Oct. 22, 1963 T. M. ASHER 3,107,805

DIAGNOSTIC REAGENT CONTAINER

Filed Oct. 27, 1960

FIG. 1

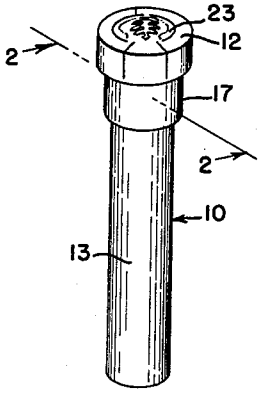


FIG. 2

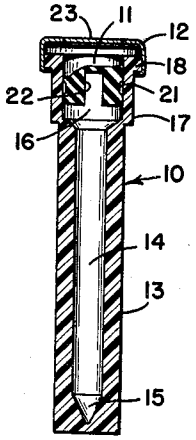


FIG. 3

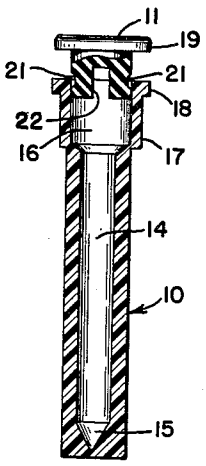
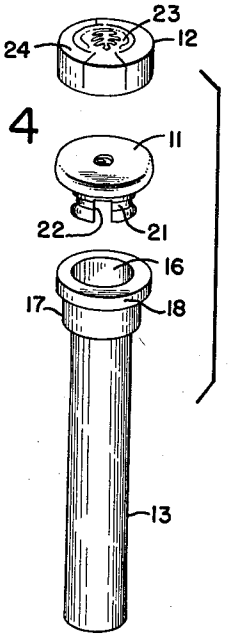


FIG. 4



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DIAGNOSTIC REAGENT CONTAINER

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This invention relates to a container and particularly to a specially adapted receptacle and closure for the lyophilization, centrifugation, and storage of diagnostic liquids such as antiserum and the like.

Many diagnostic fluids such as the antiserums that are used to perform capillary precipitin tests (e.g. serological groupings of streptococci) form spontaneous precipitates during storage. As it is essential in order to perform accurate capillary precipitin tests that the antiserum be crystal clear laboratories find it essential to periodically centrifuge the antiserum to remove such normal spontaneous precipitates. The procedure usually followed involves transferring the serum from the storage container to a centrifuge tube and after centrifugation decanting the serum into a new clean storage container. This procedure involving multiple transfers is naturally time consuming and wasteful.

It is therefore an object of the present invention to disclose an improved serum container which eliminates the necessity of repeatedly transferring the serum to different containers for the lyophilization, centrifugation and storage thereby conserving time, glassware and serum.

Still other objects will appear from the following description, the claim appended thereto, and from the accompanying drawing.

The invention will now be explained in detail in conjunction with the accompanying drawing in which:

FIGURE 1 is a perspective view of a serum container according to the present invention.

FIGURE 2 is a sectional view taken longitudinally through the container on line 2—2 of FIGURE 1.

FIGURE 3 is a cross-sectional view taken longitudinally through the receptacle and stopper combination.

FIGURE 4 is an exploded perspective view of the container and its components.

Referring now to the drawing, the novel container of the present invention is seen to constitute three main components, these being the receptacle generally designated 10, a stopper 11 and a retaining and protective cap 12. Each of these will be described in detail hereinafter.

The receptacle 10 includes a side wall of cylindrical formation designated by the reference numeral 13, said side wall being integral with a bottom. The receptacle has an internal compartment 14 of a generally cylindrical shape with a conical lower section 15 and an enlarged stopper receiving top or neck portion 16. In this connection it will be apparent that as illustrated in FIGURE 2 it is not necessary that the outer shape of the container conform exactly to the shape of the compartment.

Integrally formed upon the upper end of the wall 13 and extending continuously through the full circumference of said wall are two outwardly diverted flanges 17 and 18. Both of said flanges lying in a plane normal to the axis of the receptacle.

The flange 17 is located immediately adjacent the cylindrical wall 13 and is comparatively wider and, of course, of lesser diameter than the integral overriding flange 18. Flange 17 is particularly well designed to fit within the tube holder of a standard centrifuge apparatus.

The stopper 11 is constructed of a resilient material such as rubber in order to closely conform to the neck 16 of the receptacle so as to prevent infiltration of air. Stopper 11 is provided with an integral annular flange

portion 19 at one end thereof. Flange 19 is adapted to rest upon the upper surface of flange 18 of the receptacle 10, thereby preventing the stopper from being pushed into the container. The lower portion of the stopper which during storage is located within the mouth of the container is provided with an annular recess 21 and a diametrically extending recess 22.

The stopper 11 is maintained in position in the neck of receptacle 10 by cooperation of the metal cup-shaped cap 12, the wall of which is rolled under annular flange 18 of receptacle 10 as shown in FIGURE 2. The cap 12 may be made of any pliable material capable of permanent deformation and ready tearing e.g. aluminum. It is preferably provided with a tear-off tab 23 which is partially severed within the rib 24, thereby providing a convenient gripping means for rupturing the rib 23 and removing the entire cap 12.

In its preferred embodiment the receptacle is molded of a transparent material e.g. an acrylic resin or glass. It measures 2⅞ inches long overall and has a ½ inch outside diameter across the bottom, a ⅝ inch outside diameter through flange 17 and a ¾ inch outside diameter across the top. This size is preferred as it can be used with almost any laboratory centrifuge apparatus. Internally the compartment 14 including its conical lower section 15 is of suitable size to receive about 2 ml. of diagnostic liquid.

When it is desired to employ the novel container of the present invention for a diagnostic liquid such as an antiserum the following general procedure may be followed. First, the container is sterilized with heat or gas. Second, a small amount (1 to 2 ml.) of antiserum is placed in the compartment 14. Third, the stopper is placed within the container so that the annular recess 21 engages the uppermost inner surface of flange 18 (as seen only in FIGURE 3). This allows the upper portion of the diametrically extending recess 22 to be above the open neck of the container thereby allowing for the passage of air and moisture out of the compartment. Fourth, the receptacle with stopper positioned as above indicated is placed within a lyophilizer and freeze dried. Fifth, the stopper is forced into the receptacle to form an airtight seal. Sixth, the one piece aluminum cap is fitted over the stopper-receptacle combination and its outer skirt rolled under flange 18 (as shown in FIGURE 2).

When the customer desires to perform a precipitin test using the antiserum he simply removes the retaining protective cap 12 and the stopper 11 from the receptacle and reconstitutes the lyophilized product with 1 ml. of distilled water. A capillary tube is filled by dipping it into the compartment and the precipitin test performed. The container and the remainder of its contents are then refrigerated. Prior to using the remainder of the serum for additional precipitin tests the container and its contents are centrifuged to settle any spontaneous precipitate which may have formed. As it is centrifuged the precipitate, if any, is so firmly packed into the conical portion 15 of the compartment 14 that it cannot be resuspended without extremely vigorous shaking. Since the precipitate is not resuspended during normal handling capillary tubes may be dipped directly into the container and a crystal clear sample of the antiserum removed. The stopper may then be replaced and the container and remainder of its original contents once more refrigerated until further needed at which time the above procedure may be repeated.

It will be readily apparent from the above description that the novel container of the present invention provides many time saving and handling advantages over the previous practices. The novel conical bottom section of the antiserum-containing compartment uniquely provides

for the elimination of the fluid currents which normally act to resuspend the precipitates deposited within conventional centrifuge tubes. Furthermore, the unique receptacle, stopper and cap combination provide the valuable storage and handling advantages previously described.

While for purposes of illustration a container has been described the compartment of which is generally cylindrical in shape with a lower conical section, it will be apparent that the present invention is not so restricted. For example, a container with a compartment which is entirely conical in shape without any cylindrical section as well as other modifications may be employed without departing from the spirit and scope of the present invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are as follows:

An improved diagnostic fluid storage container which allows for use of a single container in the lyophilization, storage and handling of a diagnostic fluid which forms spontaneous precipitates, said container comprising a transparent receptacle open at only one end, and provided with an inner compartment having both cylindrical and conical shaped sections, the length of said conical section being substantially equal to the diameter of the cylindrical section, said cylindrical section being located immediately adjacent said open end, a removable resilient closure closing said open end, and a diagnostic fluid which forms spontaneous precipitates and periodically requires centrifugation located within said compartment, said receptacle being further provided adjacent said open end with an outwardly extending annular flange, said flange being specifically adapted to fit within the tube rack of a centrifuge apparatus so that the spontaneous precipitate which forms and is suspended in the diagnostic fluid may be separated periodically from the diagnostic fluid by centrifuging said container thereby packing the precipitate within the conical section of said inner compartment.

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