

UNITED STATES PATENT OFFICE

2,541,103

SPERMICIDAL COMPOSITION

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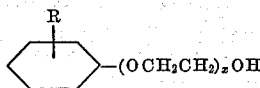
9 Claims. (Cl. 167—58)

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This invention relates to novel compositions of matter and more particularly to novel compositions which are intended for topical use. In one of its more specific aspects the invention is directed to novel compositions of matter useful chiefly for application to the mucous surfaces of the vaginal cavity where they act as spermicidal media.

Prior to this invention a number of different spermicidal compositions have been proposed. Among them are the spermicidal compositions disclosed in the United States patent of Frank V. Sander, No. 2,330,846, issued on October 5, 1943. That patent discloses spermicidal compositions comprising essentially an aqueous vehicle having therein an unsaturated higher fatty acid of ten or more carbon atoms, e. g., ricinoleic, oleic and linoleic acids, and a surface tension depressant, e. g., sulfonated fatty acids and alcohols and the salts and esters thereof, the unsaturated fatty acid being suspended in the vehicle as finely dispersed particles. While the spermicidal compositions disclosed in said patent have found acceptance in the art, I have provided novel spermicidal compositions that are significantly more efficacious than the compositions described in said patent.

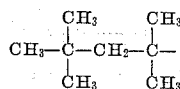
I have now discovered that the spermicidal activity of a composition employing a vehicle, an unsaturated fatty acid, and a dispersing and wetting agent may be potentiated and increased many fold in spermicidal power by employing a dispersing and wetting agent which is a water soluble alkylphenoxyethanol having the following general formula



in which R is an alkyl radical, preferably in the position para to the oxygen atom, and x may be 1 or greater than 1. A mixture of water soluble alkylphenoxyethanols may be used, and in the preferred practice x has an average value of from 9.25 to 10.25, and the average molecular weight of the said ethers is 595 to 639. In the preferred specific embodiment of my invention, x is approximately 9.75, and R is tertiary octyl and is in the para position. Generally R is an alkyl radical having 1 to 22 carbon atoms and the value of x is in the range of 1 to 12, which is the preferred range, although compounds in which the value of x is greater than 12 are also of value. Of these alkylphenoxyethanols, I prefer

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to employ those in which R has 8 carbon atoms and especially those in which R is tertiary octyl having the following graphic formula:



Dispersing and wetting agents such as those described above enable a fine division of the unsaturated fatty acid to be obtained, and this contributes substantially to the spermicidal power of the formulation.

The vehicle employed in the combination is preferably an aqueous vehicle, and vegetable gums are preferred as ingredients but synthetic resins and cellulose derivatives may also be used.

In the practice of this invention, there may be employed as a vehicle a thickened mass comprising water and locust bean gum, tragacanth, Irish moss, alginates, acacia, or various other equivalent vegetable gums, used either alone or in combination with one or more of said unsaturated fatty acids and one or more of said alkylphenoxyethanols. The amounts of said fatty acid and alkylphenoxyethanols present in the aqueous vehicle is small, and it is preferable that the ratio of the quantity by weight respectively of the fatty acid and the alkylphenoxyethanol to the vehicle be no greater than about 5 to 100 and generally is in the range of .5 to 100 and 1 to 100. Also present may be one or more anti-septic agents such as boric acid, oxyquinoline sulphate, phenols, cresols, thymols, chlorinated phenols, cresols and thymols; an anti-molding compound such as propyl para-hydroxy benzoate; a hygroscopic agent such as glycerine as well as other substances such as perfumes, etc.

The invention accordingly comprises compositions of matter possessing the characteristics, properties and the relation of constituents which will be exemplified in the composition hereinafter described and the scope of the invention will be indicated in the claims.

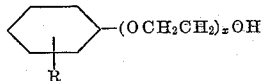
For a fuller understanding of the invention, reference should be had to the following examples which are given as specific illustrations. It should be understood, however, that the invention is not limited to the specific details set forth in the illustrations.

Typical spermicidal compositions in the nature of jellies embodying the invention may be prepared by following any of the well-known procedures and using the components of the following examples, all parts being given by weight,

The procedure in my U. S. Patent 2,330,846 for the preparation of a spermicidal composition is particularly satisfactory for preparing the compositions of the instant invention.

Example I

Ricinoleic acid.....	0.75
Boric acid.....	3.0
Oxyquinoline sulphate.....	0.025
Propyl para-hydroxy benzoate.....	0.05
Glycerine.....	5.0
Acacia.....	0.5
Tragacanth.....	3.0
Perfume.....	0.025
One of said alkylphenoxyethanols represented by the general formula	



in which R and z have the same significance as before..... 1.0
 Water (q. s. ad. 100) pH adjusted to 4.5 with acetic acid..... 87.65

Example II

A spermicidal composition having the same formula as Example I but in which the alkylphenoxyethanol is a mixture of the para-alkylphenoxyethanols in which R is di-isobutyl, and x has an approximate value of 9.75.

Example III

A spermicidal composition having the same formula as that of Example I but in which the alkylphenoxyethanol is para - tertiaryamylphenoxyethanol.

Example IV

A spermicidal composition having the same formula as that of Example I but in which the alkylphenoxyethanol is para - tertiaryamylphenoxydiethoxyethanol.

Example V

A spermicidal composition having the same formula as that of Example I but in which the alkylphenoxyethanol is para-tertiaryoctylphenoxyethanol.

Example VI

A spermicidal composition having the same formula as that of Example I but in which the alkylphenoxyethanol is para-tertiaryoctylphenoxydiethoxyethanol.

Example VII

A spermicidal composition having the same formula as that of Example I but in which the alkylphenoxyethanol is para-tertiaryoctylphenoxytetraethoxyethanol.

Example VIII

A spermicidal composition having the same formula as that of Example I except that the alkylphenoxyethanol is omitted.

The specific spermicidal compositions of Examples II to VIII inclusive were tested to determine their spermicidal power. Two grams of a spermicidal composition represented by Examples II to VIII inclusive were placed in a test tube containing 98 grams of a physiological saline solution. The saline solution contained 9 grams of sodium chloride per liter of water. The test tube was shaken vigorously until the jelly was uniformly distributed in the saline solution. One cc. of the jelly in saline solution was added to a second test tube containing 0.2 cc. of fresh human semen; the contents of the second tube were quickly mixed and examined microscopically to determine the activity of the

spermatozoa. The time required for the mixing of the contents of the second test tube, the placing of a sample on a suitable slide, and its subsequent microscopic examination required a minimum of 20 seconds; therefore, results of the tests listed as -20 seconds indicate that when first viewed under the microscope the spermatozoa were immotile. In instances where the spermatozoa evidenced motility when first examined under the microscope, the exact time when they became completely immotilized was found by constant observation of the test sample on the microscopic slide.

The following table gives the results of tests, expressed in time required to render spermatozoa completely immotile, of the compositions of Examples II and VIII inclusive, made according to the above procedure. Three series of tests were made of the seven formulations at intervals of a few days so that each formulation was tested three times. Each series of tests was made on a sample of human semen obtained by pooling individual specimens from three donors. The semen specimens were collected, cooled, pooled, and used within a few hours to insure that the spermatozoa had full motility at the time the test were made.

Composition of--	Test #1	Test #2	Test #3
Example II.....	-20 sec.	-20 sec.	-20 sec.
Example III.....	1 min.	1 min.	50 sec.
Example IV.....	6 min.	5 min.	4 min.
Example V.....	1 min. 15 sec.	1 min. 25 sec.	1 min. 15 sec.
Example VI.....	55 sec.	45 sec.	45 sec.
Example VII.....	40 sec.	1 min. 50 sec.	1 min.
Example VIII.....	50 min.	56 min.	52 min.

The tabulated results further show that all of the spermicidal compositions of Examples II and VII inclusive are capable of immotilizing spermatozoa in at least six minutes even when so greatly diluted as in the heretofore described tests wherein the composition tested contained only 2 per cent of a spermicidal composition. At this dilution one gram of the novel spermicidal composition in saline solution contains only 0.00015 gram of one of the said unsaturated fatty acids and 0.0002 gram of one of the said para-alkylphenoxyethanols.

The tabulated results also indicate the effectiveness of the alkylphenoxyethanols in potentiating the spermicidal power of a composition containing an unsaturated fatty acid as a spermicidal agent in that the time required for such a potentiated composition to completely immotilize spermatozoa when tested according to the above procedure is a maximum of six minutes, whereas the same composition, except that the alkylphenoxyethanol is omitted, requires a corresponding maximum period of 56 minutes to completely immotilize spermatozoa.

Based upon the results of the tests, the novel spermicidal compositions of the present invention, comprising the combination with a vehicle and an unsaturated fatty acid of ten or more carbon atoms of one or more of said alkylphenoxyethanols, are many times more effective than the old compositions in which the same vehicle included one of said fatty acids but not one or a mixture of the said alkylphenoxyethanols.

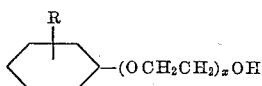
Since certain changes may be made in the above compositions, of matter and different embodiments of the invention could be made without departing from its scope, it is intended that all matter contained in the above description shall

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be interpreted as illustrative and not in a limiting sense.

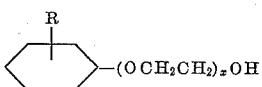
What is claimed is:

1. A spermicidal composition comprising in combination with a vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and an alkylphenoxyethanol of the following general formula



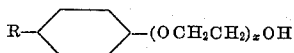
in which R is an alkyl radical and x has a value of at least one.

2. A spermicidal composition comprising in combination with a vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and an alkylphenoxyethanol of the following general formula



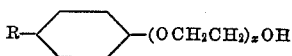
in which R is an alkyl radical having a number of carbon atoms within the range of 1 to 22, and x has a value of at least one.

3. A spermicidal composition comprising in combination with a vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and a para-alkylphenoxyethanol of the following general formula



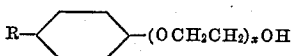
in which R is an alkyl radical and x has a value of at least one.

4. A spermicidal composition comprising in combination with a vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and a para-alkylphenoxyethanol of the following general formula



in which R is an alkyl radical having a number of carbon atoms within the range of 1 to 22, and x has a value of at least one.

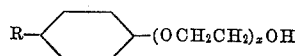
5. A spermicidal composition comprising in combination with a vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and a para-alkylphenoxyethanol of the following general formula



in which R is di-isobutyl and x has a value of at least one.

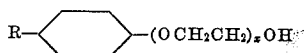
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6. A spermicidal composition comprising in combination with an aqueous vehicle, an unsaturated fatty acid containing at least 10 carbon atoms, and a mixture of para-alkylphenoxyethanols of the following general formula



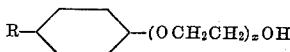
in which R is di-isobutyl and the average value of x in said mixture is approximately 9.25 to 10.25 and the average molecular weight of said ethers is approximately 595 to 639.

7. A spermicidal composition comprising in combination with a vehicle, ricinoleic acid, and a para-alkylphenoxyethanol of the following general formula



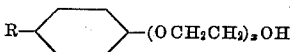
in which R is an alkyl and the value of x is at least 1.

8. A spermicidal composition comprising in combination with a vehicle, ricinoleic acid, and a para-alkylphenoxyethanol of the following general formula



in which R is di-isobutyl and x has a value of at least one.

9. A spermicidal composition comprising in combination with an aqueous vehicle, ricinoleic acid, and a mixture of para-alkylphenoxyethanols of the following general formula



in which R is di-isobutyl and the average value of x in said mixture is 9.75 and the average molecular weight of the said ethers is 635.

FRANK V. SANDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,149,240	Crossley	Feb. 28, 1939
2,330,846	Sander	Oct. 5, 1943
2,436,184	Stillman et al.	Feb. 17, 1948

OTHER REFERENCES

Dickinson: Control of Conception, 2nd ed., 1938, Williams and Wilkins Co., Baltimore, Md., pages 71-73.

J. A. P. A., Prac. Phar. Ed., Mar. 1946, page 138.