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[54] **NOVEL FIRST AID PRODUCTS**
8 Claims, No Drawings

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ABSTRACT: Disclosed herein is a portable disposable first aid pad impregnated with a film-forming composition consisting essentially of specified amounts of germicidal quaternary ammonium halide, a local anesthetic, a water soluble polyoxyethylene-polyoxypropylene block polymer and certain nonionic surface active agents.

FIRST AID PRODUCTS

This invention relates to novel compositions of matter and to an article incorporating these compositions which uniquely fully exploits all their beneficial properties.

These novel compositions can be used to treat minor skin wounds, abrasions, burns, and similar first aid problems. They fight infection, relieve pain on contact and generally soothe the injured area. Furthermore, this antiseptic action is effected without a stinging sensation, thus rendering these compositions especially valuable for treating children and pets who are often reluctant to receive commonly used first aid treatments because of their stinging effect. Moreover, shortly after application, these compositions air-dry and deposit an invisible film which prolongs the activity and aids in protecting the injured area from further immediate contamination. These novel compositions broadly comprise aqueous solutions of a germicidal quaternary ammonium compound, a local anesthetic, and a polyoxyethylene-polyoxypropylene block polymer.

Germicidal quaternary ammonium compounds are well-known in the art. They are generally used in the form of their halides and preferably as chlorides. Preferred quaternary ammonium compound for use in the compositions of this invention are the alkylarylether dimethylbenzylammonium chlorides, an example of which is 2-[2-(p-octylcresoxy)ethoxy]ethyl dimethylbenzylammonium chloride, available under the name of methylbenzethonium chloride or Hyamine 10X and the corresponding p-octylphenoxy compound available as benzethonium chloride or Hyamine 1622, and the alkyl-dimethylbenzyl ammonium chlorides available under the name benzalkonium chloride. Other suitable germicidal quaternary ammonium compounds are alkyltrimethyl ammonium chloride, such as cetyltrimethylammonium chloride available under the trade name Cetab; alkyl-dimethylethylammonium halide such as alkenyldimethylethylammonium bromide known under the trade name Onyxide; alkylpyridinium chloride, such as cetylpyridinium chloride; alkylimidazolinium chloride such as alkylhydroxyethylimidazolinium chloride known as Alrosept MB; alkyl-dimethyldichlorobenzylammonium chloride such as alkyl-dimethyl-3,4-dichloro benzylammonium chloride known as Tetrosan; acylcolaminoformyl-methyl pyridinium chloride available under the name of Emulsept; and alkaryl-methylpyridinium chloride such as polyalkyl-naphthalene methylpyridinium chloride available under the trade name Emcol. In the foregoing compounds the term "alkyl" is understood to encompass C_6H_{17} to $C_{18}H_{37}$ radicals including mixtures within this range, this being the range in which quaternary ammonium compounds are considered to have good germicidal activity.

Similarly, local anesthetics are a well-known class of materials. The preferred subclass of local anesthetics for use in a composition of this invention are those amino-substituted phenyl esters and amides distinguishable by having a generic name ending in the syllable "caine." This class of local anesthetic compounds will be referred to hereinafter as "caine-type." Exemplary of these are lidocaine, tetracaine, benzocaine, procaine, cocaine, mepivacaine and bupivacaine. These can be used as the free base or in a form of their pharmaceutically acceptable acid addition salts, particularly as the hydrochloride. Preferred local anesthetics for use in compositions of this invention are tetracaine and lidocaine. Other local anesthetics which are not of the "caine-type" can also be used, for example, benzyl alcohol.

The polyoxyethylene-polyoxypropylene block polymers to be used in the composition of this invention are also well known in the art and may be represented by the structural formula:



wherein the $(C_3H_6O)_b$ represents the polyoxypropylene hydrophobic base component and the $HO(C_2H_4O)_n$ and $(C_2H_4O)_nH$ represent the polyoxyethylene hydrophilic constituents. The polyoxyethylene portion of the polymer may vary from as little as 10 percent to as high as 90 percent. The higher the polyoxyethylene percentage, the more water-sol-

ble becomes the total molecule or polymer. The substantially water-soluble polymers in the molecular weight range of between about 5 and about 11,000 are preferable. These materials are readily available under the trade name Pluronic polyols. A preferred material of this class for use in the compositions of this invention is available under the trade name of Pluronic F68 and has an average molecular weight of about 8350, although it may vary in range between about 6000 and 9000. In this material "a" and "c" in the above formula can, for example, each be 72 and "b" can be 26.

Both the antimicrobial quaternary ammonium compounds and the local anesthetics should be present in the aqueous composition of this invention in a range of 0.1 to 2 percent by weight. The polyoxyethylene-polyoxypropylene block polymers should be present in the amount of 2 to 15 percent by weight of the total composition and preferably 3 to 7 percent. The bulk of the composition is of course water.

The aqueous compositions of this invention can optionally contain, in addition to the above ingredients, other materials to maximize effectiveness.

Nonionic polyethenoxy surface active agents such as the well-known polyethenoxy mono-ethers, polyethenoxy mono-esters and polyethenoxy mono-amides are advantageously included in the composition of this invention, preferably in an amount of 0.2 to 3 percent by weight of the composition. These nonionic surface active agents provide detergent action to a much greater extent than the free polyoxyethylene-polyoxypropylene block polymer polyols. Such compounds are well known in the art. The preferred class of materials of this type for use in this invention are the polyethenoxy mono-ethers of alkylphenols as exemplified by polyethenoxy mono-isooctylphenylether, available under the trade name Triton X-100. Other suitable nonionic surface active agents are polyoxyethylenesorbitan mono-oleate, and the corresponding mono-stearate.

Desirably, the composition of this invention also included a humectant such as propylene glycol, glycerine, sorbitol, diethylene glycol or polyethylene glycol. In addition to their humectant effect, these materials also serve in aiding dissolution or emulsion of the composition of this invention. These materials are desirably employed within the range of about 1 to 10 percent.

A chelating agent such as ethylenediamine tetraacetic acid (EDTA) can optionally be added to enhance the antibacterial activity of these compositions.

A minor amount (e.g. 3 percent) of isopropanol can be added to impart a "medicinal odor." Similarly, a small amount (e.g., 0.5 percent) of menthol provides a soothing "cool feeling." Calming an injured child or other patient is a desirable part of first aid treatment.

Auxiliary medicaments may be incorporated into the compositions of this invention to broaden the scope of treatment, as for example, the inclusion of a minor amount of chlorothymol to impart fungicidal properties.

The compositions of this invention can be applied to the injured area in numerous ways. They can be directly applied from a squeeze bottle or dropper, for example, or sprayed on employing an aerosol canister containing a conventional propellant such as the Freons. Alternatively, a swab can be introduced into a container of the formulation and saturated therewith and applied to the injured area. Similarly, the solutions can be applied by means of a handkerchief or other extraneous cloth or tissue. Each of these methods has disadvantages, however, with regard to convenience, hygiene and/or effectiveness.

As a highly preferred embodiment of this invention, we have found that the maximum benefit of the compositions of this invention can be realized in the embodiment of a hermetically sealed packet containing a pad impregnated with these compositions. The pad should be an absorptive sheet preferably made of nonwoven cellulosic material. Nonwoven rayon has been found to be particularly good for this purpose. The packet should be impervious to liquid or vapor and its in-

terior should be inert to the composition of this invention. Such packets are well known in the art and preferably comprises an outer surface of a metal foil such as aluminum whose inner surface is lined with a thermoplastic film such as polyethylene, polyvinyl resin or cellulose acetate as described, for example, in U.S. Pat. No. 3,057,467 A laminate having an intermediate layer of paper is an advantageous variation. This sealed packet protects both the composition and the applicator against contamination occurring after manufacture and before application to the wounded area.

The invention in this preferred embodiment furthermore provides a sanitary means to cleanse the wounded area thoroughly of dirt and other particles. Thus, it aids in preventing further infection by removal of superficial organisms that have not yet infected the wound, and by prophylaxis of the surrounding area, while at the same time fighting infection by any organisms already in the wound. Use of this pad also permits the application of a thin uniform coating of the composition, thereby minimizing the time necessary for the skin to dry and the film to form. In this embodiment it is preferred that the compositions additionally contain a nonionic polyethenoxy surface active agent as described above to further aid in the cleansing operation.

This preferred embodiment provides an ideal means to have the compositions of this invention readily available at the time the injury is sustained since it can be carried in the pocket, handbag, as well as stored on vehicles or at home or work. The entire packet is inexpensive enough to be disposed of after a single use. Moreover, the open foil packet provides a hygienic place to temporarily store the used pad until suitable disposal facilities become available.

The following example illustrates a preferred embodiment of this invention.

EXAMPLE

A piece of nonwoven rayon pad measuring 3 inches x 3½ inches is folded longitudinally and transversely and is inserted into a pouch formed by two sheets of a laminate of aluminum foil and paper, coated (on the paper side) with polyethylene. Two milliliters of a formulation consisting of:

methylbenzethonium chloride	0.5%
tetracaine hydrochloride	0.6%
polyoxyethylene-polyoxypropylene (Pluronic F68)	5.0%
polyethenoxy alkylaryl ether (Triton X100)	2.0%
propylene glycol	3.0%
isopropyl alcohol	3.0%
methanol	0.1%
purified water	85.8%

are injected into the folds of the pad and the aluminum laminate is then heat sealed on the open fourth side to complete the packet.

The pad could alternatively be folded in a "zigzag" or "accordion-pleating" fold. Numerous other variations of the above-described nonstinging products and processes that within the spirit of this invention will become apparent to one skilled in the art.

We claim:

1. An absorptive nonwoven cellulosic sheet of single use disposable pad material impregnated with a nonstinging antiseptic composition which air-dries and forms a protective and activity-prolonging film coating, said composition consisting essentially of an aqueous solution of effective amounts within the range of 0.1-2 percent by weight of each of a germicidal quaternary ammonium halide and a local anesthetic compound, and 2-150 by weight of a water soluble polyoxyethylene-polyoxypropylene block polymer and 0.2-3 percent by weight of a nonionic surface active agent selected from the class consisting of polyethenoxy ethers, polyethenoxy esters and polyethenoxy amides, said disposable pad being of suitably small dimensions to be folded and filled into a hermetically sealed packet that can be carried in the pocket or handbag.

2. A pad material according to claim 1 wherein said local anesthetic compound is of the "caine" type.

3. A pad material according to claim 1 wherein said block polymer has an average molecular weight between about 6000 and 9000.

4. A pad material according to claim 1 wherein said local anesthetic is selected from the group consisting of tetracaine and lidocaine.

5. A pad material according to claim 4 wherein said nonionic surface active agent is a polyethenoxy mono-alkylaryl ether.

6. A pad material according to claim 1 wherein said cellulosic sheet material is rayon.

7. A method of painlessly forming a thin invisible uniform protective and activity-prolonging film coating on a skin wound comprising applying to said wound by means of an absorptive nonwoven cellulosic sheet of single use disposable pad material impregnated in accordance with claim 14, said composition comprising a germicidal quaternary ammonium halide, said local anesthetic, said oxyethylene-oxypropylene block polymer and said nonionic surface active agent.

8. A method according to claim 7 wherein said cellulosic sheet material is rayon.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,624,224 Dated November 30, 1971

Inventor(s) Ling Wei and Robert Marchisotto

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, lines 44 and 45, "polyalkulnapthalene" should read --- polyalkynapthalene ---. Column 1, line 72, $(C_2H_4O)H$ should read --- $(C_2H_4O)_cH$ ---. Column 3, lines 2 and 3 "comprises" should read --- comprise ---. Column 3, line 48, "methanol" should read --- menthol ---. Column 4, line 18, "2-150" should read --- 2-15 $\frac{1}{2}$ ---. Column 4, line 41, "said would" should read --- said wound ---.

Signed and sealed this 13th day of June 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents