

## UNITED STATES PATENT OFFICE

2,251,935

## GERMICIDAL SOAP

Walter H. Hartung, Lansdowne, Pa., assignor to  
Sharp & Dohme, Incorporated, Philadelphia,  
Pa., a corporation of Maryland

No Drawing. Application September 21, 1936,  
Serial No. 101,788

12 Claims. (Cl. 252—107)

This invention relates to germicidal soap; and more particularly to such soaps, either solid or liquid, which contain a phenol and which retain the detergent properties of the soap and the germicidal or antiseptic properties of the phenol. The amount of phenol used in the new soaps of the present invention is relatively small, so that the soaps retain their detergent properties and when used in a concentration such that the concentration of phenol is such as to give effective germicidal action are effective detergents or washing agents.

A great number of compositions containing soap and phenols of one type or another have previously been suggested and used as antiseptic compositions; the soap having frequently been used or proposed for use as a solubilizing agent for the phenols, many of which are not sufficiently soluble in water to produce an antiseptic solution unless some other agent is included in the solution to increase their solubility or dispersion.

Such compositions in general have used the soap in about equal proportions with the phenol, or have used the phenol in greater amounts than the soap, so that in any concentration of the mixture in water which is effective and usable as an antiseptic or germicide, the amount of soap present is too small to have any effective detergent or washing action and the solutions are disinfecting or germicidal solutions rather than detergent solutions. Such compositions, whether solid or liquid, have not been available for use as germicidal soaps, because the proportion of phenol which they contain is so great that their detergent action is not comparable to the detergent action of ordinary soap.

It is accordingly the object of the present invention to provide a soap which is germicidal or antiseptic, and which may be used as an ordinary soap, that is, as a detergent or washing agent, and which combines with its detergent or washing properties the property of serving as a germicide or antiseptic.

In accordance with the present invention, soaps are produced from commercially available fats or oils, such as coconut oil and palm oil, and the soaps produced are comparable with ordinary commercial soaps. The fat or oil which is selected as the base for the soap is hydrogenated to substantially complete saturation so that the resulting soap is substantially free from unsaturated fatty acids. After the fat or oil is thus hydrogenated to substantially complete saturation, it is saponified in one of the usual

ways with either a sodium or a potassium base, and is converted into soap. The resulting soap, which is a soap of saturated fatty acids, and substantially free from soap of unsaturated fatty acids, is then filtered in a suitable manner, or it may be extracted with ether, to remove all of the unsaponifiable matter. Care should be taken that in the final soap which is produced no substantial amount of unsaponified fat or oil or excess free fatty acid is present. The amount of caustic used in producing the soap should be the stoichiometric quantity required to neutralize all of the fatty acid present, or may be somewhat in excess of this, so that no free fatty acid remains in the final soap.

The soaps may be produced from a single commercial oil or fat, such as coconut oil or palm oil, or may be produced from mixed oils or fats, such as mixtures of palm oil and coconut oil, or mixtures of tallow and palm oil, etc.

A relatively small amount of a phenol is combined with the soap so produced. The phenols which are advantageously used are the higher or more active phenols such as the alkyl phenols, the alkyl cresols, the alkyl resorcinols, etc., such highly active phenols as secondary and tertiary butyl, amyl and hexyl cresols being particularly advantageous both from the point of view of germicidal activity and stability. These phenols are incorporated in the composition in proportions ranging from about 1% to about 10% by weight, based on the soap; a somewhat higher proportion of the phenol being used in the production of liquid soap compositions than is used in the production of solid soap compositions or bar soaps, and the more active phenols being used in smaller proportions than the less active phenols. For example, a phenol such as secondary or tertiary hexyl cresol may be used in proportions ranging from about 1% to about 10% based upon the weight of the soap used.

The presence of soap from unsaturated fatty acids in substantial amounts, or the presence of unsaponifiable or unsaponified material, other than the phenol, in the soap product has a marked inhibiting effect upon the germicidal or antiseptic activity of the composition. For example, if a few percent of a soap from oleic acid be incorporated in such a composition, the activity of the composition may be reduced by as much as two-thirds; and the presence of a small amount of free fatty acid, or a small amount of unsaponified or unsaponifiable material, such as free oil, or fat, or other unsaponifiable material, may reduce the germicidal or antiseptic

activity of the composition by as much as 75%.

The soap compositions may also contain a small amount of a suitable material to mask the odor of the composition, or to impart a desirable odor to the composition. Any perfuming ingredients used should in general be of a more or less phenolic character. Such aromatic compositions as oil of cloves or creosote may be used with advantage. Oil of cloves contains eugenol, which is a propenyl guaiacol, and creosote contains cresol and guaiacol. Other perfuming agents, such as lemon grass oil, bergamot oil, camphor oil, thyme oil, and tar oil, which are non-phenolic in character, exhibit a marked inhibiting action upon the germicidal or antiseptic properties of the composition, and even when used in small amounts may reduce the activity by about two-thirds, more or less.

It is my theory that such unsaponified or unsaponifiable material as free fatty acids, fat or oil, non-phenolic perfuming ingredients, etc., offer, when the compositions are dissolved in water, discrete surfaces upon which the phenolic germicides tend to be adsorbed, with a marked reduction in the amount of the phenol which is available for germicidal or antiseptic purposes. By the elimination of substantially all such materials, and the elimination of substantially all unsaturated fatty acid soaps, which also have a marked inhibiting action upon the germicidal or antiseptic activity of the composition, I find that it is possible to produce soap compositions containing a greatly preponderating amount of soap and a smaller amount of phenol, such that the compositions when dissolved in water are effective germicides and also effective detergent or washing agents.

The invention will be illustrated by the following specific examples, although it is not limited thereto.

*Example I.*—Cocoanut oil is hydrogenated to substantially complete saturation, saponified, and the resulting soap extracted with ether to remove unsaponified and unsaponifiable material. An aqueous liquid soap which contains about 10% of the resulting saturated soap and 1% of secondary or tertiary hexyl cresol is then made. This liquid soap is effectively germicidal or antiseptic, and is an effective detergent or washing agent, when used as such liquid soaps are normally used.

*Example II.*—Cocoanut oil is hydrogenated to substantially complete saturation, saponified, and the resulting soap is filtered to remove unsaponified and unsaponifiable material. A solid soap, containing about 85% soap and 15% water is produced therefrom, and from about 1% to about 10% of secondary or tertiary hexyl cresol based on the soap incorporated in it. The resulting solid soap is effectively germicidal or antiseptic when used as such soaps are ordinarily used, and is also an effective detergent or washing agent, not differing substantially from solid soaps of similar constitution as ordinarily made.

Alkyl di-hydroxy phenols, such as alkyl resorcinols, catechols, etc., may also be used advantageously.

Thus by the present invention, I provide a process by which new and improved germicidal or antiseptic soaps may be produced, the soaps being in either liquid or solid form, and having substantially the same detergent or washing properties as ordinary soaps, and also having an effective germicidal or antiseptic action when used as such soaps are ordinarily used. The

soaps are produced from commercially available fats and oils, by hydrogenating the fats or oils to substantially complete saturation, so that the resulting soaps are substantially free from unsaturated fatty acid soaps, and the soaps are treated so that they are substantially free from unsaponified and unsaponifiable material.

I claim:

1. A germicidal and detergent soap composition exhibiting effective germicidal activity and possessing effective detergent and washing properties, which composition comprises a water-soluble soap obtained from a soap-base selected from the group consisting of commercial fatty oils and fats, said soap being substantially free from unsaturated fatty acid soaps and from unsaponified and unsaponifiable material except phenols, said composition also containing from about 1% to about 10% of an alkyl phenol capable of acting as a germicide, based upon the weight of the soap.
2. A germicidal and detergent soap composition as in claim 1, in which the alkyl phenol is an alkyl cresol.
3. A germicidal and detergent soap composition as in claim 1, in which the alkyl phenol is an alkyl cresol, in which the alkyl group has at least four but not more than six carbon atoms.
4. A germicidal and detergent soap as in claim 1, in which the alkyl phenol is an alkyl di-hydroxy phenol.
5. A liquid aqueous soap composition possessing effective detergent and washing properties and exhibiting effective germicidal activity, which composition comprises from about 0.1% to about 1% of an alkyl phenol capable of acting as a germicide, and about 10% of a water-soluble soap substantially free from unsaponified and unsaponifiable fatty material and obtained from a substantially completely hydrogenated soap-base selected from the group consisting of commercial fatty oils and fats.
6. A germicidal and detergent soap composition as in claim 5, in which the alkyl phenol is an alkyl cresol.
7. A germicidal and detergent soap composition as in claim 5, in which the alkyl phenol is an alkyl cresol, in which the alkyl group has at least four but not more than six carbon atoms.
8. A solid germicidal and detergent soap exhibiting effective germicidal activity and possessing effective detergent and washing properties, which soap contains about 15% water and from about 1% to about 10%, based upon the weight of the soap, of an alkyl phenol capable of acting as a germicide, the soap being water-soluble and obtained from a substantially completely hydrogenated soap-base selected from the group consisting of commercial fatty oils and fats, said soap being substantially free from unsaponified and unsaponifiable fatty material.
9. A germicidal and detergent soap composition as in claim 8, in which the alkyl phenol is an alkyl cresol.
10. A germicidal and detergent soap composition as in claim 8, in which the alkyl phenol is an alkyl cresol, in which the alkyl group has at least four but not more than six carbon atoms.
11. The process of producing a germicidal and detergent soap exhibiting effective germicidal activity and possessing effective detergent and washing properties, from a soap-base selected from the group consisting of commercial fatty oils and fats, which comprises saponifying the soap-base, previously hydrogenated to substan-

ially complete saturation forming therefrom a water-soluble soap substantially free from unsaponified and unsaponifiable material, and incorporating in said soap from about 1% to 10% by weight, based on the weight of the soap, of an alkyl phenol capable of acting as a germicide.

12. The process of producing a germicidal and detergent soap composition, exhibiting effective germicidal activity and possessing effective detergent and washing properties, from a soap-base selected from the group consisting of com-

mercial fatty oils and fats, which comprises saponifying the soap-base previously hydrogenated to substantially complete saturation, removing unsaponified and unsaponifiable material therefrom leaving a water-soluble soap, and incorporating in the soap from about 1% to about 10% by weight, based on the weight of the soap, of an alkyl phenol capable of acting as a germicide.

WALTER H. HARTUNG.