

2,777,796

SPERMICIDAL COMPOSITION

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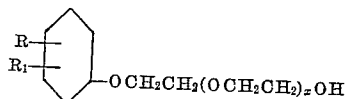
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This invention relates to novel compositions useful for topical remedies, and more particularly to novel compositions for use chiefly in contact with the mucous surfaces of the vaginal cavity.

In the U. S. patent of Nathaniel M. Elias, No. 2,467,884, issued April 19, 1949, there is disclosed a spermicidal composition comprising essentially a vehicle and one of seven classes of substances including (a) straight chain fatty monohydroxy alcohols having from 8 to 11 carbon atoms in the chain, (b) branched chain fatty alcohols from 8 to 18 carbon atoms in the chain, (c) glyceryl, ethylene glycol and propylene glycol monoethers of the alcohols mentioned in (a) and (b), (d) polyethylene glycol and polypropylene glycol monoethers of these alcohols, the polyglycols ranging from diglycol to the polyglycols of molecular weight of about 4,000, (e) glyceryl, ethylene glycol and propylene glycol monoesters of unsaturated fatty acids having from 10 to 18 carbons in the chain, (f) the polyethylene glycol and the polypropylene glycol monoesters of fatty acids, saturated and unsaturated, having from 10 to 18 carbons in the chain, the polyglycols ranging in molecular weight from diglycol to polyglycol of molecular weight of about 4000, (g) glyceryl mono-lactate monoesters of unsaturated fatty acids of 10 to 18 carbon atoms, and mixtures thereof. It is indicated that these ingredients must be finally dispersed throughout a vehicle and may include a surface tension depressant.

I have now discovered that the spermicidal activity of such compositions may be enhanced and increased very substantially in spermicidal power by adding to them a water soluble polyethylene glycol monoether of alkyl phenol of the following formula:



in which R represents an alkyl group, R₁ represents a member of the group consisting of alkyl groups and hydrogen, and x=0 or greater than 0. Preferably, one alkyl group is in the para position to the oxygen atom. A mixture of water soluble polyethylene glycol monoethers of alkyl phenols may be used, and in the preferred practice, x has an average value of 8 to 11. The preferred value of x is in the range of 0 to 12, although compounds in which the value of x is greater than 12 may also be used. In the preferred specific embodiment of my invention, x has an approximate average value of 9.75, R is the tri isopropyl group and is in the para position to the oxygen atom and R₁ is hydrogen. Preferably each of R and R₁ has from 1 to 22 carbon atoms, the sum of the carbon atoms in the two groups not exceeding 23.

An important advantage of using these materials in conjunction with the compositions disclosed in U. S. Patent No. 2,467,884 is the fact that the resulting mix-

tures are neutral substances which make possible a choice of any pH value without affecting the spermicidal ingredients, since neither the materials of the previous patent nor the additions herein disclosed react with weak acids, or with alkalis, or with buffer salts, such as may be used for buffering such compositions.

In accordance with the present invention, the polyethylene glycol monoether of alkyl phenol is uniformly distributed in vehicles together with the materials shown in U. S. Patent 2,467,884, to form various spermicidal compositions, these compositions being generally classified as jellies, creams, concentrated foam jellies, concentrated foam producing mixtures, concentrated foam powders, jelly producing anhydrous powders, suppositories and tampons.

For jellies and creams I generally prefer to use less than 2% by weight of the polyethylene glycol monoether of alkyl phenol, although higher percentages may be used for the more concentrated compositions such as jelly forming powders or concentrated foam-producing powders for jellies which are later to be diluted with water before use, much higher concentrations up to 50% or more may be used, depending upon the composition and the degree of later dilution.

The composition of the present invention may contain water or be anhydrous. In general, it should be noted that in any of the following jelly or cream formulae, glycerine or other polyhydroxy alcohol may be added to prevent dehydration of the jelly and also to prevent freezing of the composition. The various vegetable gums, such as gum tragacanth, gum karaya and gum arabic may be replaced by other gums such as Irish moss, Indian gum, alginates, locust bean gum, synthetic cellulose derivatives such as colloresin, carboxy methyl cellulose, synthetic resins, etc. The butyl para hydroxy benzoate may be replaced by other mold preventive material such as the methyl, ethyl or propyl para hydroxy benzoates. The oxyquinoline sulfate may be replaced by other bacteriostatic materials such as the phenols or alkyl phenols, chlorinated phenols, chlorinated thymols, the alkali alkyl sulfates, etc. The emulsifying agent, sodium lauryl sulfate, may be replaced by any of the known alkali, ammonium, or substituted ammonium alkyl sulfates or other sulfonated substances such as sulfonated oils, sulfonated hydrocarbons, sulfonated castor oil and similar products.

The water soluble acids which may be substituted for boric acids as shown in the formulae may include lactic acid, acetic acid, tartaric acid and similar acids. The potassium acetate as shown in the formulae is a buffer and may be replaced by sodium acetate or by alkaliborates, tartrates, phosphates, lactates, etc. Other salts or neutral additions such as sodium or potassium chloride or urea may be added to regulate the osmotic pressure of the composition.

It is understood that where the water soluble organic acids are used, they exert a certain known spermicidal power, but this spermicidal power alone is insufficient to achieve the effectiveness now possible with these new compositions.

In the case of boric acid, this product has very slight spermicidal efficacy and is used simply for regulating the pH of the composition. The fact that compositions of extremely high spermicidal value, even though neutral, or even slightly alkaline, are made possible by this invention, establishes the utility of these compositions regardless of the presence or absence of added acid.

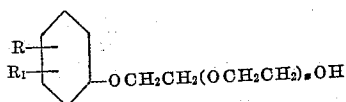
The proportion of the gums used indicates the viscosity range chiefly preferred in the jellies, but such viscosities may range either lower or higher than indicated in the compositions described without seriously affecting the utility of the product.

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The following typical spermicidal compositions are given by weight to give a fuller understanding of the invention. It should be understood, however, that the invention is not limited to the specific details set forth in the illustrations.

Example 1

Glyceryl monoricinoleate	1.0
Boric acid	3.0
Oxyquinoline sulfate	0.05
Sodium lauryl sulfate	0.02
Glycerine	5.0
Gum tragacanth	2.0
Gum karaya	1.0
Acacia	0.5
Perfume	0.03
One of the polyethylene glycol monoethers of alkyl phenol of the general formula	



(in which R, R₁ and x have the same significance, as previous indicated) 1.3
Water sufficient to make a total of 100.

Example 2

A spermicidal composition having the same formula as Example 1 except that the polyethylene glycol monoether of alkyl phenol constitutes a mixture thereof in which R is tri isopropyl and is para to the oxygen atom, R₁ is hydrogen and x has an approximate average value of 9.75.

Example 3

A spermicidal composition having the same formula as Example 1 but in which the polyethylene glycol monoether of alkyl phenol is one in which R is a tertiary butyl group para to the oxygen atom, R₁ is a methyl group and x has an average value of about 6.

Example 4

A spermicidal composition having the same formula as Example 1 but in which the polyethylene glycol monoether of alkyl phenol is one in which R is the tertiary butyl group and is para to the oxygen atom, R₁ is hydrogen and x is 0.

A spermicidal composition having the same formula as that of Example 1, except that the polyethylene glycol monoether of alkyl phenol is omitted was prepared as a control composition. The various compositions of Examples 2, 3 and 4 and the aforesaid control composition were tested to determine their spermicidal power by an extension of the Brown and Gamble method described in Human Fertility and recommended for use by the American Medical Association. This method calls for making a mixture of one part of spermicidal composition with four parts of physiological saline solution and then mixing the resulting solution on a slide with an equal volume of human semen and observing the time required to completely immobilize the spermatozoa.

In the case of the control composition described above, immobilization occurred within four minutes. In the case of all of the Examples 2, 3 and 4, immobilization occurred as rapidly as observation could be made, which is less than 30 seconds. Further tests were then made in which one part of the composition was diluted with nine parts of physiological saline and the resulting mixture then mixed on a microscope slide with an equal quantity of human semen. Complete immobilization occurred in less than five minutes in Examples 3 and 4. In the case of the control mixture, it took 70 minutes, and in Example 2 immobilization occurred in less than thirty seconds. A third test was made diluting one part of Example 2 with 14 parts of physiological saline and then mixing on the microscope slide with an equal volume of

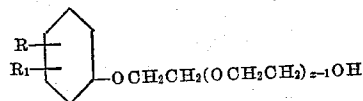
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human semen. Complete immobilization was obtained in less than three minutes. This would indicate that the addition of the polyethylene glycol monoether of alkyl phenol approximately tripled the spermicidal effectiveness of the product.

Numerous other tests were made using the compositions disclosed in my U. S. Patent No. 2,467,884, in which similar increases in effectiveness were found, by adding the polyethylene ethers of alkyl phenols not only in jellies but in the various other types of compositions there described.

What I claim is:

1. A non-toxic spermicidal composition comprising a vehicle, a substance of the class consisting of glyceryl, ethylene glycol and propylene glycol monoesters of unsaturated fatty acids having from 10 to 18 carbons in the chain, and mixtures thereof, and a polyethylene glycol monoether of alkyl phenol of the following general formula



20 in which R is an alkyl radical, R₁ is a member of the class consisting of an alkyl group and hydrogen and x is an integer greater than 0, said polyethylene glycol monoether of alkyl phenol being present in sufficient quantities with respect to said substance as to enhance the spermicidal capacity of said substance.

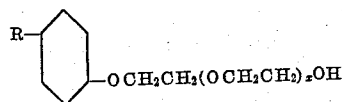
2. A spermicidal composition as described in claim 1, in which, in the general formula shown, R is an alkyl radical having a number of carbon atoms within the range of 1 to 22, and when R₁ is an alkyl group, R₁ may have a number of carbon atoms within the range of 1 to 22, except that the total number of carbon atoms in R₁ and R shall not exceed 23.

3. A spermicidal composition as described in claim 1, in which, in the general formula shown, R is an alkyl radical para to the oxygen atom.

4. A spermicidal composition as described in claim 1, in which, in the general formula shown, R is an alkyl radical para to the oxygen atom having a number of carbon atoms within the range of 1 to 22, and when R₁ is an alkyl group, R₁ may have a number of carbon atoms within the range of 1 to 22 except that the total number of carbon atoms in R₁ and R shall not exceed 23.

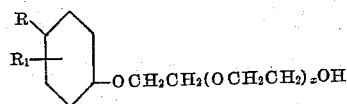
5. A spermicidal composition as described in claim 1, in which, in the general formula shown, R is tri isopropyl, para to the oxygen atom, and R₁ is hydrogen.

6. A spermicidal composition as described in claim 1, in which the polyethylene glycol monoether of the alkyl phenol is a mixture of the following formula



55 where R is tri isopropyl, para to the oxygen atom, and x has a value between 8 and 11.

7. A spermicidal composition comprising in combination with a vehicle, glyceryl monoricinoleate and a polyethylene glycol monoether of an alkyl phenol of the general formula

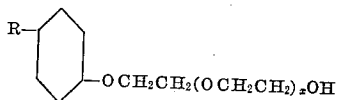


65 in which R is an alkyl, para to the oxygen atom, R₁ is a member of the class consisting of alkyls and hydrogen and x has a value of at least 0.

8. A spermicidal composition comprising in combination with a vehicle, glyceryl monoricinoleate and a poly-

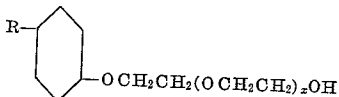
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ethylene glycol monoether of an alkyl phenol of the general formula



in which R is tri isopropyl, para to the oxygen atom, and x has a value of at least 0.

9. A spermicidal composition comprising in combination with an aqueous vehicle, glyceryl monoricinoleate and a mixture of polyethylene glycol monoethers of alkyl phenol of the general formula



in which R is tri isopropyl, and the average value of x is between 8 and 11.

10. A composition according to claim 1, wherein said spermicidal composition is a solid.

11. A composition of matter according to claim 1, including an emulsifying agent.

12. A composition of matter according to claim 1, wherein said spermicidal composition is in the form of a jelly.

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13. A composition of matter according to claim 1, wherein the spermicidal composition is in the form of a cream.

14. A composition of matter according to claim 1, wherein said spermicidal composition is in the form of a foam producing concentrate.

15. A composition of matter, according to claim 1, wherein said spermicidal composition is in the form of a suppository.

16. A tampon impregnated with the composition of claim 1.

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