

1

3,341,460

SHAMPOO COMPOSITION

Ling Wei, East Brunswick, N.J., assignor to Colgate-Palmolive Company, New York, N.Y., a corporation of Delaware

Filed Oct. 21, 1965, Ser. No. 500,208

9 Claims. (Cl. 252-152)

This application is a continuation-in-part of copending application S.N. 295,216, filed July 15, 1963.

The present invention has to do with a shampoo composition and, more particularly, has to do with a shampoo composition substantially non-irritating to an animal eye when in contact therewith.

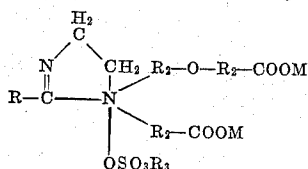
A wide variety of detergent compounds and mixtures thereof has been used for the formulation of detergent compositions, including shampoos. In the formulation of such compositions, many factors must be considered in order to realize desired results. One very important consideration is irritation to the eye produced when a detergent contacts the eye. This is particularly pronounced in the case of infants, whose eyes are extremely sensitive. For some time, a class of compounds referred to in the art as "cycloimidates" has been known to have detergent and foaming qualities, and to be relatively non-irritating to the eye. These materials are described, for example, in U.S. Patent Numbers 2,773,068; 2,781,354 and 2,781,357. However, some "cycloimidates" do not remain completely in solution at temperatures at which the shampoos are often displayed and used, that is, temperatures on the order of 15-17° C. Even at 27° C., a cloudy appearance characterizes the appearance of the shampoos, thereby materially reducing the aesthetic values of the products. When a variety of compounds has been added to such shampoos in an effort to inhibit this cloud formation, it has been found that many of them are effective cloud formation inhibitors but that they have adverse effects and destroy the non-stinging and non-irritating properties of the cycloimidates. Still other compounds have proven to be ineffective for the desired inhibition.

It has now been found that the cloud formation susceptibility of certain cycloimide shampoos can be inhibited effectively by incorporating relatively small amounts of certain compounds which do not reduce the beneficial properties of the cycloimidates.

It is an object of this invention, therefore, to provide an improved detergent composition. It is a further object to provide an improved shampoo for humans, and particularly for infants. Still another object is to provide an improved shampoo substantially free from irritation of an animal eye, particularly a human eye, when in contact therewith. A particular object is to provide an improved shampoo of excellent foaming and aging stability characteristics. Another object is to provide a shampoo having a cloud point lower than about 15° C. Still other objects of the invention will appear from the following description of the invention.

Broadly stated, according to the present invention, I have found detergent compounds of low cloud point, excellent foaming properties, and substantially free from irritation to an animal eye, to be those containing:

(A) A compound represented by the general formula



wherein—

R is a hydrocarbon radical of 4-18 carbon atoms;

2

R₂ is selected from the class consisting of

- (a) aliphatic hydrocarbon groups 1-4 carbon atoms,
- (b) hydroxy substituted hydrocarbon groups of 1-4 carbon atoms;
- (c) aliphatic ether groups, each of said groups having a single ether linkage therein and otherwise being hydrocarbon of 2-4 carbon atoms,
- (d) aliphatic ether groups, each of said groups having a single ether linkage therein and otherwise being hydroxy substituted hydrocarbon of 2-4 carbon atoms,
- (e) aliphatic keto groups, each of said groups having a single keto linkage therein and otherwise being hydrocarbon of 2-4 carbon atoms,
- (f) aliphatic keto groups, each of said groups having a single keto linkage therein and otherwise being hydroxy substituted hydrocarbon of 2-4 carbon atoms;

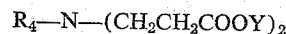
R₃ is a fatty acid monoglyceride group wherein the fatty acid contains from about 8 to about 18 carbon atoms;

and

M is selected from the group consisting of hydrogen and an alkali metal;

and

(B) An iminodipropionate represented by the general formula



wherein—

R₄ is an aliphatic hydrocarbon group having more than about 10 carbon atoms, and particularly between about 12 and about 18 carbon atoms, and Y is selected from the group consisting of hydrogen and a salt forming radical.

Since cycloimidates and methods for their preparation are fully described in U.S. Patent Numbers 2,773,068; 2,781,354 and 2,781,357, it is considered unnecessary to describe them again in detail herein. Reference is made to the said patents for details in the preparation and composition of cycloimidates. It is to be understood, of course, that one or a plurality of the cycloimidates represented by general Formula A can be used in the compositions of this invention. A typical and preferred cycloimide is the disodium salt of 1-lauryl-cycloimidium-2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate.

The term "coco" refers to fatty acid groups formed in coconut oil fatty acids. Such acids contain from about 8 to about 18 carbon atoms per molecule, predominating in C₁₂-C₁₄ acids.

Compounds discovered to be advantageous cloud point inhibitors or depressants herein are iminodipropionates, as represented above by the general Formula B. Compounds of such character are described in U.S. Patent Numbers 2,816,920 and 2,993,071. Accordingly, reference is made to such patent disclosures for details in the preparation of such compounds. Representative compounds for use in the compositions of this invention are:

- disodium-N-lauryl-B,B-iminodipropionate
- monosodium-N-lauryl-B,B-iminodipropionate
- mono-, di- and tri-ethanolamine salts of N-lauryl-B,B-iminodipropionate
- lithium salts of N-lauryl-B,B-iminodipropionate.

Particularly preferred herein, however, is disodium-N-lauryl-B,B-iminodipropionate.

The concentration of iminodipropionate (general Formula B), used in the compositions of this invention, is sufficient to substantially lower the cloud point. In general, this ranges up to about 5 percent by weight of the final composition, preferably in the approximate range

of 2 to 4 percent. Generally, a cycloimidate or a plurality of the same, (A), will be present in a concentration of about 10 to about 20 percent by weight.

In addition to the foregoing components of the compositions of this invention, additional additives or compounds can be present therein in customary concentrations, unless otherwise specified below. These include: preservatives such as formalin; dyes such as those certified by the Food and Drug Administration; perfumes such as those conventionally used in cosmetic products; anti-freeze materials such as ethanol, hexylene glycol and glycerin.

Buffering agents, such as citric acid, can be used for pH control. The pH of the compositions of this invention should range from about 5.8 to about 8.2 with preference given to those in the range of 6.2 to 6.5.

Water is generally the diluent for all of the foregoing components of the compositions contemplated herein; however, small amounts of alcohols such as ethyl alcohol and isopropyl alcohol can be used in combination with water.

Shampoos of this invention are formed by mixing together compounds (A) and (B). After the two compounds are thoroughly mixed, water or other diluent is added. Any additional components such as perfume and preservative (e.g., formalin) are then added.

Alternatively, a shampoo can be prepared and an iminodipropionate (Compound (B)) can be added thereto in suitable concentration. The resulting mixture is stirred to form a homogeneous product.

The invention is illustrated, but in no sense limited, by the following typical examples. All parts are by weight in the examples, unless otherwise indicated.

Examples 1-5

A shampoo composition was formulated from:

15 parts disodium salt of 1-lauryl-cycloimidium-2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate

2 parts polyoxyethylene sorbitan monooleate (Tween 80 of Atlas Chemical Company)

0.3 part perfume

and

82.7 parts water

The sulfate and water were mixed together at a temperature of about 25° C. for about 15 minutes. The monooleate and perfume were then added.

The resulting composition was used as a control to demonstrate the effectiveness of an iminodipropionate as a cloud point depressant. As shown below in Table I, various amounts of disodium-N-lauryl-B,B-iminodipropionate were incorporated in a sample of the control composition. The results are shown below in Table I.

Cloud point is determined by cooling a one-ounce sample of a composition being tested. The sample is stirred in a test tube while it is cooled at a rate of 0.56° C. (1° F.) per minute. When a definite cloud is formed, the temperature is noted. The sample is then heated at the rate of 0.56° C. (1° F.) per minute, while being stirred. The temperature at which the cloud disappears is the clear point.

TABLE I

Example	Concentration of Additive, Percent Wt.	Cloud Point, ° C.	Clear Point, ° C.
1-----	(Control)	Cloudy at 27	-----
2-----	1	15	20
3-----	3	3	11
4-----	4	1	6
5-----	5	-5	-2

As indicated in the foregoing tabulation, the iminodipropionate is effective in concentrations ranging from 1 to 5 percent by weight. Still larger concentrations can be used, up to about 15 percent; however, concentrations of 2 to 4 percent are preferred to provide advantageous products.

That the iminodipropionate did not impair the characteristic feature of the cycloimidate, namely, freedom from irritation of an animal eye, is shown by rabbit eye tests. No irritation was noted during a 48-hour period when the shampoo was placed in the rabbit's eyes and allowed to stay therein for that period. This was the result with one of the foregoing compositions containing 3 percent of the iminodipropionate. The Draize method was used to determine eye irritation.

The polyoxyethylene sorbitan monooleate is added primarily for its function as a dispersing agent for the perfume. It may be used in amounts up to about 5 percent; however, its use in amount of about 3 percent is preferred.

Example 6

A shampoo composition was formulated from:

15 parts disodium salt of 1 - lauryl - cycloimidium - 2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate

5 parts disodium salt of N-lauryl-B,B-iminodipropionate and

80 parts water

The sulfate and water were mixed initially following which the dipropionate was added. The cloud point is determined by the same method as that used for Examples 1-5 and found to be -5° C. The clear point is 0° C.

Example 7

A shampoo composition was formulated from:

12 parts disodium salt of 1-lauryl-cycloimidium-2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate

3 parts disodium salt of N-lauryl-B,B-iminodipropionate and

85 parts water

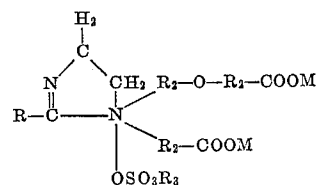
The sulfate and water were mixed initially following which the dipropionate was added. The cloud point is determined by the same method as that used for Examples 1-5 and found to be -1° C. The clear point is 2° C.

The present invention has been described with reference to illustrative examples and proportions; however, it will be appreciated by those skilled in the art that other variations and modifications of my invention can be employed, without departing from the principle thereof. Thus, it will be understood that my invention is not limited to the particular types of compositions set forth in our illustrative examples nor to the particular ingredients recited therein. It is intended in the appended claims to cover all such variations and modifications.

I claim:

1. A shampoo composition substantially non-irritating to an animal eye when in contact therewith, consisting essentially of

(A) between about 10 and about 20 percent by weight of a compound represented by the general formula



wherein—

R is an alkyl group of 4-18 carbon atoms;

5

R_2 is selected from the class of consisting of

- (a) alkylene group of 1-4 carbon atoms,
- (b) hydroxy substituted alkylene groups of 1-4 carbon atoms wherein at least one hydrogen is hydroxy substituted,
- (c) alkylene ether groups, of 2-4 carbon atoms having a single ether linkage therein,
- (d) hydroxy substituted alkylene ether groups, of 2-4 carbon atoms having a single ether linkage therein and wherein at least one hydrogen is hydroxy substituted,
- (e) alkylene keto groups, of 2-4 carbon atoms having a single keto linkage therein,
- (f) hydroxy substituted alkylene keto groups, of 2-4 carbon atoms having a single keto linkage therein and wherein at least one hydrogen is hydroxy substituted,

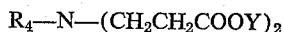
R_3 is a fatty acid monoglyceride group wherein the fatty acid contains from about 8 to about 18 carbon atoms;

and

M is selected from the group consisting of hydrogen and an alkali metal

and

- (B) between about 1 and about 15 percent by weight said amount being sufficient to substantially lower the cloud point of the composition, of an iminodipropionate represented by the general formula



wherein R_4 is an alkyl group having about 10 to about 18 carbon atoms, and Y is selected from the group consisting of hydrogen and a salt forming radical selected from the group consisting of alkali metal salts and alkylolamine salts; and water.

2. The composition of claim 1 wherein (A) is a disodium salt of 1-lauryl-cycloimidium-2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate.

3. The composition of claim 1 wherein R_4 is an aliphatic hydrocarbon group having between about 12 and about 18 carbon atoms.

4. The composition of claim 1 wherein (B) is disodium-N-lauryl-B,B-iminodipropionate.

6

5. The composition of claim 1 having a pH between about 5.8 and about 8.2.

6. A shampoo composition substantially non-irritating to an animal eye when in contact therewith and having a cloud point below about 15° C., consisting essentially of about 15 parts by weight of 1-lauryl-cycloimidium-2-ethoxyethionic acid-2-ethionic acid-2-cocomonoglyceride sulfate, from about 1 to about 5 parts by weight of disodium-N-lauryl-B,B-iminodipropionate, and water.

7. The composition of claim 1 and further including polyoxyethylene sorbitan monooleate.

8. The composition of claim 7 wherein said polyoxyethylene sorbitan monooleate is present in an amount up to about five percent.

9. The composition of claim 7 wherein said polyoxyethylene sorbitan monooleate is present in an amount of between about one and three percent.

References Cited

UNITED STATES PATENTS

2,773,068	12/1956	Mannheimer	252—152 X
2,781,351	2/1957	Mannheimer	252—152 X
2,781,354	2/1957	Mannheimer	252—357 X
2,781,357	2/1957	Mannheimer	252—152 X
2,816,920	12/1957	Anderson.	
2,950,255	8/1960	Goff	252—152
3,055,836	10/1962	Masci	252—152
3,086,943	4/1963	Lang	252—152

FOREIGN PATENTS

223,814	7/1959	Australia.
---------	--------	------------

OTHER REFERENCES

Lesser, "Soap and Sanitary Chemicals," January 1951, pp. 38-41, 115, 117, 119.

"The Miranol Amphoteric Surface Active Agents," April 1958, pp. 1-5, 9, 10, 17, 18, 23-31.

Cycloimidinium Amphoterics, Documentary Edition of American Perfuming and Cosmetics, 1960 (Feb. 17, 1960), TP 983 A1 A5d, pp. 169-171.

LEON D. ROSDOL, *Primary Examiner.*

S. E. DARDEN, *Assistant Examiner.*