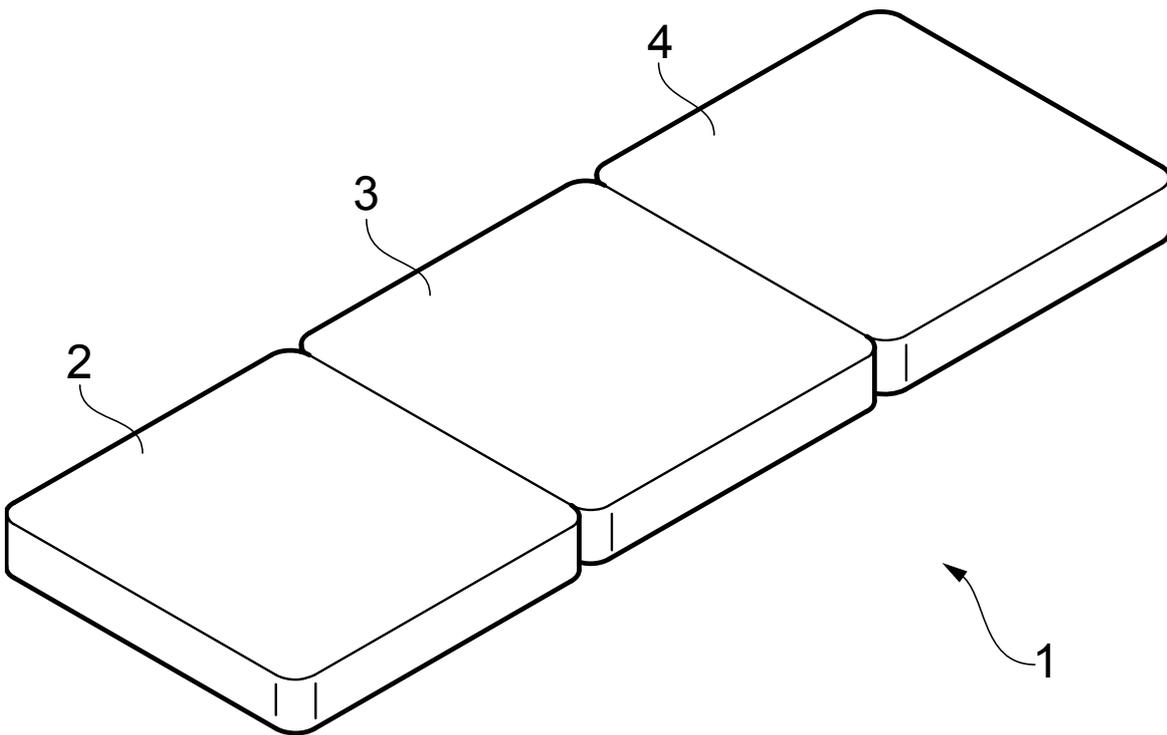


Fig. 1b



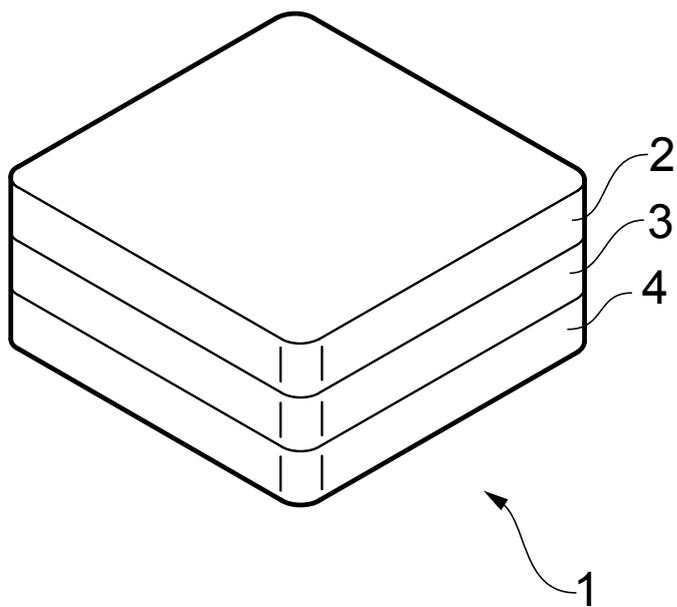


Fig. 2



Document D1: publication number: EP1234567

[001] The present application is concerned with dishwashing tablets. It is known to use dishwashing compositions that contain detergent and are pressed in the form of a tablet. This tablet only contains detergent. Other components, such as rinse aid and salt, need to be added into different compartments in the dishwasher.

[002] Such a tablet is more convenient than dishwashing powder. However, it is necessary to make sure that all the components required for dishwashing are present during the dishwashing cycle.

[003] Our invention concerns a tablet that contains all the components needed for a dishwashing cycle. We have achieved this by gluing all the components together. In doing so, the tablet is very convenient to use.

[004] For a detailed description of our invention, we refer you to the figure in which a dishwashing tablet according to the invention is shown. The tablet 1 has two layers, a bottom layer 2 and an upper layer 3, each formed from a pressed composition, which is different for each layer.

[005] The bottom layer 2 contains the main detergent. This layer of the tablet dissolves more quickly than the upper layer 3. The respective solubility of the layers 2 and 3 is chosen dependent on the specific requirements of a dishwashing cycle.



Claims:

1. Dishwashing tablet (1) comprising at least two different compositions, the compositions being arranged as separate layers (2, 3), the layers being glued together.
2. Dishwashing tablet (1) according to claim 1, in which the layers (2, 3) have different solubilities.
3. Dishwashing tablet (1) according to claim 1 or 2, wherein the tablet comprises at least 3 layers.
4. Dishwashing tablet (1) according to any of claims 1 to 3, in which the layers (2, 3) contain a detergent and/or salt and/or a rinse aid.



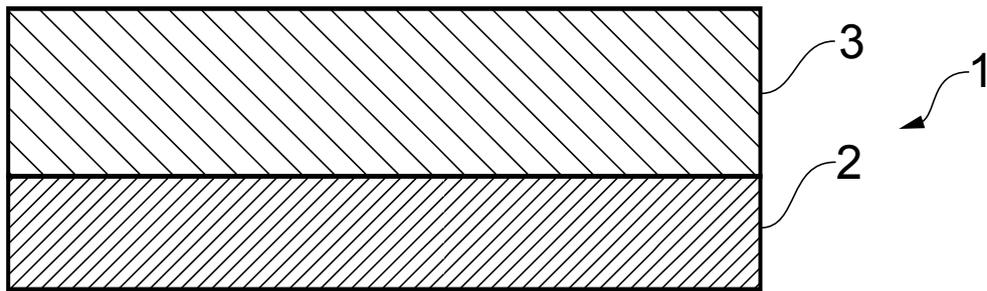


Fig.



Document D2: Detergent weekly 20 (2007), page 156

[001] We report on a new development in dishwashing detergents. In recent years we have seen a departure from detergents in the form of powder towards detergents in the form of tablets. Tablets are more convenient for users, who now do not have to fill powder into a small compartment of a dishwasher. Furthermore, the dosage is always exact. This has advantages for both users and the environment.

[002] Tablets, however, have some inconveniences. Firstly, due to contact between them, tablets sometimes get damaged or even break. Secondly, due to contact with moisture in the air, the tablets lose some of their activity during storage.

[003] The new development that we are now reporting on concerns packaged tablets. The tablets are packaged in a pouch made of a polymer film that protects them. Furthermore, the pouch provides a protective environment, which largely avoids contact between tablets and moisture in the air. When a user wants to use a tablet, he or she only needs to open a pouch and put the tablet in a compartment of the dishwasher. The packaged tablets can be sold as strips. A strip comprises a row of tablets. Each tablet is packaged in a protective pouch. The pouches of two adjacent tablets are connected to each other. Two adjacent tablets can be easily separated by the provision of perforations between the two pouches.

[004] A wide variety of polymers can be used for making the pouches. The preferred polymers are polyacrylates, polyvinyl alcohol (PVA), polyethers and polyesters. Films of these polymers are commercially available. The films need to be relatively thick so that the pouches remain stable when stored in a moist environment. Films having a thickness of 100 μm were found suitable.

[005] A pouch is produced by wrapping a tablet in a polymer film, which is then closed by heat sealing.



[006] The first tests were very promising. By using packaged tablets, detergents retained their activity for over 100 days.

[007] We are currently working on a further improvement. We are performing research to find a dishwashing product in which the pouch is water-soluble. This would make the product even easier to use, because users would not have to tear the pouch, nor would they need to touch a tablet. We believe that the choice of a polymer film having a lower thickness will achieve the required water solubility. We are currently testing PVA films with a thickness of 40 μm .

