stronger bag. However, no matter how well a desiccant bag is made, it still becomes a problem when it cannot be found and remains mixed in with the package contents. Therefore, there is a need for a desiccant packaging system that includes a desiccant bag that does not easily rupture and can be easily separated from the package contents.

SUMMARY OF THE INVENTION

[008] In accordance with embodiments of the present invention, a packaging system is provided that maintains the free flowing characteristic of solid materials contained therein. The packaging system comprises, consists of, or consists essentially of: a container, a cover, a vapor permeable bag, a vapor impermeable liner and at least two desiccant snakes. The container has a perimetrical side wall extending upwardly from a bottom wall to an open top. The side wall and bottom wall define an interior and a cover is removably attached to the open top to seal the interior.

[009] The vapor permeable bag is disposed in the interior of the container and has an opening for receiving solid materials. After the vapor permeable bag is filled with a product, the opening is closed. A cable tie can be used to close the vapor permeable bag. Preferably, the vapor permeable bag is formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

[010] The vapor impermeable liner surrounds the vapor permeable bag and provides a moisture barrier. The vapor impermeable liner can be made from a polymer material that includes polyethylene, polypropylene, nylon, polyester, copolymer of vinylidene chloride (PVDC), ethylene-vinyl acetate copolymer (EVA), ionomers or blends of two or more of these polymer materials. Preferably, the vapor impermeable liner comprises, consists of, or consists essentially of low density polyethylene, high density polyethylene, linear low density polyethylene, or very low density polyethylene.

[011] At least two desiccant "snakes" are disposed between the vapor permeable bag and the liner. Preferably, a first snake is located at the bottom of the container and a second snake is located on top of the vapor permeable bag. The snakes have an identification cord. When the first snake is placed at the bottom of the container, the identification cord extends to the top of the vapor permeable bag to allow a user to identify the desiccant snake without having to remove the vapor permeable bag. In addition, one or more desiccant snakes can be placed in the vapor permeable bag before it is closed. Each snake comprises, consists of, or consists essentially of two or more desiccant packages formed from a vapor permeable material through which moisture

can freely pass. Each snake desiccant package contains clay, silica, or molecular sieves. The desiccant packages can be formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

[011A] According to an aspect of the present invention, there is provided a packaging system that maintains the free flowing characteristic of solid materials contained therein, the packaging system including: a container having a perimetrical side wall extending upwardly from a bottom wall to an open top, wherein the perimetrical side wall and bottom wall define an interior; a cover removably attached to the open top to seal the interior; a vapor permeable bag in the interior of the container, the vapor permeable bag comprising an opening for receiving a product, wherein, after the vapor permeable bag receives the product, the opening is closed; a vapor impermeable liner surrounding the vapor permeable bag; and at least two desiccant snakes unattached to other components of the packaging system and disposed between the vapor permeable bag and the liner, wherein each snake comprises two or more desiccant packages that are directly attached to each other or attached by a cord or string, wherein a first snake is located at the bottom of the container and has an identification cord that extends to the top of the vapor permeable bag, and wherein a second snake is located on top of the vapor permeable bag.

[011B] Disclosed herein is a packaging system that maintains the free flowing characteristic of solid materials contained therein. The packaging system comprises: a container having a perimetrical side wall extending upwardly from a bottom wall to an open top, wherein the side wall and bottom wall define an interior; a cover removably attached to the open top to seal the interior; a vapor permeable bag disposed in the interior of the container, the vapor permeable bag comprising an opening for receiving a product, wherein, after the vapor permeable bag is filled with the product, the opening is closed; a vapor impermeable liner surrounding the vapor permeable bag; and at least two desiccant snakes disposed between the vapor permeable bag and the liner, wherein each snake comprises two or more desiccant packages formed from a vapor permeable material through which moisture can freely pass, wherein each snake has an identification cord that extends to the top of the vapor permeable bag, and wherein each desiccant pouch is formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

[011C] Disclosed herein is a packaging system that maintains the free flowing characteristic of solid materials contained therein. The packaging system comprises: a container having a perimetrical side wall extending upwardly from a bottom wall to an open top, wherein the side wall and bottom wall define an interior; a cover removably attached to the open top to seal the

interior; a vapor permeable bag disposed in the interior of the container, the vapor permeable bag comprising an opening for receiving a product, wherein the vapor permeable bag is formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional, and wherein, after the bag is filled with the product, the opening is closed; a vapor impermeable liner surrounding the vapor permeable bag; and at least two desiccant snakes disposed between the vapor permeable bag and the liner, wherein each snake comprises two or more desiccant packages formed from a vapor permeable material through which moisture can freely pass, wherein each snake has an identification cord that extends to the top of the vapor permeable bag, and wherein each desiccant pouch is formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

BRIEF DESCRIPTION OF THE FIGURES

[012] The preferred embodiments of the packaging system of the present invention, as well as other objects, features and advantages of this invention, will be apparent from the accompanying drawings wherein:

[013] FIG. 1 shows a sectional side view of the packaging system with a desiccant snake at the top and bottom of the bag containing the product.

[014] FIG. 2 shows a peripheral view of a desiccant snake with a cord attached to one end.

DETAILED DESCRIPTION OF THE INVENTION

[015] The present invention is a packaging system that is designed for storage and/or transportation of granular or dry materials that may experience caking due to moisture. The packaging system is especially designed for various salts and buffers (herein referred to generically as the "product") used in the manufacturing operations associated with biopharmaceuticals production. The packaging system includes a drum with a poly liner, a vapor permeable or porous bag that receives the product and at least two desiccant snakes. The term desiccant snake refers to a plurality of desiccant bags or pouches attached at their ends to form a string of bags that look like a snake. The desiccant bags can be directly attached to each other (e.g., the ends can be stitched together) or they can be connected by a string or cord. The first desiccant snake is positioned on the bottom of the drum and then the

We claim:

1. A packaging system that maintains the free flowing characteristic of solid materials contained therein, the packaging system comprising:

a container having a perimetrical side wall extending upwardly from a bottom wall to an open top, wherein the perimetrical side wall and bottom wall define an interior;

a cover removably attached to the open top to seal the interior;

a vapor permeable bag in the interior of the container, the vapor permeable bag comprising an opening for receiving a product, wherein, after the vapor permeable bag receives the product, the opening is closed;

a vapor impermeable liner surrounding the vapor permeable bag; and

at least two desiccant snakes unattached to other components of the packaging system and disposed between the vapor permeable bag and the liner, wherein each snake comprises two or more desiccant packages that are directly attached to each other or attached by a cord or string, wherein a first snake is located at the bottom of the container and has an identification cord that extends to the top of the vapor permeable bag, and wherein a second snake is located on top of the vapor permeable bag.

2. The packaging system according to claim 1, wherein a product is placed inside the vapor permeable bag before the opening is closed.

3. The packaging system according to claim 1, wherein a cable tie is used to close the vapor permeable bag.

4. The packaging system according to claim 1, wherein the vapor permeable bag is formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

5. The packaging system according to claim 1, wherein one or more desiccant snakes are placed in the vapor permeable bag before it is closed.

6. The packaging system according to claim 1, wherein the two or more desiccant packages for each snake are formed from a vapor permeable material through which moisture can freely pass.

7. The packaging system according to claim 1, wherein the two or more desiccant packages for each snake contain clay, silica or molecular sieves.

8. The packaging system according to claim 1, wherein the two or more desiccant packages for each snake are formed from cloth or continuous fibers of high-density polyethylene that are randomly distributed and non-directional.

9. The packaging system according to claim 1, wherein the vapor impermeable liner comprises polyethylene, polypropylene, nylon, polyester, copolymer of vinylidene chloride (PVDC), ethylene-vinyl acetate copolymer (EVA), or ionomers.