

Detergent Composition

The invention relates to a detergent composition and provides a composition with an improved mildness to the skin and the hair and further an improved foaming property.

Recently, the safety requirement for cleansers has become severe, and research aimed at the development of safer surface active agents has become vigorous. Furthermore, of the known surface active agents, those having high safety are being reconsidered even though their cleansing properties may be relatively poor and studies are being made in an attempt to improve their cleansing properties by combining them with other detergent bases.

Of the many known surface active agents, anionic surface active agents consisting of phosphoric acid ester salts such as salts of lauryl phosphate and myristyl phosphate are mild to the skin and are excellent in feel during use and they are therefore used as the detergent base of solid detergents, shampoos, dental creams, cleansing creams, body shampoos and the like.

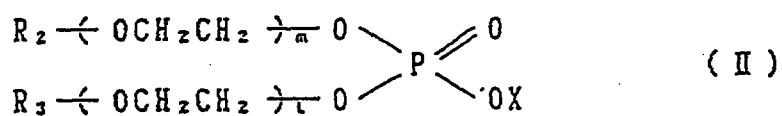
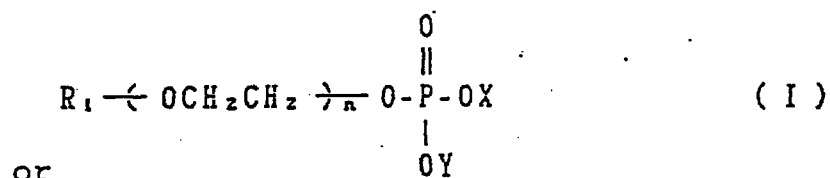
When these cleanser compositions are used for parts of the body contaminated with oily materials, such as made-up faces, and feet and hands after violent exercise, the cleansing power is sufficient but the foaming property is not, and especially in the case of cleanser compositions which are used in a foamed state brought about by use of a towel or the like, such as solid detergents or body shampoos, this weak foaming power is a fatal defect because _____ it results directly in a reduction in quality.

As pointed out hereinbefore, a cleanser composition comprising a surface active agent of the phosphoric acid ester type displays excellent cleansing power, but it is defective in that its foaming properties are relatively poor. Accordingly, it is eagerly desired to improve the foaming property of a cleanser composition comprising a surface active agent of the phosphoric acid ester type while utilizing the good characteristics of this surface active agent. However, a cleanser composition meeting this desire has not been developed until now.

In order to provide a technical improvement on the state of art as outlined above, research has been carried out to improve the foaming properties of a phosphoric acid ester salt which displays excellent safety and is mild to the skin, and as a result, it has been found that when (A) a phosphoric acid ester salt having a specific cation is combined with (B) an insoluble metal salt of a surface active agent, the foaming property, the creaminess of the foam and the finish feel are improved, and that this improved effect is enhanced if a super-fatting agent (C) is used in combination with the components (A) and (B) and this effect is especially good when the concentration of the insoluble metal salt of the surface active agent is low. We have now completed the present invention based on these findings.

The phosphoric acid ester type surface active agent (A) to be used as one active component of the detergent composition (called also a cleanser composition) of the invention is defined

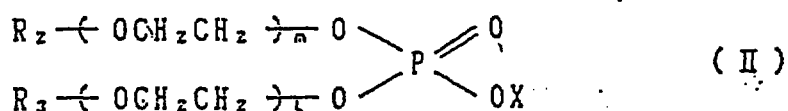
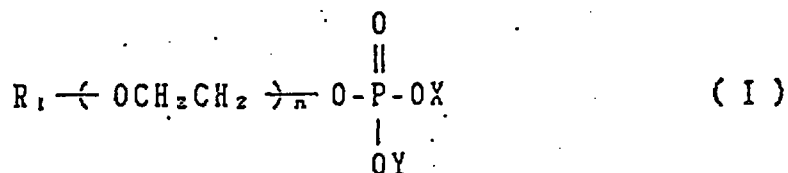
by the following general formula (I) or (II):



wherein R_1 , R_2 and R_3 stand for a saturated or unsaturated hydrocarbon group having 8 to 18 carbon atoms, X and Y stand for a hydrogen atom, an alkali metal, ammonium and an alkanolamine having 2 or 3 carbon atoms, and l , m and n stand for an integer of from 0 to 10.

According to one aspect of the invention, we provide a detergent composition which comprises:

(A) 10 parts by weight of a phosphoric acid ester of the formula (I) or (II):



in which R1, R2 and R3 are each independently a saturated or unsaturated hydrocarbon group having 8 to 18 carbon atoms, X and Y each independently hydrogen, an alkali metal, ammonium or an alkanolamine having 2 or 3 carbon atoms and n, m and L are each independently zero or an integer from 1 to 10, and
(B) 0.05 to 10 parts by weight of an insoluble metal salt of a surface active agent.

7. B

According to another aspect of the invention, we provide a composition as defined in the preceding paragraph, modified in that it contains 0.001 to 10 parts by weight of the insoluble metal salt of a surface active agent (B) and in addition contains (C) 0.01 to 10 parts by weight of (C) a superfatting agent.

The phosphoric acid ester may preferably comprise one having the formula (I) and up to 50 percent by weight, based on the total weight of (A), of one having the formula (II).

The invention moreover provides an mixture of either of the above-defined compositions and water adjusted so as to have a pH of 5.5 to 8.5 when it is has a concentration of 5 percent by weight.

The compositions of the invention may be in the form of solid, liquid, powder, granules or paste.

The saturated or unsaturated hydrocarbon group may be linear, branched or cyclic, and the hydrocarbon group may be composed of a single hydrocarbon group or may comprise at least two hydrocarbon groups. An alkyl group having 10 to 14 carbon atoms is especially preferred as R_1 , R_2 and R_3 . Sodium is preferred as the cations X and Y when the composition is used as a solid cleanser, and potassium or an alkanolamine is preferred as the cations X and Y when the composition is used as a liquid cleanser.

As preferred examples of the phosphoric acid ester salt, there can be mentioned sodium monolauryl phosphate, sodium dilauryl phosphate, potassium monolauryl phosphate, potassium dilauryl phosphate, diethanolamine monolauryl phosphate, diethanolamine dilauryl phosphate, triethanolamine monolauryl phosphate, triethanolamine dilauryl phosphate, sodium monomyristyl phosphate, sodium dimyristyl phosphate, potassium monomyristyl phosphate, potassium dimyristyl phosphate, triethanolamine monomyristyl phosphate, triethanolamine dimyristyl phosphate, sodium monooleyl phosphate, sodium dioleyl phosphate, potassium monooleyl phosphate, potassium dioleyl phosphate, potassium monocetyl phosphate, triethanol-

9

25

amine monocetyl phosphate, potassium monostearyl phosphate and triethanolamine monostearyl phosphate.

In the present invention, the phosphoric acid ester salt (A) may be a single compound represented by the formula (I) or (II) or may be a mixture of two or more of compounds represented by the formulae (I) and (II). A mixture comprising a compound represented by the formula (I) and a compound represented by the formula (II) at a weight ratio of from 100/0 to 50/50 is especially preferred. It is preferred that the phosphoric acid ester salt (A) be incorporated in the cleanser composition in an amount of 5 to 95% by weight (all of "%" given hereinafter are by weight), especially 10 to 90%.

As preferred examples of the insoluble salt of the surface active agent used as the component (B) in the present invention, there can be mentioned an insoluble metal salt of a higher fatty acid having 8 to 24 carbon atoms and an insoluble metal salt of an alkyl phosphate. The metal is a metal other than an alkali metal, and there can be mentioned aluminum, calcium, magnesium and zinc. Magnesium is especially preferred. The insoluble metal salt of the alkyl phosphate can be prepared by reacting the phosphoric acid ester represented

by the above-mentioned formula (I) or (II) with a metal salt represented by the following general formula (III):

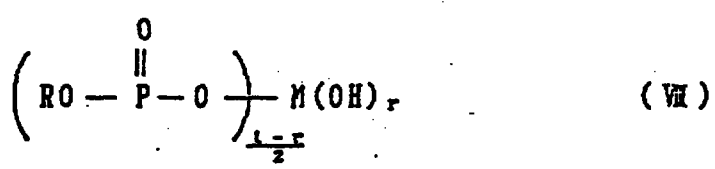
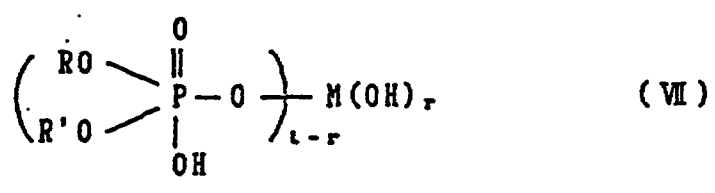
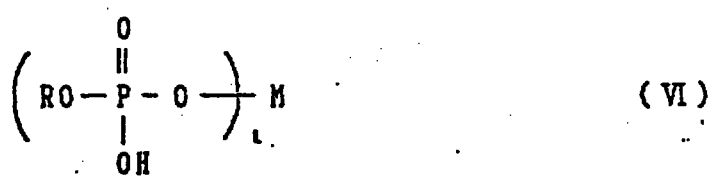
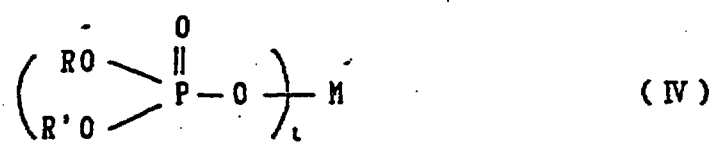


wherein M stands for a metal other than an alkali metal, X stands for an organic or inorganic anion, and m and n stand for an integer.

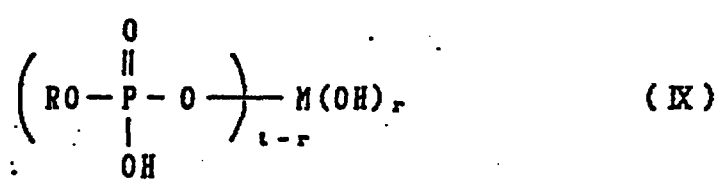
In the general formula (III), M stands for a metal other than an alkali metal, and aluminum, calcium, magnesium and zinc are preferred for the cleanser. As the inorganic anion X, there can be mentioned OH, a halogen SO₄, NO₂, CO₃ and PO₄, and as the organic anion, there can be mentioned an organic carboxylic acid. Compounds of the general formulae (I) and (II) wherein X and Y stand for arginine or morpholine may be used as the alkyl phosphateous starting materials for the preparation of the salt (B).

Various insoluble metal salts of alkyl phosphates differing in structure can be used as the component (B) in the present invention.

As the metal salt of the alkyl phosphate that can be prepared according to the above-mentioned process, there can be mentioned compounds represented by the following general formulae (IV) to (IX):



and



wherein R and R' independently stand for alkyl groups having 8 to 18 carbon atoms, M stands for a metal other than an alkali metal, l is an

integer corresponding to the valency of M, and r is an integer larger than 0 but smaller than $l - 1$.

The insoluble metal salt (B) of the surface active agent may be incorporated into the composition or may be prepared by reacting the surface active agent with a metal salt during the preparation process according to customary procedures. One insoluble salt (B) or a mixture of two or more of insoluble salts (B) may be used. When a super-fattening agent is not used, the weight ratio of the component (A) to the component (B) is in the range of from 10/0.05 to 10/10, and preferably from 10/0.2 to 10/8.

As the super-fattening agent used as the component (C) in the present invention, there can be mentioned a higher fatty acid having 8 to 24 carbon atoms, a mixture of such higher fatty acids, a higher alcohol having 8 to 24 carbon atoms, a mixture of such higher alcohols, a hydrocarbon, an ester, a glycol, lecithin, a derivative thereof, lanoline, a derivative thereof, a phosphoric acid ester of the general formula (I) or (II) where both of X and Y stand for a hydrogen atom, a derivative thereof, and other known super-fattening agents.

When the superfatting agent (C) is incorporated, the component (A)/component (B)/component (C) weight ratio is in the range of from 10/0.001/0.01 to 10/10/10, preferably from 10/0.05/0.2 to 10/8/5. When a super-fatting agent capable of forming a salt, such as a higher fatty acid, is used, the effect of the present invention is not inhibited, even if the super-fatting agent is partially converted to form a salt of a higher fatty acid by salt-exchange reaction with the phosphoric acid ester salt.

In view of the bubbling property and skin-irritating property, the pH value of the cleanser composition of the present invention (in the form of a 5% aqueous mixture) be 5.5 to 8.5.

In the present invention, if the insoluble metal salt of the surface active agent is incorporated in the phosphoric acid ester salt, the object of the present invention can be tentatively attained, but if the super-fatting agent is further incorporated in the composition, a cleanser composition having a very excellent quality can be obtained. This effect is especially high when the amount incorporated of the insoluble metal salt of the surface active agent is small.

Liquids such as water, colorants, perfumes,

fungicides, antiinflammatory agents, chelating agents, inorganic or organic salts, viscosity modifiers, bubbling agents, antiseptic agents, wetting agents and other surface active agents may be incorporated in the cleanser composition of the present invention in addition to the above-mentioned essential components according to the form and intended use of the composition, so far as attainment of the effect of the present invention is not inhibited.

The cleanser composition of the present invention may be prepared by mixing the above components according to a known method, and the shape is not particularly critical and any of solid, liquid, powdery, granular and pasty forms may be adopted.

The cleanser composition of the present invention is very mild to the skin and hairs and the composition shows a good bubbling property and gives fine bubbles.

(Examples).

The present invention will now be described in detail with reference to the following examples that by no means limit the scope of the invention.

Example 1

A phosphoric acid ester salt was mixed with

an insoluble metal salt of a surface active agent at a mixing ratio shown in Table 1. The unit of each number shown in Table 1 is "parts by weight".

The bubbling quantity of the cleanser composition was measured by the mechanical method. Furthermore, with respect to the bubbling quantity and the bubble creaminess, the hand washing test was carried out by a panel consisting of 10 experts. The obtained results are shown in Table 2.

The mechanical measurement of the bubbling quantity was carried out in the following manner. The cleanser composition was formed into an aqueous mixture having an surfactant concentration of 5% (the total concentration of sodium monolauryl phosphate and sodium monomyristyl phosphate), and 100 g of the solution was charged in a graduated cylinder. Then, a stirring vane was set in the solution, and the volume of bubbles generated when stirring was conducted for 30 seconds was measured. The rotation number of the stirring vane was 1000 rpm and the stirring direction was reversed every 5 seconds.

(Evaluation Standard at Water Washing Organoleptic Test)

5: much excellent

- 4: excellent
 - 3: common
 - 2: inferior
 - 1: much inferior
-

Table 1

	Products of Present Invention																				Comparative Products				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
sodium monolauryl phosphate	100	100	100	100	100	100	100	100	100	50	100	100	100	100	100	50					50	100	100		
sodium monomyristyl phosphate										50						50					50				
sodium oxyethylene (3) monomyristyl phosphate*																	100	100	100	100				100	
calcium monolauryl phosphate	40															40	1	20	90						
magnesium monolauryl phosphate		40									1	5	20	60	90								110		
zinc monolauryl phosphate			40																						
calcium laurate				40						40										10					
magnesium laurate					40																				
zinc laurate						40																			
calcium stearate							40																		
magnesium stearate								40																	
zin stearate									40																
water	20	20	20	20	20	20	20	20	20	20	20	20	20	20	25	20	20	20	20	20	15	15	30	15	

Note *: parenthesized value indicates the number of moles of added oxyethylene units

Table 2

		Bubbling Quantity (ml) at 40°C	Hand Washing Organoleptic Test	
			Bubbling Quantity	Bubble Creaminess
Products of Present Invention	1	298	3.7	4.2
	2	332	4.5	4.2
	3	280	3.5	3.7
	4	320	4.3	4.4
	5	335	4.6	4.5
	6	328	4.5	4.2
	7	283	3.6	3.8
	8	299	3.9	4.0
	9	285	3.6	3.7
	10	293	3.7	3.9
	11	292	3.7	3.9
	12	320	4.4	4.3
	13	325	4.6	4.5
	14	336	4.6	4.5
	15	287	3.6	4.6
	16	295	3.8	4.5
	17	280	3.5	3.5
	18	300	3.8	3.7
	19	285	3.6	3.5
	20	290	3.7	3.6
Comparative Products	21	236	2.6	2.8
	22	251	2.8	2.7
	23	210	1.9	3.8
	24	207	2.6	2.4

As is apparent from the results shown in Table 2, the product of the present invention formed by incorporating a higher fatty acid metal salt or phosphoric acid ester metal salt into a phosphoric acid ester salt is excellent over a comparative product comprising a phosphoric acid ester salt alone because the mechanical bubbling quantity is significantly larger and the bubbling quantity and bubble creaminess at the organoleptic test are better.

Example 2 (Solid Cleanser)

A cleanser composition shown in Table 3 was prepared to check the bubbling property in the same manner as described in Example 1 and examine the effect attained by addition of a super-fatting agent. The obtained results are shown in Table 4. Incidentally, in Table 3, the unit of each numerical value is "% by weight".

Table 3

	Products of Present Invention																				Comparative Products				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
sodium monolauryl phosphate	100	100	100	100	100	100	100	100	100	50	100	100	50							100	100	50	100		
sodium monomyristyl phosphate	-								50				50									50			
sodium oxyethylene (3) monomyristyl phosphate	-													100	100	100	100	100	100						
magnesium monolauryl phosphate	0.3		0.3	0.3	0.3	0.3	-		0.3	40			40	0.3	0.3			0.3		0.3		0.3	110		
magnesium laurate		0.3					1.0	1.0	1.0			40				0.3	0.3		0.3		0.3				
lauric acid	5	5				50	15	50	100	5	5	5	5	5	5	5							110		
stearic acid			5												5		5								
coconut oil fatty acid				5																					
lauryl alcohol					5																				
water	15	15	15	15	15	15	15	15	15	15	20	20	20	15	15	15	15	20	20	15	15	15	45		

Note *: parenthesized value indicates the number of added oxyethylene units

Table 4

		Bubbling Quantity (ml) at 40°C	Hand Washing Organoleptic Test	
			Bubbling Quantity	Bubble Creaminess
Products of Present Invention	1	298	3.9	3.8
	2	300	4.0	4.0
	3	276	3.4	3.7
	4	285	3.6	3.9
	5	272	3.3	4.0
	6	310	4.0	4.4
	7	305	4.0	4.3
	8	318	4.2	4.5
	9	330	4.5	4.7
	10	282	3.5	4.0
	11	351	4.8	4.9
	12	350	4.8	4.7
	13	336	4.5	4.3
	14	288	3.7	3.7
	15	280	3.6	3.6
	16	291	3.7	3.7
	17	282	3.5	3.5
Comparative Products	18	253	2.8	3.2
	19	257	2.9	3.4
	20	247	2.7	3.7
	21	213	2.0	4.0

From the results shown in Table 4, it is seen that the product of the present invention formed by incorporating an insoluble metal salt and a super-fattening agent into a phosphoric acid ester salt is excellent over the comparative product composed solely of a phosphoric acid ester salt alone in the bubbling property and the state of bubbles and is better than the product of Example 1 formed by incorporating only an insoluble metal salt in a phosphoric acid ester salt in the bubbling quantity and the bubble creaminess. The effect is especially high in the composition in which the amount incorporated of the insoluble metal salt is small.

Example 3 (Solid Cleanser)

Sodium monolauryl phosphate	45%
Sodium monomyristyl phosphate	15%
Lauric acid	8%
Stearic acid	7%
Calcium laurate	7%
Magnesium monolauryl phosphate	6%
Water	12%

A solid cleanser having the above composition was prepared and subjected to the hand washing organoleptic test in the same manner as described

in Example 1. The bubbling property was good and the bubbles were fine and had an agreeable touch.

Example 4 (Solid Cleanser)

Sodium monomyristyl phosphate	55%
Sodium monolauryl phosphate	15%
Sodium polyoxyethylene (10) monomyristyl phosphate	5%
Zinc stearate	4%
Calcium laurate	4%
Zinc monolauryl phosphate	5%
Water	12%

A solid cleanser having the above composition was prepared and subjected to the hand washing organoleptic test in the same manner as described in Example 1. The bubbling property was good and the bubbles were fine and had an agreeable touch.

Example 5 (Body Shampoo)

Potassium monomyristyl phosphate	5%
Triethanolamine monomyristyl phosphate	10%
Potassium monolauryl phosphate	5%
Triethanolamine monolauryl phosphate	10%
Calcium myristate	2%
Lauric acid	5%
Glycerol	10%
Ethanol	5%

Propylene glycol	5%
Perfume, antiseptic and colorant	appropriate amounts
Water	balance

From the above components was prepared a creamy body shampoo having a good bubbling property.

Example 6 (Cleansing Cream)

Potassium monomyristyl phosphate	25%
Potassium monolauryl phosphate	15%
Zinc stearate	1%
Propylene glycol	10%
Sodium chloride	8%
Sorbitol	2%
Glycerol	10%
Perfume, colorant and antiseptic	appropriate amounts
Water (pH value = 7.3)	balance

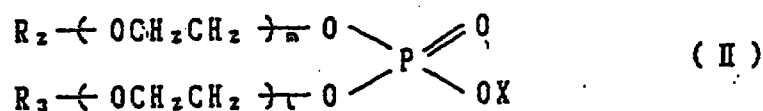
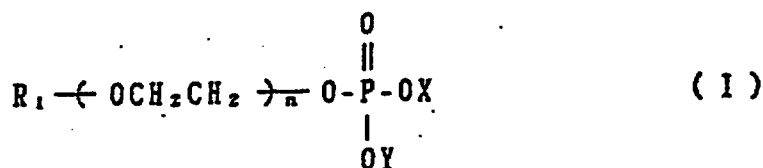
From the above components was prepared a cleansing cream having a good bubbling property and creamy bubbles.

CLAIMS:

-1-

A detergent composition which comprises:

- (A) 10 parts by weight of a phosphoric acid ester of the formula (I) or (II):



in which R₁, R₂ and R₃ are each independently a saturated or unsaturated hydrocarbon group having 8 to 18 carbon atoms, X and Y each independently hydrogen, an alkali metal, ammonium or an alkanolamine having 2 to 3 carbon atoms and n, m and l are each independently zero or an integer from 1 to 10, and

- (B) 0.05 to 10 parts by weight of an insoluble metal salt of a surface active agent.



* C L M S *