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(54) **PACK CONTAINING PHARMACEUTICAL ADMINISTRATION FORMS**

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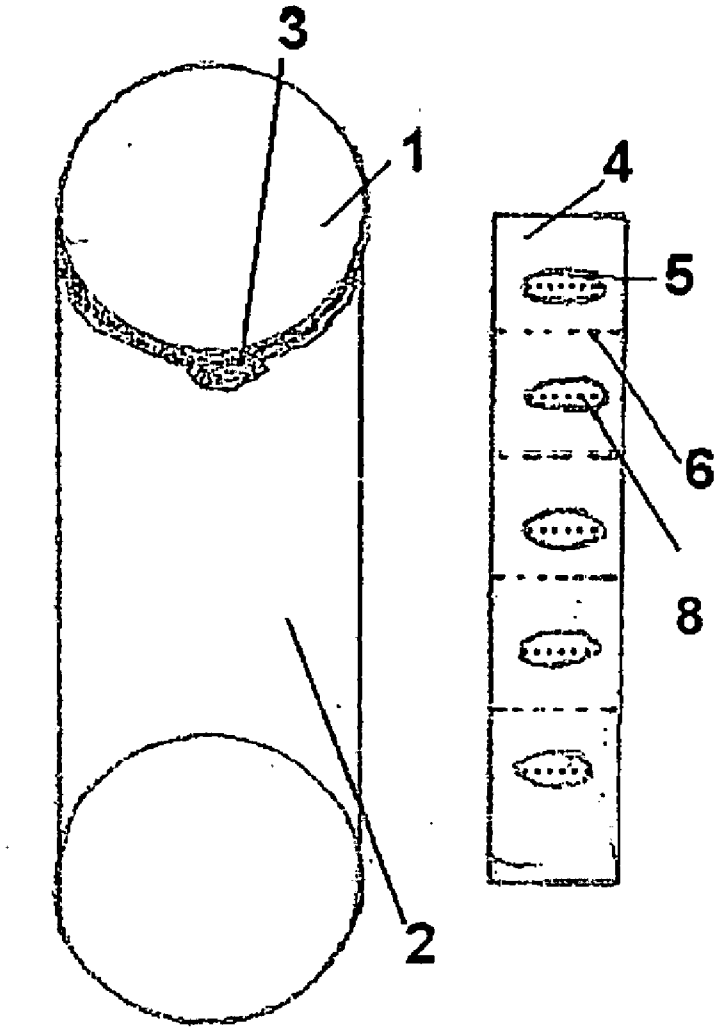
(57) **ABSTRACT**

The invention relates to a pack comprising a container (**2**) and solid pharmaceutical administration forms packed in blister packs (**4**).



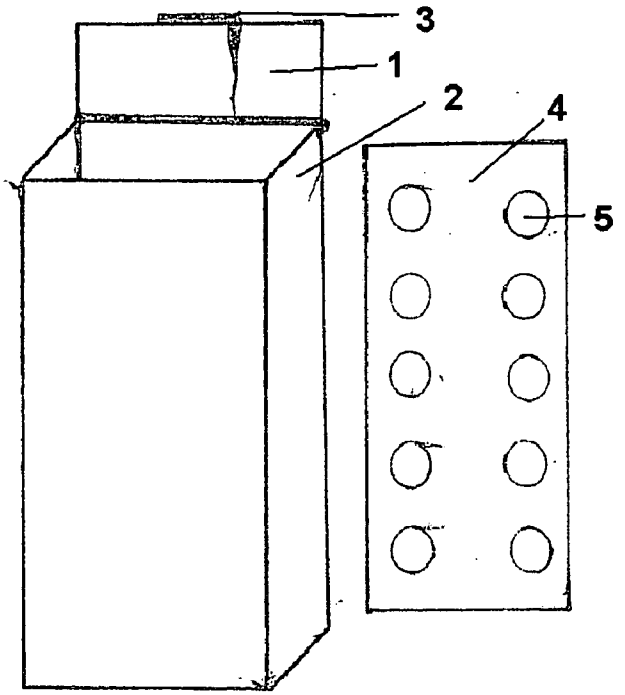


Figure 1

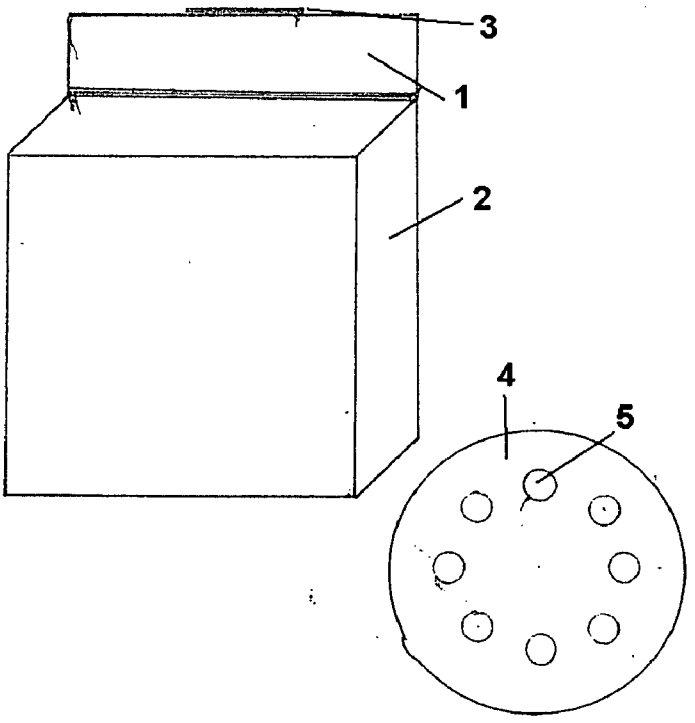


Figure 2

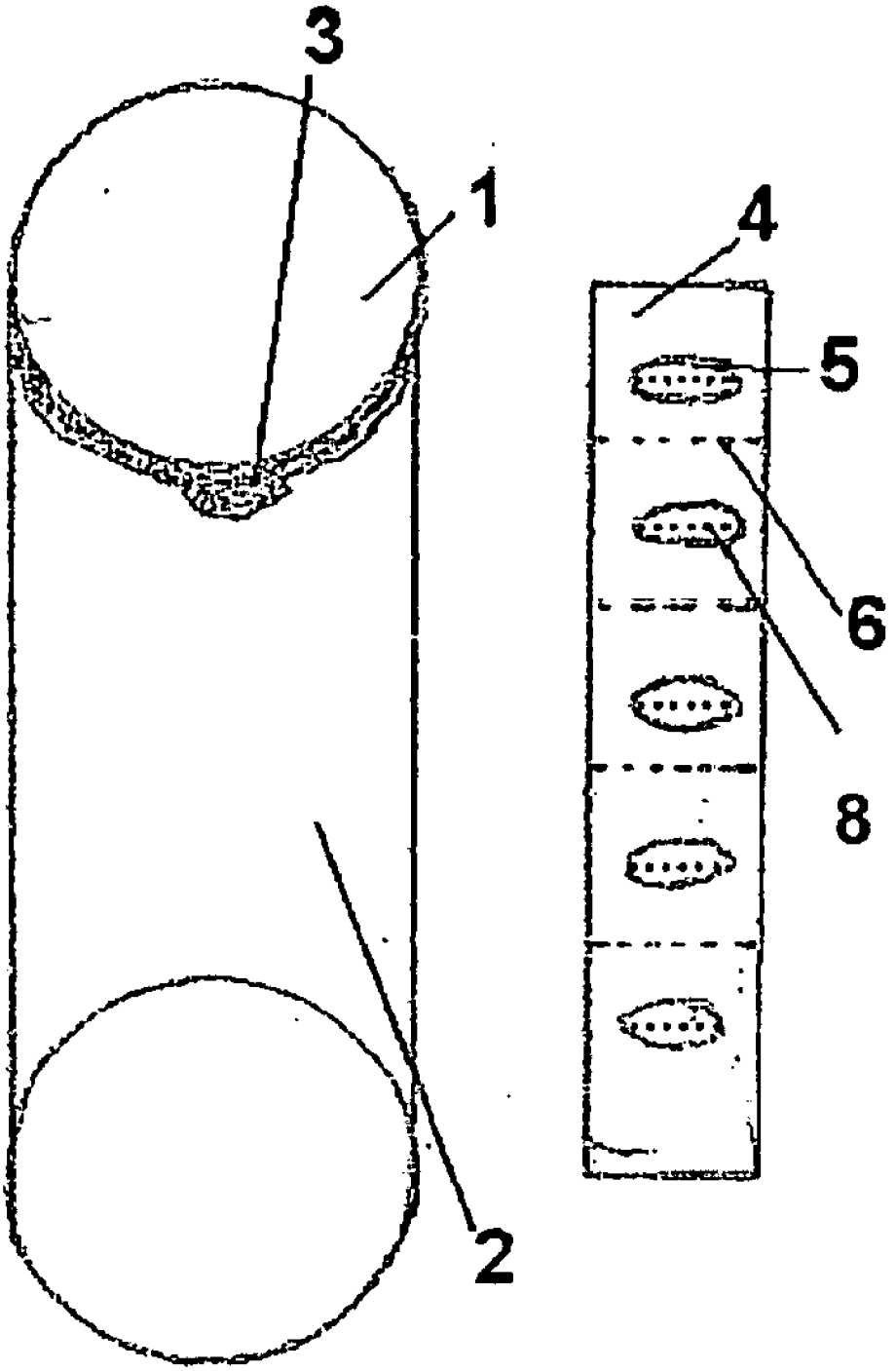


Figure 3

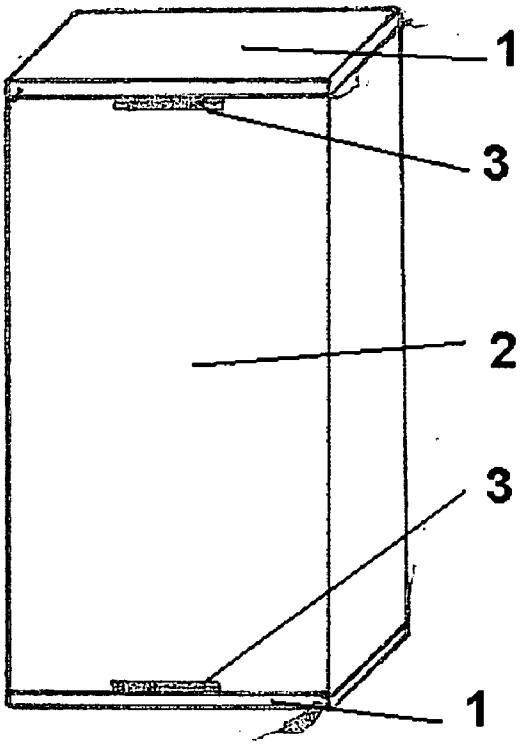


Figure 4

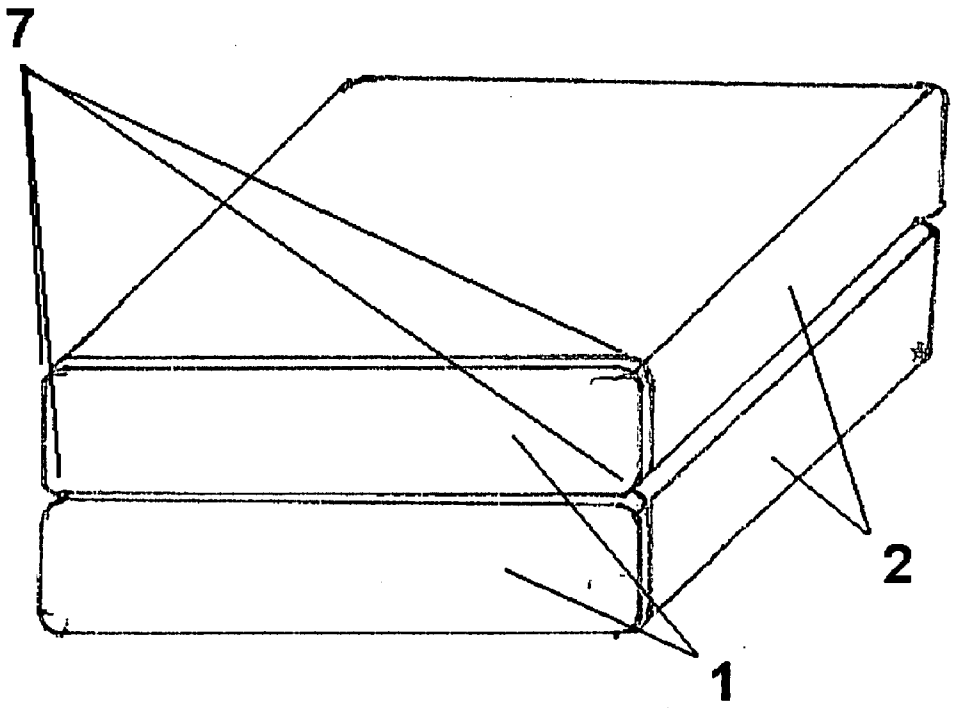


Figure 5

PACK CONTAINING PHARMACEUTICAL ADMINISTRATION FORMS

[0001] The invention relates to a pack comprising a container and solid pharmaceutical administration forms packed in blister packs, and to a method for the stabilisation of solid pharmaceutical administration forms by introduction of the solid pharmaceutical administration forms into blister packs and introduction of the blister packs into the container.

[0002] Blister packs below are taken to mean packaging comprising two sheets, films or foils which are firmly bonded to one another and which contain cavities for the accommodation of the solids to be packed. Blister packs usually consist of a thermoformed plastic sheet or film (cavity sheet or film) for the accommodation of the solids, which, after filling, is firmly bonded, i.e. heat-sealed, to a second sheet, film or foil (cover sheet, film or foil), which usually consists of an aluminium foil and/or plastic sheet or film. The packaged solids can be pushed through the cover sheet, film or foil by pressure on the cavity sheet, film or foil and removed individually from the blister pack. Blister packs are therefore also known as push-through packs. If "pushing-through" the cover sheet, film or foil is not possible owing to the shape, size and/or strength of the solids contained, the blister packs can also be opened by slitting open the cover sheet, film or foil using a sharp object, for example using the finger nail. However, the term "blister pack" is not restricted thereto, but also encompasses special embodiments, such as, for example, child-proof modifications, such as, for example, those in which it is necessary to carry out two different opening operations whose sequences are intended to be beyond the intellectual capacity of children (such as so-called "peel-push systems"), or embodiments in which the cover sheet, film or foil is not punctured, but instead peeled off before removal of the solids contained.

[0003] Blister packs are the preferred primary packaging means for solid pharmaceutical administration forms. Advantages are that the administration forms can be removed individually and thus without contamination of the other administration forms, which are furthermore contained in sealed cavities, the administration forms are separated from one another (meaning that mutual interaction, such as, for example, abrasion or sticking, are basically prevented).

[0004] A further important function of blister packs is protection of the pharmaceutical administration forms contained therein against harmful environmental influences, such as light, gases, in particular oxygen, and against moisture. The last-mentioned function in particular is of particular importance since many medicaments are sensitive to moisture. Since blister packs are usually accommodated in folding cartons, which are not effective barriers against moisture and gases, the crucial protective action in the case of solid pharmaceutical administration forms packaged in blister packs (primary packaging means) and folding cartons (secondary packaging means) arises through the blister packs.

[0005] However, the plastic sheets or films used for blister packs only provide limited protection against gases and moisture ingressing from the outside. Various plastic sheets or films, such as, for example, polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), high-density polyethylene (HDPE), polypropylene (PP), polyethylene terephthalate (PET), polycarbonate, each of which have different material properties, stand. Although the selection of a material of relatively low permeability for moisture or the use of composite sheets or films made from these materials, such as, for example, PVC/PVDC, PVC/HDPE, optionally also together with further polymers as barrier layer, such as, for example, cycloolefin copolymer (COC), or special polyhalogenated polymers, such as polychlorotrifluoroethylene (PCTFE) Aclar®, (PVC/PCTFE, PP/COC (for example Polybar®) PVC/COC/PVDC composite sheets or films), enables the ingress of moisture to be reduced to a certain degree, it does not prevent it completely.

[0006] Besides the choice of plastic, the material thickness, i.e. the sheet, film or foil thickness, also has an essential influence on the permeability of the blister pack. Thus, besides the selection of the materials and the combination thereof to give composite sheets or films, the permeability for gases and moisture can also be reduced by increasing the sheet, film or foil thickness. However, even these measures have only a limited effect and in addition do not result in the desired substantial exclusion of moisture. Higher production complexity, greater use of materials and difficulties in converting the sheets, films or foils into blisters packs and recycling thereof also arise disadvantageously.

[0007] The use of composite sheets or films which also comprise metal foils enables the permeability for moisture and gases to be significantly reduced again, but in this case particular difficulties arise during processing (thermoforming). On use of composite sheets or films comprising metal foils, the blister packs are also no longer transparent, meaning that the customer can no longer see the pharmaceutical administration forms contained therein, which is undesired for security and marketing reasons.

[0008] The problems described have the consequence that many moisture-sensitive medicaments are not packed in blister packs for export and marketing in regions of increased atmospheric humidity, for example in the tropics.

[0009] In order to solve the problems described, special blister packs have been proposed which contain desiccants and consequently are intended to keep the moisture away from the medicament.

[0010] EP 466068 discloses a blister pack in which in each case a tablet cavity is connected to a cavity containing a desiccant. However, the provision of a desiccant per administration form, such as, for example, a tablet, is associated with high material consumption and space occupancy, is complex in terms of packaging technology and is expensive.

[0011] U.S. Pat. No. 4,753,352 discloses a blister pack in which a plurality of tablet cavities are connected to a cavity containing a desiccant. Although this enables the packaging complexity per pharmaceutical administration form to be reduced, the removal of only one pharmaceutical administration form from the blister pack results in opening of the previously closed system, with the consequence that moisture is able to ingress through the resultant opening. After exhaustion of the moisture uptake of the desiccant connected thereto, the other pharmaceutical administration forms connected to this desiccant are then no longer adequately protected against ingressing moisture by the sheet or film and by the desiccant connection channels. Furthermore, it cannot be excluded in either system that the desiccant is removed and ingested instead of the pharmaceutical administration form, which is extremely serious for safety reasons.

[0012] Regarding the last-mentioned problem of unintentional ingestion, EP 779872 A1 proposes a reinforcement of the blister packs in the region of the desiccant cavities, which

is intended to prevent unintentional ingestion of the desiccant by the user. However, this results in an additional increase in the production complexity and cost, which are increased anyway due to the introduction of desiccant.

[0013] Whereas simple blister packs often provide only inadequate protection against moisture, the desiccant-containing blister packs have a complex structure, are difficult and therefore expensive to manufacture, cannot be manufactured in production facilities for simple blister packs, take up more space owing to the desiccant contained and thus increase the storage space requirement, and/or are afflicted with safety problems. Furthermore, adequate protection against moisture likewise cannot always be ensured with desiccant-containing blister packs.

[0014] The object of the present invention was to provide simple packaging for pharmaceutical administration forms in which the pharmaceutical administration forms are present in separated form, in which reliable protection against moisture is ensured and which is not afflicted with the above-mentioned problems.

[0015] The object has, surprisingly, been achieved by firstly introducing the pharmaceutical administration forms into a simple blister pack and subsequently introducing the latter into a container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area, and tightly sealed. The invention thus relates to a pack comprising a resealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area, and at least one blister pack containing one or more solid pharmaceutical administration forms, where the blister pack (s) is (are) contained in the container.

[0016] The container is intended for the storage of at least one blister pack. It can therefore have any spatial shapes which fulfil this function, i.e. those which are suitable for accommodating at least one blister pack. It is preferred for the spatial shape of the container to be matched to the dimensions of the blister pack. If it is intended, for example, to store blister packs having a rectangular shape, it is preferred for the container to have the same basic shape, i.e. for the container to have the spatial shape of a cuboid, if it is intended to store blister packs having a circular shape, it is preferred for the container to have the spatial shape of a cylinder. However, it is likewise possible in accordance with the invention to employ as container any desired spatial shape irrespective of the shape of the blister pack, so long merely that it is suitable for accommodating the blister pack. For example, a blister pack having a circular shape can also be stored in a container having a cuboid spatial shape or a blister pack having a rectangular shape can also be stored in a container having a cylindrical spatial shape.

[0017] Individual embodiments of the invention are depicted in the figures. Uniform numbering is used to denote the constituents of the embodiments shown in the figures, i.e. identical numbers in the figures in each case denote the same constituents.

[0018] FIG. **1** shows a cuboid container containing a blister pack having a rectangular shape. The container comprises walls (**2**) whose inward-facing sides comprise at least one channel former together with at least one absorbent, at least over part of the area, has as closure a lid (**1**) and is provided with an (optional) opening aid (**3**). The blister pack (**4**) contains cavities (**5**) for the accommodation of the solid pharmaceutical administration forms.

[0019] FIG. **2** shows, like FIG. **1**, a cuboid container and a blister pack, but with different dimensions of the container and a blister pack having a circular shape.

[0020] FIG. **3** shows a container having a cylindrical spatial shape. The round wall (**2**) comprises at least one channel former together with at least one absorbent in the inward-facing side, at least over part of the area and is provided with a fitting circular lid (**1**) and (optional) filling aid (**3**). The blister pack (**4**) has a strip-shaped design, contains oval cavities (**5**) for the accommodation of the solid administration forms and is provided with a tear-off aid (**6**) along which the blisters can be divided.

[0021] The container is resealable. Resealable means that the container can be opened and re-closed repeatedly, i.e. at least once, preferably a number of times, particularly preferably at least as often as corresponds to the number of solid pharmaceutical administration forms which, packed in blister packs, are intended to be contained in the container. The container is tightly sealed after each opening and sealing operation so that ingress of moisture and gases into the interior of the container is effectively prevented.

[0022] Opening and sealing of the container are effected by means of a tightly closing closure matched to the container. Not restricted to one closure. All types of closures can be employed so long as they ensure that gases and/or moisture cannot ingress into the interior of the container in the closed state even after repeated opening and closing of the container. The container can have one or more closures. In the case of cuboid containers, each of the rectangular surfaces can basically be designed as a closure.

[0023] FIG. **4** shows an embodiment of a cuboid container having two closures (**1**).

[0024] According to an embodiment of the invention, lids (**1**) are used as closure. Examples of lids are screw closures, caps which are folded over the upper rim of the vessels or introduced into the interior of the vessel. In the case of spatial shapes which have corners, such as, for example, cuboids, the corners of the opening and the lid fitted thereto may also be slightly rounded in order to increase the sealing of the container against gases and moisture.

[0025] According to a preferred embodiment, the container has a cuboid spatial shape, rounded corners (**7**) and can be stacked well (see FIG. **5**).

[0026] The absorbents and channel formers contained in the container may jointly either be present directly in the inside wall(s) of the polymer forming the container or applied as a layer to the inside wall(s) of the polymeric container. Absorbents and channel formers may likewise be embedded in an inlay, which is introduced into the container as insert, so that at least part of the inside walls of the container are lined therewith.

[0027] Inside wall(s) is taken to mean the inward-facing surface of the wall(s) of the container, i.e. the surface(s) of the container which is (are) in contact with the solid pharmaceutical administration forms contained therein packed in blister packs.

[0028] Suitable materials for the container are polymers. Polymers which can be employed as a mixture with absorbents and channel formers are, in particular, thermoplastics, such as, for example, polyolefins, such as polyethylene and/or polypropylenes, polyisoprenes, polybutadienes, polybutenes, polysiloxanes, polyamides, ethylene-vinyl acetate copolymers, ethylene-methacrylate copolymers, polystyrenes, polyesters, polyanhydrides, polyacrylate nitriles,

polysulfonates, polyester-amides, polyacrylate esters, propylene-maleic anhydride, polyethylene-maleic anhydride, polyethylene-urethanes, polyethylene-ethyl vinyl alcohols, polyethylene-nylon and/or polyurethanes. The walls provided on their inside surface with absorbents and channel formers have, based on the total weight of the mixture of polymer, channel formers and absorbents, a polymer content of 10-90% by weight.

[0029] Absorbents which may be present are in principle any type of desiccants, i.e. moisture-binding binders. Three groups of desiccants come into consideration:

[0030] The first group includes chemical substances which form hydrates with water. Examples of chemical substances of this type are anhydrous salts, which tend to absorb water or moisture and in the process form a stable hydrate. The moisture is bound and liberation thereof is prevented by a chemical reaction.

[0031] The second group of desiccants contains substances which are reactive. The substances react with water or moisture by forming a new substance. The newly formed substances are normally stable at low temperatures, which is only reversible with expenditure of high energy. Desiccants of this type are principally used for drying solvents and as water-absorbent material in the case of polymers which themselves have to remain in a reduced-moisture state.

[0032] The third group of desiccants binds the moisture by physical adsorption. The desiccant contains particles having fine capillaries into which the moisture is drawn. The pore size of the capillaries and the density thereof in the desiccant determine the absorption properties. Examples of desiccants of this type are molecular sieves, silica gels, certain synthetic polymers, such as, for example, those which are used in nappies, and starches. Desiccants from the third group are preferably contained in the container since they are substantially inert and water-insoluble. Particular preference is given here to molecular sieves having a pore size of 3 to 15 Angstrom and/or silica gels having a pore size of 24 Angstrom.

[0033] Channel formers which come into consideration are hydrophilic substances, such as, for example, polyglycols, ethyl vinyl alcoles, glycerol, polyvinyl alcohols, polyvinylpyrrolidone, vinylpyrrolidone, N-methylpyrrolidone, polysaccharides, saccharides and/or sugar alcohols. Preferred polyglycols are polyethylene glycol and/or polypropylene glycol. Saccharides which can be used are, for example, glucose, mannose, galactose and/or fructose. Suitable sugar alcohols are, for example, mannitol, sorbitol, hexitol, dulcitol, xylitol, ribitol and/or erythrol. Polysaccharides are taken to mean, for example, dextrins and/or hydrolysed starch.

[0034] In the inside walls provided with absorbents and channel formers, the channel formers can have a proportion of 10-40% by weight, based on the total weight of the mixture of polymer, channel formers and absorbents.

[0035] Absorbents and channel formers are embedded in the inside wall(s) of the container over part of the area or over the entire area. Over part of the area means that at least part of the entire area of the container forming the inside wall(s) comprises absorbents and channel formers. Over the entire area means that the entire area of the container forming the inside walls comprises absorbents and channel formers. According to an advantageous embodiment, absorbents and channel formers are present in at least 10%, preferably in at least 50%, particularly preferably in at least 90%, of the inside walls, based on the entire inside surface area of the container.

[0036] Containers made from polymers which comprise absorbents and channel formers and which are suitable as container for the pack according to the invention are known in the prior art and are described, for example, in WO 97/32663 A1, EP 1000873 A2 and WO 03/086900 A1, EP 1421991 A1. Containers which can be employed in the pack according to the invention are commercially available and are offered, for example, by Capitol Specialty Plastics Inc., 2039 McMillan Street Auburn, Alabama, USA, under the trade name Activ-Vial, or by Sud Chemie, Ostenrieder Str. 15, 85368 Moosburg, Germany, under the trade name 2 AP Multipolymer.

[0037] The blister packs can preferably and advantageously be made from simple plastic sheets or films which have high permeability for water vapour. After introduction of the blister pack into the container and sealing thereof, they are then located in a dry environment, which is ensured by the drying effect of the absorbent located in the walls of the container. In the case of a relatively high moisture content in the interiors of the blister packs (containing the solid pharmaceutical administration forms) compared with the interior of the container (which is ensured by the desiccant), this diffuses through the plastic sheet or film of the blister packs into the interior of the container, where it is absorbed by the desiccant present in the container walls. If the pharmaceutical administration forms contained in the blisters have a higher moisture content than the interiors of the blisters surrounding them, moisture diffuses out of the pharmaceutical administration forms into the interiors of the blisters and then further, as described, through the plastic sheet or film of the blister packs into the interior of the container. In the case of an increased moisture content of the pharmaceutical administration forms compared with the interior of the container, drying of the solid pharmaceutical administration forms thus occurs even after packaging thereof.

[0038] Compared with commercially available blister packs packaged in folding cartons, a reversal of the diffusion direction of moisture, which generally takes place from the outside inward, i.e. in the direction of the pharmaceutical administration form, in conventional secondary packaging for blister packs, such as folding cartons, in the direction from the inside outward, i.e. out of the cavity of the blister pack and also out of the pharmaceutical administration form, occurres in the pack according to the invention. Drying of the pharmaceutical administration form consequently arises for the pack according to the invention even after manufacture and packaging of the pharmaceutical administration forms in blister packs, which advantageously results in a further increase in the shelf life, in particular in the case of pharmaceutical administration forms having sensitive ingredients.

[0039] Owing to the drying which takes place in the pack according to the invention after the pharmaceutical administration forms have been dispensed into the blister packs, the pharmaceutical administration forms can also be provided less expensively since drying times necessary after their manufacture can be omitted or shortened.

[0040] Suitable for use for the manufacture of blister packs which are suitable for the pack according to the invention are all plastic sheets or films which can be converted into blister packs in corresponding plants, in particular thermoforming plants, and which have a certain water-vapour permeability. Examples of plastic sheets and films which are suitable for the manufacture of blister packs are polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), high-density polyethylene (HDPE), polypropylene (PP), polyethylene terephthalate

(PET), polycarbonate, cycloolefin copolymer (COC), special polyhalogenated polymers, such as polychlorotrifluoroethylene (PCTFE) Aclar®, and composite sheets or films made from these materials, such as, for example, PVC/PVDC, PVC/HDPE, PVC/PCTFE, PP/COC (Polybar®) PVC/COC/PVDC, particularly suitable are PVC, PVDC, HDPE, PP, PET and composite sheets or films made from these, very particularly suitable PVC, PP, and PET. The plastic sheets or films can be employed as cavity sheet or film and/or as cover sheet or film. The cavity sheet or film at least preferably consists of a plastic sheet or film.

[0041] Plastic sheets or films of low thickness are preferably and advantageously employed for the manufacture of the blister packs. This is because a reduction in the material thickness of the sheets or films is also accompanied by a reduction in the diffusion resistance thereof, so that the described stabilisation of the pharmaceutical administration form can occur even more quickly due to removal of moisture during storage. The plastic sheets or films used as cavity sheet or film usually have a thickness of 10 to 500 μm, preferably 15 to 300 μm, particularly preferably 15 to 100 μm, very particularly preferably 15 to 50.

[0042] High permeability for water vapour and low sheet or film thickness enable the use of inexpensive plastic sheets or films, such as, for example, PVC, PP, and PET, which have a water-vapour permeability (WVP) in accordance with DIN 53122 of about 3.5, 0.84 and 5.4 g/cm^{2}24 h respectively at a thickness of 250 μm. Besides savings in material costs, sheets or films of this type can also be processed and filled well in conventional thermoforming plants, giving rise to additional cost advantages.

[0043] Aluminium foil, which has low water permeability, is usually employed for sealing blister packs. Low water permeability is not necessary in the pack according to the invention, meaning that other materials can also be employed for sealing the blister packs. This enables the use of plastic sheets or films as cover sheet or film, where sheets or films made from the same material as the cavity sheet or film can also be used. Single-material packaging of this type is particularly advantageous since it can be recycled without prior separation of cavity sheet or film and cover sheet or film, which is particularly desired for environmental protection reasons. On use of plastic sheets or films as cover sheet or film, water vapour present in the cavities of the blister pack can also be removed through the cover sheet or film, which advantageously increases the drying rate of the pharmaceutical administration forms contained in the blister pack. If, in addition, a plastic sheet or film of very low material thickness is used, a further increase in the drying rate and easier removal of the solid pharmaceutical administration form contained in the blister pack arise, since this can be pushed through more easily, besides reduced material usage.

[0044] According to an advantageous embodiment, each cavity of the blister pack containing a solid pharmaceutical administration form contains at least one hole. The hole/holes preferably have a diameter of <1 mm, they simplify the exchange of gases and moisture from the cavities of the blister packs in the interior of the container of the pack according to the invention, meaning that the drying rate is significantly increased. The holes also enable plastic sheets or films of high gas and moisture permeability and increased sheet or film thickness to be used for the blister packs without the stabilisation arising due to the drying being reduced. The invention therefore also relates to the pack according to the invention which is characterised in that the blister pack(s) contained in the pack has at least one hole in each cavity which contains a solid pharmaceutical administration form.

[0045] If a plurality of holes are present, they are preferably in the form of a row of small cuts/punched holes, i.e. a perforation, which, inter alia, simplify tearing-off along the line forming. The invention therefore also relates to pack which is characterised in that a plurality of holes are present as perforation in each cavity.

[0046] The perforations are particularly preferably microperforations, i.e. holes having a respective diameter of between 0.25 and 0.05 mm, which can be punched into the sheets or films. The invention therefore furthermore relates to a pack which is characterised in that the perforation present in each cavity is a microperforation.

[0047] The holes/perforations may be present in the cavity sheet or film and/or the cover sheet or film of the blister packs and introduced into the sheets or films either before or after filling of the blisters. The holes/perforations can be introduced by methods known from the prior art, such as, for example, by mechanical punching or by burning-in by means of laser light. The holes/perforations can be introduced into the plastic sheets or films before conversion thereof into blister packs, during conversion thereof into blister packs and also after the manufacture and filling of the blister packs.

[0048] If pre-holed/pre-perforated sheets or films are employed, it is preferred for only the cover sheet or film to be holed/perforated. This enables problem-free processing of the cavity sheet or film in conventional thermoforming plants and protects the pharmaceutical administration forms against contamination in the thermoforming plant after introduction thereof into the cavities. The filled cavity sheet or film can subsequently be heat-sealed to the cover sheet or film without problems, the latter preferably being perforated, particularly preferably microperforated. FIG. **3** shows a blister pack (**4**) which is provided with perforations (**8**). If the pharmaceutical administration forms are removed by pushing through the cover sheet or film, the perforations are preferably introduced in such a way that the cover sheet or film can be torn along the perforations in the case of pressure on the cavity sheet or film and the administration forms can be removed in a simple manner. The invention therefore furthermore relates to the pack according to the invention which is characterised in that the hole, holes, perforation or microperforation is (are) in each case introduced in the cover sheet or film.

[0049] Pharmaceutical administration forms which can be contained in the pack are all solid pharmaceutical administration forms which are in the solid physical state at room temperature and are intended, for example, for oral, anal or vaginal administration. This encompasses all solid pharmaceutical administration forms which are intended for direct administration after removal from the container, such as, for example, tablets, dragees, hard capsules, granules, pellets, powders, suppositories, but also those which have to be converted into the administrable form before administration, such as, for example, dry juices, for example in the form of powders which have to be converted into solution before administration. The pharmaceutical administration form is preferably a tablet, a dragee, a hard capsule, a granular material, a suppository, a pellet or a powder. Hard capsules have shells without added plasticiser, can be divided into upper and lower part and consist, for example, of gelatine or starch.

[0050] The invention also relates to a process for the production of the pack, which is characterised in that the solid

pharmaceutical administration forms is introduced into a blister pack and sealed, and the sealed blister pack is subsequently introduced into a container which [lacuna] of a tightly sealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area.

[0051] Pharmaceutical administration form(s) above and below is taken to mean a term for various technical administration forms as are known for the administration of medicaments to humans or animals. The expression pharmaceutical administration form is thus independent of a particular legal status and in no way restricted to medicaments, various substances, such as, for example, medicaments, food supplements and/or functional ingredients, may be present as ingredients. Examples of pharmaceutical administration forms for the purposes of the present invention can be in the form of medicaments and food supplements.

[0052] Surprisingly, the process according to the invention also enables the provision of marketable products of solid pharmaceutical administration forms which were hitherto unsuitable for marketing in accordance with the prior art since they do not have an adequate shelf life. After transfer of the administration form into the container, water is removed continuously and over a long period from the administration form by the absorbent present in the inside wall(s) of the container. The removal of water takes place over a large area and under mild conditions and thus results in stabilisation of the solid pharmaceutical administration form during storage thereof.

[0053] The invention therefore also relates to a method for increasing the shelf life of solid pharmaceutical administration forms which is characterised in that the latter is introduced into a blister pack and sealed, and the sealed blister pack is subsequently introduced into a container which consists of a tightly sealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area.

[0054] The stabilising action of the pack according to the invention is based on the influence of the container on the solid pharmaceutical administration form contained in blister packs, which can consequently be provided in a storage-stable manner. The achievement of the action according to the invention thus requires that the solid pharmaceutical administration form contained in blister packs is contained in the container, i.e. the pharmaceutical administration form, blister pack and container together are in the form of a pack.

[0055] The pack according to the invention has a stabilising action on all solid pharmaceutical administration forms whose active compound(s) and/or adjuvant(s) are sensitive to moisture. Examples of moisture-sensitive active compounds are many pharmaceutical active compounds, such as hormones or proteins, vitamins, cells, such as, for example, probiotic cultures.

[0056] The pack according to the invention preferably contains solid pharmaceutical administration forms which comprise moisture-sensitive active compounds and/or moisture-sensitive adjuvants or adjuvant combinations. An adjuvant combination which is sensitive to moisture is, for example, the combination of an organic acid, such as, for example, citric acid, with carbonate, such as, for example, sodium hydrogencarbonate or potassium hydrogencarbonate, as used as in effervescent tablets.

[0057] The solid pharmaceutical administration form contained in the pack according to the invention may in addition, depending on the embodiment, comprise conventional adjuvants and additives. The choice of adjuvants and/or additives also depends on the food-law provisions of the country in which the solid pharmaceutical administration form contained in the pack is intended to be used. Adjuvants and/or additives used, for example for tablets, multilayered tablets, dragees, hard capsules, granules, pellet preparations and/or powders, are starch (for example maize starch), talc, microcrystalline cellulose, lactose, highly disperse silicon dioxide, polyvinyl-pyrrolidone and/or cellulose powder. Further constituents which may be present as binders and/or release agents are carbohydrates, such as, for example, mannitol, sorbitol, xylitol, glucose, sucrose, fructose, maltose, dextrose, maltodextrin and/or kaolin, and/or cellulose derivatives, such as, for example, methylcellulose, hydroxypropylcellulose and/or hydroxypropylmethylcellulose, and/or calcium carbonate, calcium stearate, magnesium stearate and/or glycerol stearate. Furthermore, the solid pharmaceutical administration form contained in the pack may also comprise dyes, flavours and/or aromas, as well as lubricants, antioxidants and/or stabilisers. The content of these base substances depends on the one hand on the target content of the substances to be administered, such as medicaments, food supplements, functional ingredients, on the other hand on criteria which determine the mechanical-physical properties of the oral administration form, such as, for example, hardness, compressibility, size, colour and/or shape.

[0058] The solid pharmaceutical administration form contained in the pack can also be prepared by various methods known to the person skilled in the art. These methods are known, for example, from H. Sucker, P. Fuchs, P. Speiser, "Pharmazeutische Technologie" [Pharmaceutical Technology], Stuttgart 1978 or K. H. Bauer, K. H. Fromming, C. Fuhrer, "Pharmazeutische Technologie" [Pharmaceutical Technology], Stuttgart 1986. They are hereby incorporated as reference and are thus part of the disclosure.

[0059] The examples explain the invention without being restricted thereto.

EXAMPLE 1

3-Layered Tablet Analogous to in EP 931 543 A1 Containing Probiotic Bacteria

Manufacture:

[0060] Mixtures of 3% by weight of bacteria preparation (containing *Lactobacillus gasseri, Bifidobacterium bifidum, Bifidobacterium longum*), 10.5% by weight of insulin, 8.6% by weight of calcium phosphate, 5.7% by weight of cellulose, 2.3% by weight of adjuvants (disintegrants, release agents) (1st layer), mineral substances, trace elements, dyes, disintegrants, release agents, cellulose (2nd layer) and vitamins, trace elements, disintegrants, release agents and cellulose (3rd layer) (percentage data in each case based on the total tablet weight) are pressed successively in a 3-layered tablet press (rotary) from E. Hata to give an oblong-shaped 3-layered tablet having the dimensions 18 mm×8 mm. The tablets obtained are subsequently provided with a film coating (from aqueous solution comprising hydroxypropyl-methylcellulose, hydroxypropylcellulose and a release agent), the coating amounted to 5% by weight, based on the weight of the core,

corresponding to 11 mg/cm^2 of tablet surface. Coated 3-layered tablets are obtained having a weight of 1050 mg each.

Storage and Testing:

[0061] The stability of the film tablets is checked in stability studies. To this end, film tablets are introduced either into PVC/aluminium blister packs (pack-aging means A) or into PVC/aluminium blister packs and the latter are introduced into a packaging means in whose inside wall a channel former is embedded together with an absorbent, (packaging means B). and stored at 40° C./75% RH. After pre-determined times, the tablets are removed from storage, and the microorganism count present in each case is determined by counting by the Koch pour plate method. The results are shown in Table 1 (average of three batches)

TABLE 1

		Storage condition 40° C./75% RH	
Test parameter	Start	13 weeks	26 weeks
		Packaging means A	
Probiotic cultures [KBE]	$7.1 \cdot 10^7$	$<1.0 \cdot 10^3$	—
		Packaging means B	
Probiotic cultures [KBE]	$7.1 \cdot 10^7$	$5.5 \cdot 10^7$	$6.7 \cdot 10^7$

EXAMPLE 2

Production

[0062] Mixtures of 10% by weight of nicorandil and adjuvants (fillers, disintegrants and release agents) are pressed in a tablet press to give a round tablet. Tablets are obtained having a weight of 100 mg each.

1. Pack comprising a resealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area, and at least one blister pack containing one or more solid pharmaceutical administration forms, where the blister pack(s) is (are) contained in the container.

2. Pack according to claim **1**, characterised in that the container has a cuboid basic shape.

3. Pack according to claim **1**, characterised in that the container contains, as absorbent, a desiccant which binds moisture by physical adsorption.

4. Pack according to claim **3**, characterised in that the desiccant is a molecular sieve or silica gel.

5. Pack according to claim **1**, characterised in that the cavity and/or cover sheet or film of the blister pack(s) contained therein consists of polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), high-density polyethylene (HDPE), polypropylene (PP), polyethylene terephthalate (PET), polycarbonate, cycloolefin copolymer (COC), polychlorotrifluoroethylene (PCTFE), or of composite sheets or films made from these materials, such as PVC/PVDC, PVC/HDPE, PVC/PCTFE, PP/COC, PVC/COC/PVDC.

6. Pack according to claim **5**, characterised in that as cavity and/or cover sheet or film consist of PVC, PP or PET.

7. Pack according to claim **1**, characterised in that the blister pack(s) contained in the pack is contain at least one hole in each cavity containing a solid pharmaceutical administration form.

8. Pack according to claim **7**, characterised in that a plurality of holes are pre-sent as perforation in each cavity.

9. Pack according to claim **8**, characterised in that the perforation is a micro-perforation.

10. Pack according to claim **7**, characterised in that the hole, holes, perforation or microperforation is (are) in each case introduced in the cover sheet or film.

11. Pack according to claim **1**, characterised in that the solid pharmaceutical administration form(s) contained in the blister pack(s) contained therein are tablets, dragees, capsules, granules, suppositories, pellets and/or powders.

12. Process for the production of the pack according to claim **1**, characterised in that the solid pharmaceutical administration forms is introduced into a blister pack and sealed, and the sealed blister pack is subsequently introduced into a container which [lacuna] of a tightly sealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area.

13. Method for increasing the shelf life of solid pharmaceutical administration forms, characterised in that the latter is introduced into a blister pack and sealed, and the sealed blister pack is subsequently introduced into a container which consists of a tightly sealable container in whose inside wall(s) at least one channel former is embedded together with at least one absorbent, at least over part of the area.

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