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2,959,838

RAYON SWAB

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This invention is directed to an improved swab or fibrous ball which is comparable to a cotton ball in its absorption power and its ability to hold its shape when immersed in water. As a preferred embodiment the invention is directed to a fibrous rayon ball having Vinyon fibers dispersed throughout.

Sterilized absorbent cotton balls about one inch in diameter are familiar items in hospitals, medical centers, etc., where they are used principally to swab patients, apply baby oil and other medicaments to the patient's skin, etc. Attempts have been made to substitute rayon fibers for the cotton fibers in these balls but although the absorbency of the two is about the same the rayon balls when immersed in water become stringy and limp. By contrast cotton balls will retain a generally spherical form when they are wet out in water. There is another potential use for fibrous rayon balls to stopper test tubes prior to sterilization since it is customary to sterilize hypodermic needles, etc., by placing them in a test tube, stoppering with a cotton ball, and then heating. Unfortunately a rayon ball tends to conform to the shape of the container during sterilization, and hence will fall into the tube if the latter is bounced around on a cart. If the ball is large enough to overhang the edges of the tube it bounces off under the same conditions. The present invention provides a means for stabilizing the shape of the fibrous rayon balls so that they overcome the objections noted above and compare favorably with cotton.

Accordingly it is an object of this invention to produce a rayon ball which will retain its shape in moisture and heat to a degree which is equal to or greater than that of cotton.

This object is achieved according to this invention by blending a potentially adhesive fiber with non-adhesive fiber such as fibrous rayon, forming a ball from the mixture of the two fibers, and then activating the potentially adhesive fiber by conventional means so as to draw up the ball into a firm stable mass which will retain its shape under sterilizing conditions.

The preferred thermoplastic fibers are of the vinyl type and preferably are made of Vinyon which is a copolymer of vinyl acetate and vinyl chloride. The proportions of these two monomers in the reaction mixture may range in parts by weight from 65% vinyl chloride/35% vinyl acetate up to as much as 90% vinyl chloride/10% vinyl acetate. Three fairly common copolymers comprise (1) 86% vinyl chloride-14% vinyl acetate, (2) 90% vinyl chloride-10% vinyl acetate, and (3) 95% vinyl chloride-5% vinyl acetate. The first of these three copolymers is preferred.

The process of preparing a rayon ball of this invention comprises, in general, blending the Vinyon fibers with rayon staple, picking, carding into a sliver, pulling off segments of the sliver and rolling these into balls. The fiber size for both the rayon and Vinyon is in the range of 1-2 denier and preferably I use 1½ denier rayon and 1½ denier Vinyon. A short staple should be

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used so that it can easily be broken off the main sliver before rolling into a ball. Of course, larger deniers such as 3-5.5 denier Vinyon could be used but 1.5 gives a better dispersion in the rayon staple when used in small amounts. Vinyon fibers are used in minor amounts as compared to rayon fibers; the general range should be 5-20% Vinyon to 95-80% rayon. The most practical limits are 10-15% Vinyon to 90-85% rayon. The mixing of the two fibers can be carried out in any suitable manner such as by blending before and/or during carding, drawing, etc., or the slivers can be made from each type independently and the slivers combined into one single sliver.

The potentially adhesive fibers in the final balls are activated, i.e., rendered adhesive, either thermally or by chemical treatment with a solvent. The thermal treatment can consist of simply heating the balls to a temperature of 80-85° C., at which temperature they become sufficiently sticky to adhere to other fibers. At higher temperatures such as the boiling point of water they shrink more and become tacky. A practical upper limit is 130° C. Solvent activation comprises contacting the balls with organic solvents, preferably in gaseous form, such as acetone, methyl ethyl ketone, methyl isobutyl ketone, dimethyl formamide, chloroform, etc., whereby the vinyl fibers become plastic and sticky.

The invention is illustrated by the following examples.

Example I

A mixture of 10% 1.5 denier Vinyon staple (86% vinyl chloride-14% vinyl acetate) with 90% 1.5 denier dull, bleached, crimped rayon fiber was carded, after blending, into a continuous sliver, formed into balls approximately one inch in diameter and steamed for two minutes at 25 pounds gauge (about 131° C.). When immersed in water these balls were equal to cotton in stability, that is, in holding their spherical shape.

Example II

A second group of cotton balls was prepared by the process of Example I but employing 15% Vinyon instead of 10%. Its wet stability was superior to that of cotton balls.

It should be noted that the sterilization of cotton balls prior to use involves immersing them in a steam chest at 15 pounds pressure for half an hour, which is equivalent to a temperature of approximately 122° C. This same process is quite sufficient to activate Vinyon so that there is no added expense in the activation step when using the mixed fibers of this invention in place of cotton balls. Because of this very practical reason the invention is intended to exclude any other thermoplastic fibers which are not activated by normal sterilization temperatures (240-260° F.). For example, cellulose acetate and nylon would not meet this requirement since both soften at higher temperatures.

One advantage of the fibrous balls of this invention in addition to providing improved shape-stability, is in the fact that the fibers do not rub off onto the patient's skin. The extent to which this applies depends on the Vinyon content; the higher the Vinyon content the more tightly the rayon fibers are held in the ball.

While mixtures per se of potentially adhesive fibers with rayon fibers are old in the art, as shown in U.S. 2,252,999, the present invention describes a concept which is believed to be new and novel.

I claim:

1. A fibrous ball for use as a swab comprising an open, loose mixture of man made, non-adhesive cel-
lulosic fibers and potentially adhesive fibers, said po-
tentially adhesive fibers constituting between 5% and

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20% of the weight of the ball, and said potentially adhesive fibers being renderable adhesive upon subjection of the ball to sterilizing conditions normally employed for sterilizing cotton balls.

2. A fibrous ball as set forth in claim 1 wherein said 5
cellulosic fibers are rayon.

3. A fibrous ball as set forth in claim 2 wherein said
potentially adhesive fibers are formed of a copolymer
of vinyl chloride and vinyl acetate.

4. A fibrous ball as set forth in claim 3 wherein both 10
the cellulosic fibers and the potentially adhesive fibers
are between 1 and 2 denier.

5. A fibrous ball as set forth in claim 1 wherein the

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potentially adhesive fibers are bonded to the cellulosic
fibers at their points of contact.

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