

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
28 August 2008 (28.08.2008)

PCT

(10) International Publication Number  
**WO 2008/103136 A1**

(51) International Patent Classification:  
*C11D 7/26* (2006.01) *C11D 7/32* (2006.01)

(21) International Application Number:  
PCT/US2007/004582

(22) International Filing Date:  
23 February 2007 (23.02.2007)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:  
— with international search report



**WO 2008/103136 A1**

(54) Title: SHEA BUTTER ALKANOLAMIDES

(57) Abstract: Novel alkanolamides prepared by the reaction of an alkanolamine and shea butter, preferably mild-processed shea butter (MPSB). Materials of the present invention are useful as cosmetic and personal care ingredients; they thicken shampoos and body washes, stabilize foam, and deliver to the hair and skin highly desirable unsaponifiables present in shea butter, including natural antioxidants.

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

### **Shea Butter Alkanolamides**

#### **Cross-Reference to Related Applications**

[0001] Not applicable.

#### **Statement Regarding Federally-Sponsored Research or Development**

[0002] Not applicable.

#### **Field of the Invention**

[0003] The present invention relates to novel alkanolamides prepared by the reaction of an alkanolamine and shea butter, preferably mild-processed shea butter (MPSB).

Materials of the present invention are useful as cosmetic and personal care ingredients; they thicken shampoos and body washes, stabilize foam, and deliver to the hair and skin highly desirable active ingredients present in shea butter, including natural antioxidants.

#### **Background of the Invention**

[0004] Alkanolamides perform a variety of functions including viscosity enhancement, foam stabilization, emulsification and detergency. Specific applications include as humectants and hair detanglers. Chemically, alkanolamides are the reaction product of an alkanolamine and a fatty material. Fatty materials are a class of compounds which include fatty carboxylic acids, fatty methyl esters and fatty glycerides. Sources of fatty materials include coconut, peanut, soybean, and rapeseed oils, fractionated and non-fractionated fatty methyl esters and fatty acids of carbon chains of varying lengths.

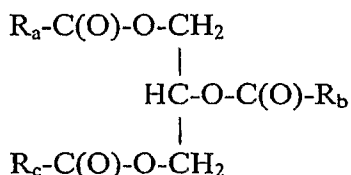
[0005] Variations in carbon chain lengths of the fatty sources can change the properties of alkanolamides. For example, a finished product having as an ingredient C<sub>8</sub> to C<sub>10</sub> fatty acids exhibit foam stability, but contribute little as thickeners. C<sub>12</sub> to C<sub>14</sub> fatty acids are particularly useful as foam boosters; they also show good viscosity building properties.

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

Blending alkanolamides of differing carbon chain lengths can help optimize performance of the finished products in which they are incorporated. Lauric-myristic diethanolamides, for example, are common ingredients in formulations of high foaming products such as dishwashing detergent, bubble bath and hair shampoo. They also impart emolliency and conditioning effects to skin and hair, making them among the most commonly used alkanolamides in the personal care industry.

**[0006]** Higher molecular weight, unsaturated fatty alkanolamides reduce foam and produce good viscosity build. Illustrative are oleic and linoleic alkanolamides which are excellent viscosity builders at low concentrations. This property makes them particularly useful in surfactant-containing formulations that otherwise are difficult to thicken. Higher molecular weight unsaturated products, however, are known to be oxidatively unstable and can interfere with fragrance in finished products.

**[0007]** Shea butter is a butter extracted from the kernel of *Butrospermum parkii*. This plant, also referred to as *Vitellaria paradoxa*, is native to Africa. The term butter describes a material that is a solid at room temperature, but melts at about 40°C. Chemically, shea butter is a triglyceride conforming to the following structure



wherein R<sub>a</sub>, R<sub>b</sub> and R<sub>c</sub> each have one of the following compositions:

<u>R Group</u>	<u>Common Name</u>	<u>Range (%)</u>	<u>Typical (%)</u>
C <sub>11</sub> H <sub>23</sub>	Lauryl	0.1 – 2.0	0.2
C <sub>13</sub> H <sub>27</sub>	Myristyl	0.5 – 2.0	1.0
C <sub>15</sub> H <sub>31</sub>	Cetyl	2.0 – 6.0	4.0
C <sub>17</sub> H <sub>35</sub>	Stearyl	25.0 - 50.0	35.0
C <sub>17</sub> H <sub>33</sub>	Oleyl	40.0 - 60.0	59.0

Rogers; O'Lenick, Jr.  
 Shea Butter Alkanolamides  
 Atty. Docket VER-PCT-001

C <sub>17</sub> H <sub>31</sub>	Linoleyl	0.5 – 1.0	0.8
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[0008] The average composition of R<sub>b</sub> is different than R<sub>a</sub> and R<sub>c</sub>, the latter two being similar. The R<sub>b</sub> moiety contains predominantly the unsaturated C<sub>18</sub> group (oleyl) while R<sub>a</sub> and R<sub>c</sub> contain predominantly the saturated C<sub>18</sub> group (stearyl). Differences between internal (R<sub>b</sub>) and terminal (R<sub>a</sub>, R<sub>c</sub>) substitution are seen in natural products but not in synthetic molecules produced in the laboratory.

[0009] The high levels of stearyl and oleyl groups make shea butter and its alkanolamide derivatives of particular interest in the personal care industry. While other raw materials used in personal care products have these species, the compounds of the present invention have significantly high concentrations of unsaponifiables, which possess highly desired antioxidant, ultra-violet radiation protection, and free-radical scavenging properties.

MPSB of the present invention typically contains from about 5% to about 15% by weight of unsaponifiables. In contrast, other butters commonly used in personal care products have less than 2% unsaponifiables. For example, cocoa butter (from *Theobroma cacao*) averages 0.4% unsaponifiables and Illipe butter (from *Shorea stenoptera*) averages 1.1%.

[0010] As described in greater detail below, the novel shea butter alkanolamide compounds of the present invention are produced by reacting shea butter, preferably MPSB, with an alkanolamine, preferably under specific mild processing conditions. By "mild processed" is meant processes that do not remove or otherwise diminish the amount or potency of active ingredients, particularly highly desired unsaponifiables. In one aspect of the present invention, mild processing is employed both at the time of harvesting and initial extraction (creating mild-processed shea butter) and during

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

subsequent preparation of derivatives. These mild processes result in materials containing unexpectedly high amounts unsaponifiables, notably antioxidants.

[0011] Prior art alkanolamides do not possess the antioxidant and free-radical scavenging properties of compounds of the present invention. For example, U.S. Patent 5,741,916 discloses the use of meadowfoam seed oil to make alkanolamides. The materials described in the '916 Patent do not possess the desirable unsaponifiable fractions which are present in the alkanolamides of the present invention.

[0012] The shea butter alkanolamides of the present invention thus deliver unexpectedly high amounts of unsaponifiables to the skin and hair in a heretofore unachievable manner. They not only thicken but also act as antioxidants and free radical scavengers.

#### **Summary of the Invention**

[0013] The present invention relates to a novel class of alkanolamides made by reacting shea butter with alkanolamines and a process for using them in personal care applications. In a preferred aspect of the present invention, mild processing is employed both at the time of harvesting and initial extraction (creating mild-processed shea butter) and during subsequent preparation of alkanolamide derivatives. In so doing, materials containing unexpectedly high amounts of active ingredients, particularly highly desired unsaponifiables, are produced.

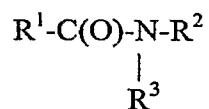
#### **Detailed Description of the Invention**

[0014] The compounds of the present invention are alkanolamides produced by reacting shea butter with an alkanolamine. Preferably, the shea butter is mild-processed and is reacted with an alkanolamine under mild processing conditions. The novel

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

alkanolamides of the present invention are rich in unsaponifiables, including antioxidants and free-radical scavengers.

[0015] Shea butter alkanolamide derivatives of the present invention conform to the following structure:



Wherein

- (i)  $\text{R}^1$  is derived from shea butter and comprises .
  - from about 0.1 to about 2.0 % by weight  $\text{C}_{11}\text{H}_{23}$ ;
  - from about 0.5 to about 2.0% by weight  $\text{C}_{13}\text{H}_{27}$ ;
  - from about 2.0 to about 6.0% by weight  $\text{C}_{15}\text{H}_{31}$ ;
  - from about 25 to about 50% by weight  $\text{C}_{17}\text{H}_{35}$ ; and
  - from about 40.0 to about 60.0 % by weight  $\text{C}_{17}\text{H}_{33}$ ;
- (ii)  $\text{R}^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (iii)  $\text{R}^3$  is selected from the group consisting of  $-\text{H}$ ,  $-\text{CH}_2\text{CH}_2\text{OH}$ .

**[0016] Shea Butter**

[0017] Shea butter can be prepared by standard extraction techniques known to those of skill in the art. For example, U.S. Patent No. 6,552,208, the disclosure of which is incorporated herein by reference, describes several methods for processing shea butter.

Suitable extraction vehicles may include, but are not limited to, ethanol, methanol, ethyl acetate, acetone, chloroform and water, or any other solvent and water.

[0018] In a preferred aspect of the present invention, shea butter is mild-processed; it is extracted using a hydrocarbon-free solvent system and its alkanolamide derivatives are

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

made under mild processing conditions. At the time of harvesting and initial extraction ground-up kernels are boiled in water under mild conditions as described in the examples below. The oil phase is then separated from the water phase by decanting. This process provides a yellow solid wax rich in unsaponifiables. By wax is meant a material obtained by boiling in water under ambient conditions, decanted and filtered.

**[0019]** The mild processing of the present invention may be contrasted with separation using solvents and high temperature treatment with high pressure steam. While the latter processes result in what some may describe as a "more pure" triglyceride, unsaponifiables, and the benefits derived therefrom, are lost. Vacuum distillation which strips off the desirable components is also to be avoided in processing MPSB of the present invention. By processing shea butter under mild conditions, materials comprising from about 5% to about 15% by weight of unsaponifiables can be produced.

**[0020]** Sterols comprise about 20% of the unsaponifiables in shea butter. More particularly, the sterols comprise: cholesterol (from about 1% to about 3%); alpha-spinasterol (from about 1% to about 4%); delta-7-stigmasterol (from about 40% to about 44%); delta-7-avenasterol (from about 38% to about 41%). The remaining constituents of the unsaponifiables (about 80%) include other highly desirable active compounds including tocopherol, karitin, cinamic acid esters, alpha and beta amyryn and phenolics.

**[0021]** Phenolic compounds are natural products composed of one or more aromatic benzene rings with one or more hydroxyl group. They are a class of natural products that possess antioxidant and free radical scavenging properties. Among the phenolics in the unsaponifiables of mild-processed shea butter include gallic acid, gallocatchin, catechin,

Rogers; O'Lenick, Jr.

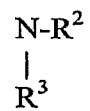
Shea Butter Alkanolamides

Atty. Docket VER-PCT-001

epigallocatechin gallate, epicatechin, gallocatechin gallate, gallocatechin gallate and quercetin.

**[0022] Alkanolamines**

**[0023]** Alkanolamides of the present invention are made by the amidation reaction of shea butter (or, preferably, MPSB) with an alkanolamine conforming to the following structure:



Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

wherein

- (i)  $R^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  
 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (ii)  $R^3$  is selected from the group consisting of  $-\text{H}$ ,  $-\text{CH}_2\text{CH}_2\text{OH}$ .

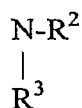
[0024] Alkanolamines suitable for use in the present invention are commercially available from a variety of suppliers, including Dow Chemical (Midland, Michigan).

Illustrative examples of suitable alkanolamines are listed below:

<u>Example</u>	<u><math>R^2</math></u>	<u><math>R^3</math></u>	<u>Chemical Name</u>
1	$-\text{CH}_2\text{CH}_2\text{OH}$	$-\text{H}$	Monoethanolamine
2	$-\text{CH}_2\text{CH}_2\text{OH}$	$-\text{CH}_2\text{CH}_2\text{OH}$	Diethanolamine
3	$-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$	$-\text{H}$	Diglycolamine
4	$-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$	$-\text{H}$	Monoisopropanol amine

[0025] In a preferred embodiment, the amidation is conducted at a temperature of from about  $80^\circ\text{C}$  to about  $90^\circ\text{C}$  in the presence of an anhydrous alkaline catalyst.

[0026] Another aspect of the present invention is a process for delivering antioxidants to the skin or hair by topically applying a finished product comprising an effective amount of an alkanolamide made by the amidation reaction of shea butter (or, preferably, MPSB) and an alkanolamine conforming to the following structure:



wherein

- (i)  $R^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  
 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (ii)  $R^3$  is selected from the group consisting of  $-\text{H}$ ,  $-\text{CH}_2\text{CH}_2\text{OH}$ .

[0027] In a preferred embodiment, the amidation is conducted at a temperature of from

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

about 80°C to about 90°C in the presence of an anhydrous alkaline catalyst. By

processing in this temperature range, alkanolamides of the present invention and glycerin remain in the product. In contrast, when methyl esters or fatty acids are used in preparing alkanolamides, methanol or water, respectively, are distilled off, resulting in the loss of desirable unsaponifiables. The lower processing temperatures are also more compatible with, and maintain the potency of, antioxidants present in the unsaponifiables.

[0028] In a preferred embodiment, the effective concentration of alkanolamide ranges from about 0.5% to about 15.0% by weight.

[0029] In a preferred embodiment  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .

[0030] In a preferred embodiment  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .

[0031] In a preferred embodiment  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .

[0032] In a preferred embodiment  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .

[0033] The following examples are further illustrative of the present invention. The components and specific ingredients are presented as being typical, and various modifications can be derived in view of the foregoing disclosure within the scope of the invention. All percentages, ratios and proportions herein are by weight, unless otherwise specified. All temperatures are in degrees Celsius unless otherwise specified.

[0034] **Examples**

[0035] Mild-processed shea butter is made according to the following procedure:

500.0 grams of nuts from the shea butter tree are cracked into small pieces and placed into a one-liter vat of water. The water is then heated to 100°C. As the temperature increases, an oil phase develops on the surface of the water. The temperature is held for about 2 hours, after which the oil is decanted and passed through filter paper. The

Rogers; O'Lenick, Jr.  
 Shea Butter Alkanolamides  
 Atty. Docket VER-PCT-001

resulting oil is mild-processed shea butter according to the present invention and may be used in making alkanolamides. It is rich in unsaponifiables, from about 7% to about 15% by weight.

[0036] Examples 5 – 8 are illustrative of the MPSB alkanolamides of the present invention. To the specified number of grams of alkanolamine (Examples 1-4) is added the specified number of grams of MPSB. This mass is heated to from about 80°C to about 90°C. Thereafter, about 0.4% by weight of solid sodium methylate powder is added. The mass is held within the specified temperature range for a period of from about four to about six hours. Nothing is distilled off during this time. The amine value drops during this period and, after several hours, stabilizes. Once the amine value stabilizes, the reaction is held an additional hour and the reaction mass is cooled to ambient temperature. Important to the preparation of MPSB alkanolamides of the present invention is the low processing temperatures. This requires neither distillation of water or processing at high temperatures (*e.g.*, from about 180°C to about 190°C).

[0037] Examples 5 – 8 (Mild-Processed Shea Butter Alkanolamides)

<u>Example</u>	<u>Alkanolamine Example</u>	<u>Alkanolamine Grams</u>	<u>MPSB Grams</u>
5	Example 1	295.0	1450.0
6	Example 2	525.0	1450.0
7	Example 3	510.0	1450.0
8	Example 4	370.0	1450.0

[0038] While the illustrative embodiments of the invention have been described with particularity, it will be understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the spirit and scope of the invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the examples and descriptions set forth hereinabove but

Rogers; O'Lenick, Jr.

Shea Butter Alkanolamides

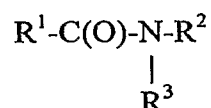
Atty. Docket VER-PCT-001

rather that the claims be construed as encompassing all the features of patentable novelty which reside in the present invention, including all features which would be treated as equivalents thereof by those skilled in the art to which the invention pertains.

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

### Claims

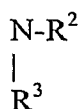
1. An alkanolamide derived from shea butter conforming to the structure:



wherein

- (i)  $\text{R}^1$  is derived from shea butter and comprises  
from about 0.1 to about 2.0 % by weight  $\text{C}_{11}\text{H}_{23}$ ;  
from about 0.5 to about 2.0% by weight  $\text{C}_{13}\text{H}_{27}$ ;  
from about 2.0 to about 6.0% by weight  $\text{C}_{15}\text{H}_{31}$ ;  
from about 25 to about 50% by weight  $\text{C}_{17}\text{H}_{35}$ ; and  
from about 40.0 to about 60.0 % by weight  $\text{C}_{17}\text{H}_{33}$ ;
- (ii)  $\text{R}^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  
 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (iii)  $\text{R}^3$  is selected from the group consisting of  $-\text{H}$  and  $-\text{CH}_2\text{CH}_2\text{OH}$ .
2. An alkanolamide of claim 1 wherein  $\text{R}^1$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $\text{R}^2$  is  $-\text{H}$ .
3. An alkanolamide of claim 1 wherein  $\text{R}^1$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $\text{R}^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
4. An alkanolamide of claim 1 wherein  $\text{R}^1$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $\text{R}^2$  is  $-\text{H}$ .
5. An alkanolamide of claim 1 wherein  $\text{R}^1$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $\text{R}^2$  is  $-\text{H}$ .
6. An alkanolamide made by the amidation reaction of

- (a) an alkanolamine conforming to the following structure:



wherein

Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

- (i)  $R^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  
 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (ii)  $R^3$  is selected from the group consisting of  $-\text{H}$ ,  $-\text{CH}_2\text{CH}_2\text{OH}$ ; and
- (b) a shea butter comprising
- from about 0.1 to about 2.0 % by weight  $\text{C}_{11}\text{H}_{23}$ ;
- from about 0.5 to about 2.0% by weight  $\text{C}_{13}\text{H}_{27}$ ;
- from about 2.0 to about 6.0% by weight  $\text{C}_{15}\text{H}_{31}$ ;
- from about 25 to about 50% by weight  $\text{C}_{17}\text{H}_{35}$ ; and
- from about 40.0 to about 60.0 % by weight  $\text{C}_{17}\text{H}_{33}$ ;
7. An alkanolamide of claim 6 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
8. An alkanolamide of claim 6 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
9. An alkanolamide of claim 6 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
10. An alkanolamide of claim 6 wherein  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
11. An alkanolamide of claim 6 wherein the amidation is conducted at a temperature of from about  $80^\circ\text{C}$  to about  $90^\circ\text{C}$  in the presence of an anhydrous alkaline catalyst.
12. An alkanolamide of claim 11 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
13. An alkanolamide of claim 11 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
14. An alkanolamide of claim 11 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
15. An alkanolamide of claim 11 wherein  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
16. A process for treating hair and skin with an effective concentration of an alkanolamide made by the amidation reaction of shea butter and an alkanolamine conforming to the following structure:



Rogers; O'Lenick, Jr.  
Shea Butter Alkanolamides  
Atty. Docket VER-PCT-001

$R^3$

wherein

- (i)  $R^2$  is selected from the group consisting of  $-\text{CH}_2\text{CH}_2\text{OH}$ ,  
 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$  and  $-\text{CH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$ ; and
- (ii)  $R^3$  is selected from the group consisting of  $-\text{H}$ ,  $-\text{CH}_2\text{CH}_2\text{OH}$ .

17. A process of claim 16 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
18. A process of claim 16 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
19. A process of claim 16 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
20. A process of claim 16 wherein  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
21. A process of claim 16 wherein the amidation is conducted at a temperature of from about  $80^\circ\text{C}$  to about  $90^\circ\text{C}$  in the presence of an anhydrous alkaline catalyst.
22. A process of claim 21 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
23. A process of claim 21 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
24. A process of claim 21 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
25. A process of claim 21 wherein  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
26. A process of claim 16 wherein the effective concentration of the alkanolamide ranges from about 0.5% to about 15.0% by weight.
27. A process of claim 26 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
28. A process of claim 26 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{CH}_2\text{CH}_2\text{OH}$ .
29. A process of claim 26 wherein  $R^2$  is  $-\text{CH}_2\text{CH}_2\text{O}-\text{CH}_2\text{CH}_2\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
30. A process of claim 26 wherein  $R^2$  is  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OH}$ , and  $R^3$  is  $-\text{H}$ .
31. An alkanolamide of claim 1 where the shea butter is mild-processed.
32. A process of claim 16 where the shea butter is mild-processed.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/04582

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC: C11D 7/26( 2006.01),7/32( 2006.01)  
  
 USPC: 510/126,237,350,499,501  
 According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 U.S. : 510/126, 237, 350, 499, 501

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
 None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 Please See Continuation Sheet


**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/0044405 A (PERELLA et al) 22 November 2001 (22.11.2001), See Abstract; paras. 14-34.	1-32
X	US 6,514,918 A (LIBRIZZI) 04 February 2003 (04.02.2003), See Abstract; column 2, lines 1-69.	1-32
X	US 5,616,552 A (YOSHIHARA et al) 1 April 1997 (01.04.1997), See Abstract; column 6, lines 30-60.	1-32

Further documents are listed in the continuation of Box C.       See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 28 January 2008 (28.01.2008)	Date of mailing of the international search report <b>13 MAR 2008</b>
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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Gregory R. Del Cotto  Telephone No. (571) 272-1312
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**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US07/04582

Continuation of B. FIELDS SEARCHED Item 3:  
WEST

search terms: shea butter, alkanolamide, fatty acid