Patent Literature 18: JP 2014-9189 A

Summary

[0017a]

In one aspect of the present disclosure, there is provided an external preparation for skin comprising:

a copolymer comprising:

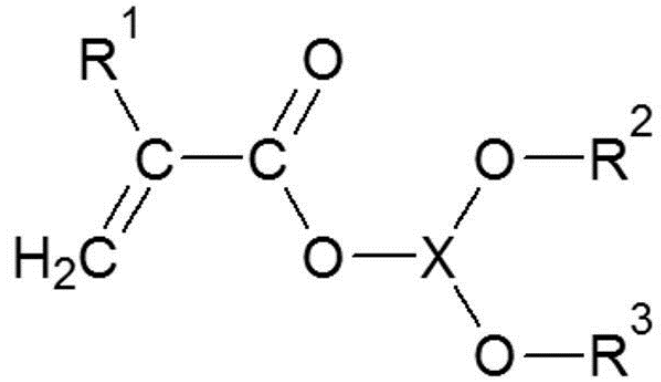
one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the copolymer is from 27,600 to 66,000,

wherein the content of the copolymer is from 0.5% to 30% by mass:

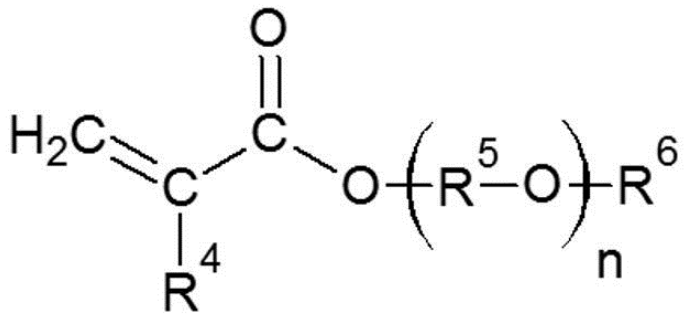
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents

an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

[0017b]

In another aspect of the present disclosure, there is provided an emulsified composition comprising;

a water-soluble copolymer

wherein the emulsified composition does not substantially contain an emulsifying agent other than the water-soluble copolymer;

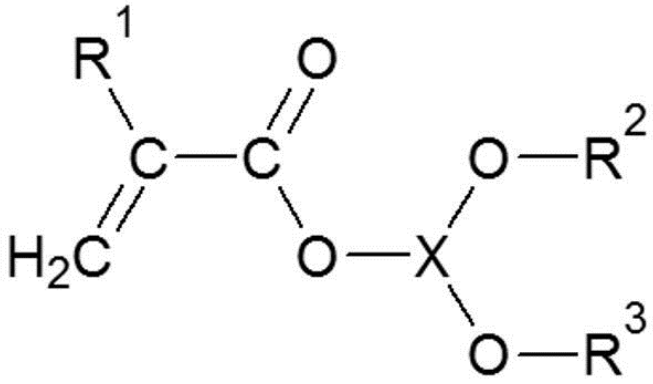
the water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

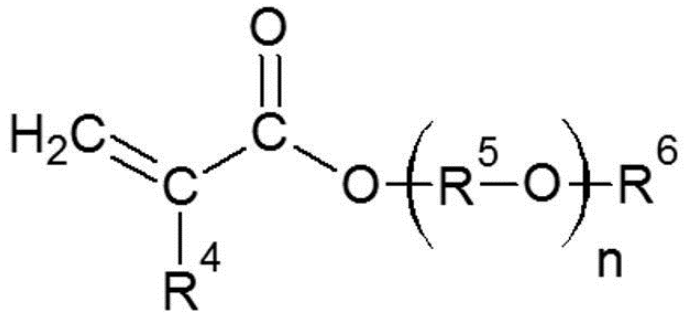
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

[0017c]

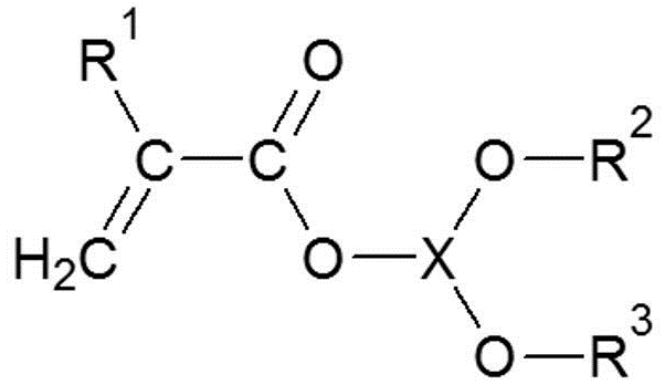
In yet another aspect of the present disclosure, there is provided an emulsifying agent containing a water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

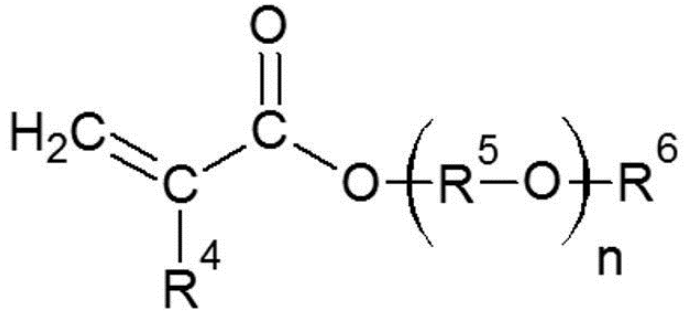
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

[0017d]

In a further aspect of the present disclosure, there is provided a method of producing an emulsified composition, comprising;

a step of conducting emulsification by using the emulsifying agent as described herein;

wherein an emulsifying agent other than the emulsifying agent is substantially not used.

[0017e]

In another aspect of the present disclosure, there is provided a skin cleanser comprising;

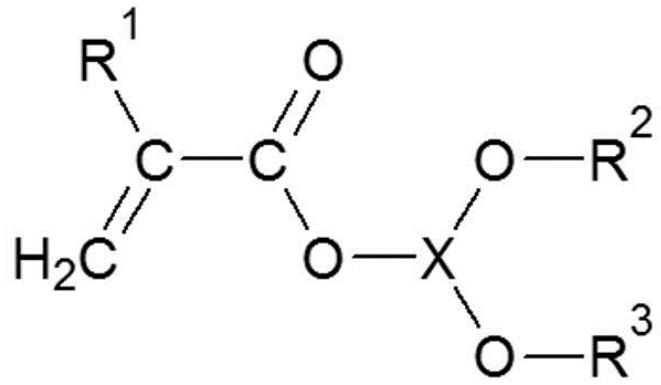
a water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

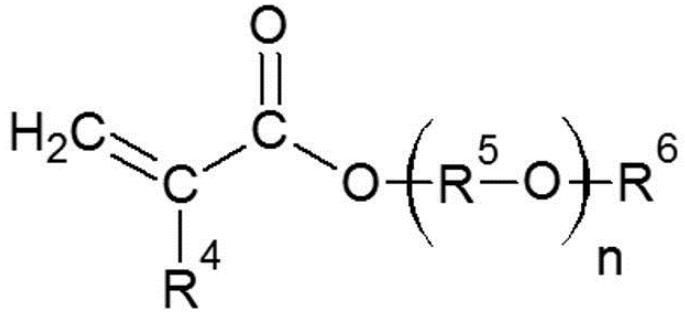
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

[0017f]

In yet another aspect of the present disclosure, there is provided an oil-in-water type sunscreen cosmetic comprising components (A) to (D);

(A) A water-soluble copolymer

(B) A polyglycerin fatty acid ester obtained by ester condensation of one molecule of polyglycerin having a polymerization degree of 10 with from two to five molecules of a fatty acid having 16 or more carbon atoms

(C) An ionic surfactant

(D) An ultraviolet scattering agent and/or an ultraviolet absorber

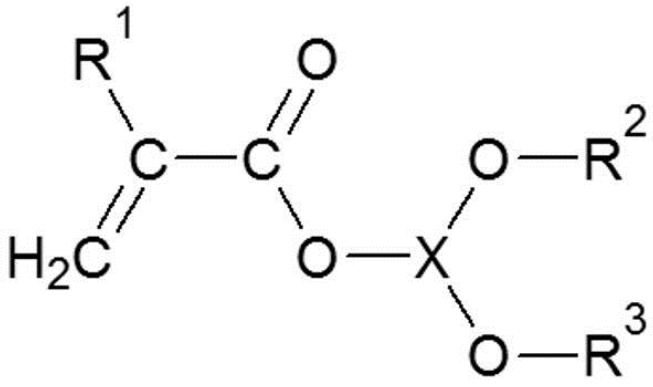
wherein the water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

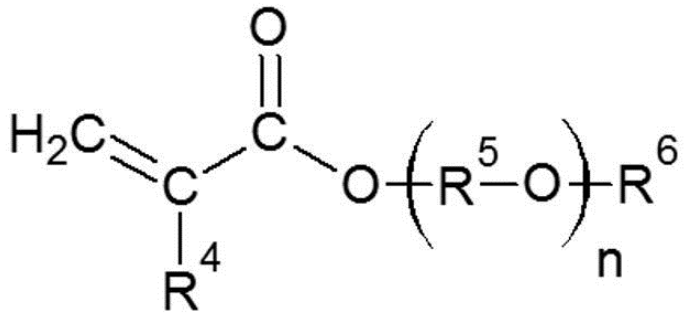
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms, and n represents an integer from 6 to 40.

[0017g]

In a further aspect of the present disclosure, there is provided the external preparation for skin as described herein, further comprising;

a water-soluble polymer and/or any salt thereof, and water,

wherein the copolymer is an amphipathic copolymer;

the external preparation for skin forms a coating film having a sea-island structure in which island particles containing the amphipathic copolymer are dispersed in an aqueous gel formed by the water-soluble polymer and/or any salt thereof by evaporation of the water.

Technical Problem

[0018]

As described above, an oil agent exhibits a favorable feel of use such as elastic feel, but it also has a problem such as stickiness. Under such circumstances, a novel material exhibiting elastic feel like an oil agent has been demanded.

An object of the present invention is to provide a novel copolymer exhibiting elastic feel. In addition, in a preferred aspect of the present invention, it is a first object to provide a copolymer which hardly causes stickiness but exhibits moist feel.

[0019]

In addition, a polymer emulsifying agent as described above has advantages that the polymer emulsifying agent causes less irritation to the skin and is less sticky when being contained at a low concentration, but it is inferior in the emulsifying power to a conventional low-molecular emulsifying agent. Hence, in order to secure the stability of an emulsified state, it is required to blend a high-molecular emulsifying agent in the emulsified composition at a high proportion and thus to increase the viscosity, but there is a problem of stickiness as a result.

[0020]

In view of such circumstances, it is a second object of the present invention to provide an emulsified composition which exhibits excellent emulsion stability while causing less irritation to the skin and being less sticky.

[0021]

With a recent increase in consumer needs, particularly foam quality and feel after washing are not

CLAIMS

1. An external preparation for skin comprising:

a copolymer comprising:

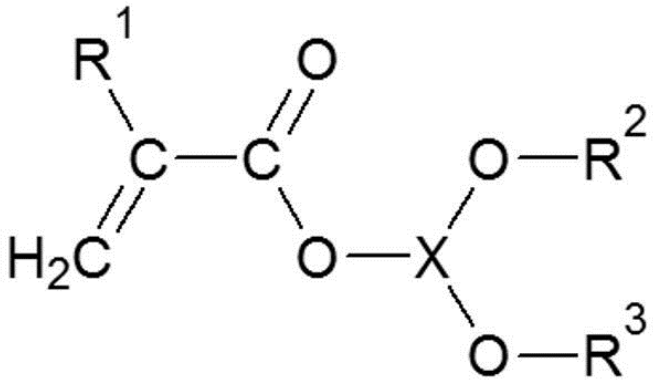
one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the copolymer is from 27,600 to 66,000,

wherein the content of the copolymer is from 0.5% to 30% by mass:

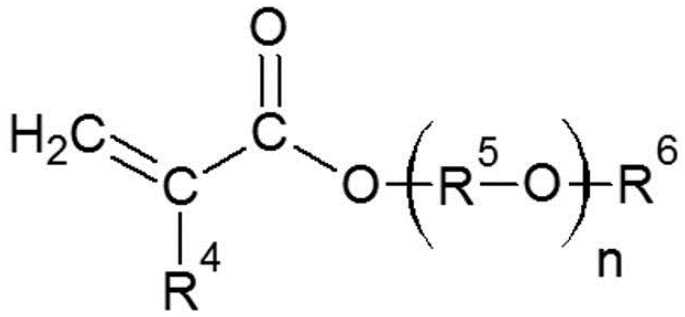
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

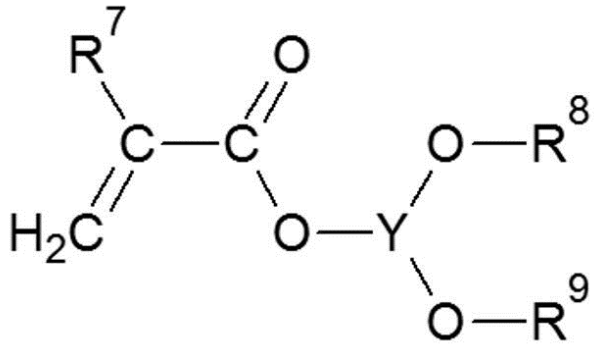
in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

2. The external preparation for skin according to claim 1, wherein a mass ratio of the constitutional unit (a) to the constitutional unit (b) is from 25 : 75 to 35 : 65.

3. The external preparation for skin according to claim 1 or 2, wherein a molar ratio of the constitutional unit (a) to the constitutional unit (b) is from 35 : 65 to 46 : 54.

4. The external preparation for skin according to any one of claims 1 to 3, wherein the hydrophobic monomer is a hydrophobic monomer represented by the following general formula (3):

General Formula (3)

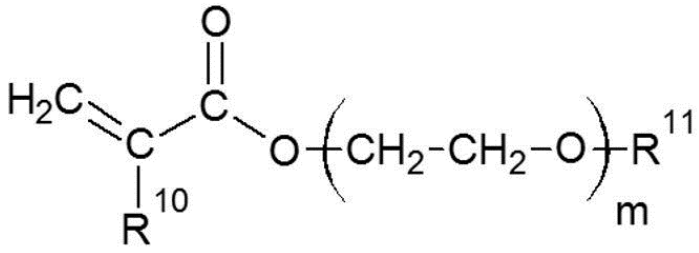


(3)

in the general formula (3), R7 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R8 and R9 may be the same as or different from each other and represent an acyl group which has from 10 to 22 carbon atoms and a branch but does not contain a ring structure or an acyl group which has from 6 to 9 carbon atoms and two or more branches but does not contain a ring structure; and Y represents a group obtained by eliminating an OH group from a trihydric alcohol.

5. The external preparation for skin according to any one of claims 1 to 4, wherein the hydrophilic monomer is a hydrophilic monomer represented by the following general formula (4):

General Formula (4)



(4)

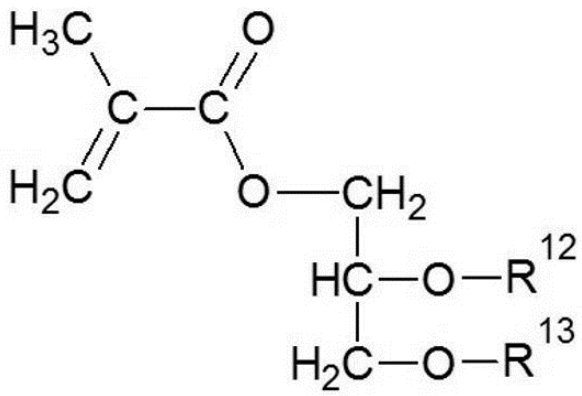
in the general formula (4), R10 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R11 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon

group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and m represents an integer from 6 to 40.

6. The external preparation for skin according to any one of claims 1 to 5, wherein the trihydric alcohol is selected from the group consisting of glycerin, trimethylolpropane, and trimethylolethane.

7. The external preparation for skin according to any one of claims 1 to 6, wherein the hydrophobic monomer is a compound represented by the following general formula (5):

General Formula (5)

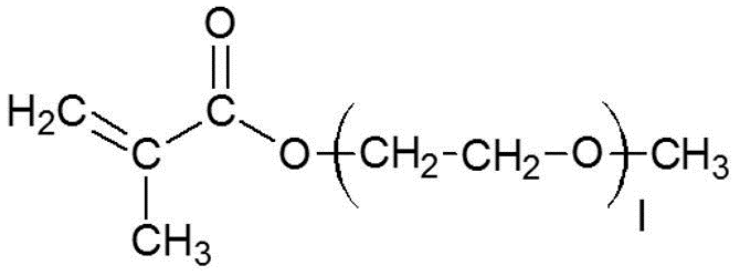


(5)

R12 and R13 in the general formula (5) may be the same as or different from each other and represent an acyl group which has 18 carbon atoms and a branch but does not contain a ring structure.

8. The external preparation for skin according to any one of claims 1 to 7, wherein the hydrophilic monomer is a hydrophilic monomer represented by the following general formula (6):

General Formula (6)



(6)

l in the general formula (6) represents an integer from 6 to 40.

9. An emulsified composition comprising;

a water-soluble copolymer

wherein the emulsified composition does not substantially contain an emulsifying agent other than the water-soluble copolymer;

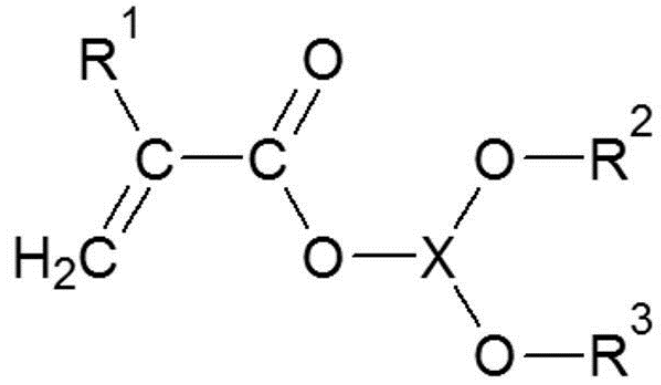
the water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

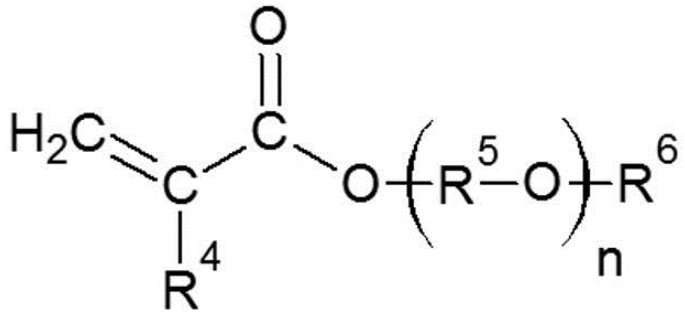
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

10. The emulsified composition according to claim 9, wherein the content of the water-soluble copolymer is from 0.5% to 30% by mass.

11. The emulsified composition according to claim 9 or 10, wherein the content of an oil phase component is from 0.1% to 70% by mass.

12. The emulsified composition according to any one of claims 9 to 11, wherein the emulsified composition is a cosmetic.

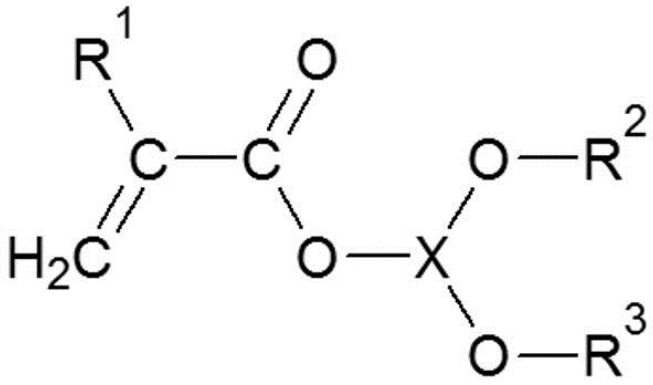
13. An emulsifying agent containing a water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

General Formula (1)

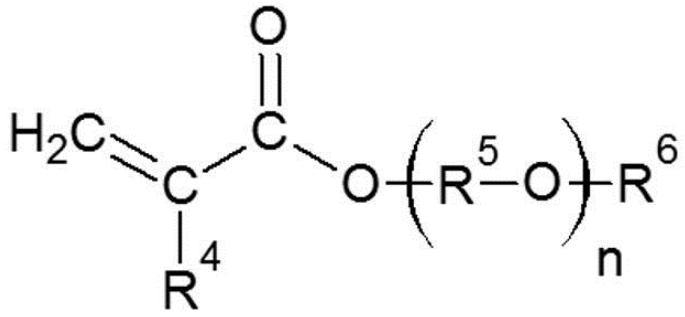


(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch

but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and n represents an integer from 6 to 40.

14. A method of producing an emulsified composition, comprising;

a step of conducting emulsification by using the emulsifying agent according to claim 13;

wherein an emulsifying agent other than the emulsifying agent is substantially not used.

15. A skin cleanser comprising;

a water-soluble copolymer comprising:

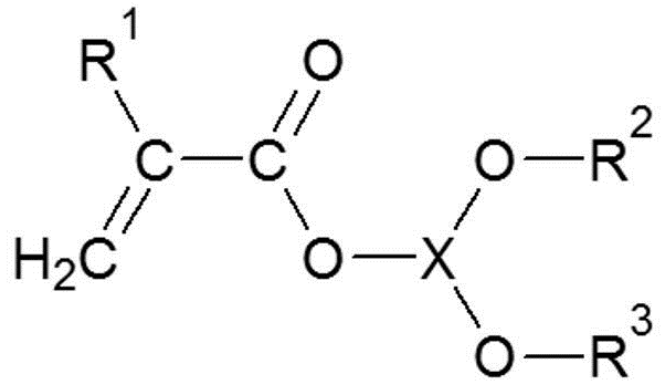
one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional

units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

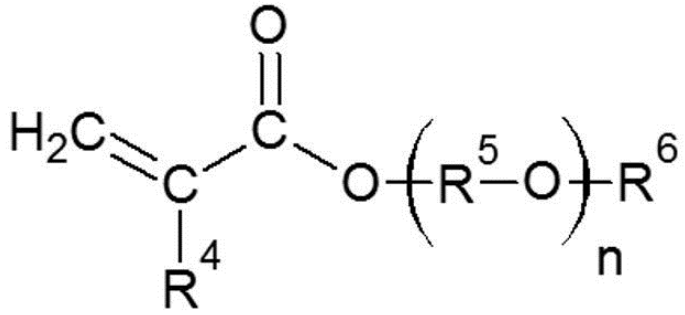
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms; and

n represents an integer from 6 to 40.

16. The skin cleanser according to claim 15, wherein the content of the water-soluble copolymer is from 0.1% to 20% by mass.

17. The skin cleanser according to claim 15 or 16, wherein the skin cleanser is a foaming cleanser.

18. The skin cleanser according to claim 15 or 16, wherein the skin cleanser is a gel skin cleanser.

19. The skin cleanser according to any one of claims 15 to 18, further comprising a surfactant.

20. The skin cleanser according to 19, comprising fatty acid soap as the surfactant.

21. The skin cleanser according to 20, wherein the ratio of the mass of the water-soluble copolymer contained to the mass of the fatty acid soap contained is from 1 : 500 to 1 : 2.

22. The skin cleanser according to 19, comprising a nonionic surfactant as the surfactant.

23. The skin cleanser according to 22, wherein the ratio of the mass of the water-soluble copolymer contained to the mass of the nonionic surfactant contained is from 1 : 20 to 1 : 0.5.

24. An oil-in-water type sunscreen cosmetic comprising components (A) to (D);

(A) A water-soluble copolymer

(B) A polyglycerin fatty acid ester obtained by ester condensation of one molecule of polyglycerin having a polymerization degree of 10 with from two to five molecules of a fatty acid having 16 or more carbon atoms

(C) An ionic surfactant

(D) An ultraviolet scattering agent and/or an

ultraviolet absorber

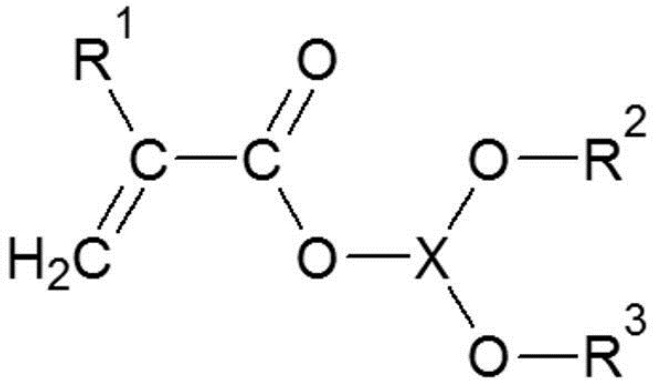
wherein the water-soluble copolymer comprising:

one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer represented by the following general formula (1); and

one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units,

wherein a weight average molecular weight of the water-soluble copolymer is from 20,000 to 110,000:

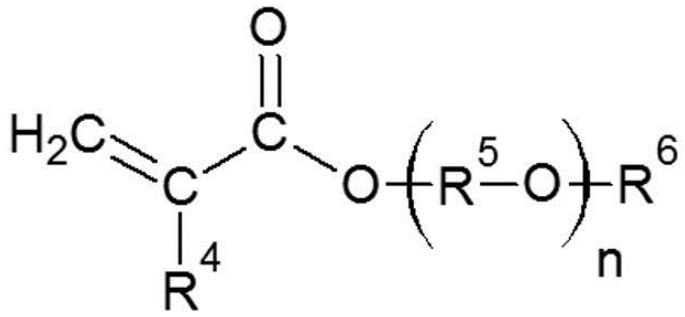
General Formula (1)



(1)

in the general formula (1), R1 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms and R2 and R3 may be the same as or different from each other and represent an acyl group which has from 6 to 22 carbon atoms and a branch but does not contain a ring structure; and X represents a group obtained by eliminating an OH group from a trihydric alcohol, and

General Formula (2)



(2)

in the general formula (2), R4 represents a hydrogen atom or an alkyl group having from 1 to 3 carbon atoms, R5 represents an alkylene group which has from 2 to 4 carbon atoms and may have a hydroxyl group, and R6 represents a hydrogen atom, an aromatic hydrocarbon group having from 6 to 10 carbon atoms, an aliphatic hydrocarbon group having from 1 to 14 carbon atoms, or an acyl group having from 1 to 12 carbon atoms, and n represents an integer from 6 to 40.

25. The sunscreen cosmetic according to 24, wherein the component (C) is an anionic surfactant.

26. The sunscreen cosmetic according to 25, wherein the anionic surfactant is sodium acyl lactate.

27. The sunscreen cosmetic according to any one of 24 to 26, wherein the component (B) is polyglyceryl-10 pentastearate.

28. The sunscreen cosmetic according to any one of 24 to 27, wherein the component (D) is a water dispersible ultraviolet scattering agent.

29. The sunscreen cosmetic according to 28, wherein the water dispersible ultraviolet scattering agent is an ultraviolet scattering agent of which the surface is treated with sodium polyacrylate.

30. The external preparation for skin according to any one of claims 1 to 8, further comprising;

a water-soluble polymer and/or any salt thereof, and water,

wherein the copolymer is an amphipathic copolymer;

the external preparation for skin forms a coating film having a sea-island structure in which island particles containing the amphipathic copolymer are dispersed in an aqueous gel formed by the water-soluble polymer and/or any salt thereof by evaporation of the water.

31. The external preparation for skin according to claim 30, wherein the average ratio of major axis to minor axis of the island particles is 0.8 or more and the number particle size distribution of the island particles having an average particle diameter of from 1 to 5 μm is 80% or more.

32. The external preparation for skin according to claim 30 or 31, wherein the water-soluble polymer is one kind or two or more kinds of water-soluble polymers selected from the group consisting of an acrylic acid-based water-soluble polymer, a water-soluble polypeptide, and a water-soluble polysaccharide and/or salts thereof.

33. The external preparation for skin according to claim 32, wherein the water-soluble polymer is one kind or two or more kinds of water-soluble polymers selected from the group consisting of sodium polyacrylate, a (acrylates/(C10-30) alkyl acrylate) crosspolymer, sodium polyglutamate, xanthan gum, and Tremella fuciformis polysaccharide.

34. The external preparation for skin according to claim 32, further comprising;

a polyol which promotes phase separation between the aqueous gel and the amphipathic copolymer and/or

a polyol which suppresses the phase separation between the aqueous gel and the amphipathic copolymer.

35. The external preparation for skin according to claim 34, wherein

the polyol which promotes the phase separation is a polyol which increases the cloud point of the aqueous solution by being mixed with an aqueous solution of a nonionic surfactant having a polyether chain at the hydrophilic moiety, and

the polyol which suppresses the phase separation is a polyol which lowers the cloud point of the aqueous solution by being mixed with an aqueous solution of a nonionic surfactant having a polyether chain at the hydrophilic moiety.

36. The external preparation for skin according to claim 35, wherein the polyol which promotes the phase separation is one kind or two or more kinds of polyols selected from the group consisting of 1,3-butylene glycol and polyethylene glycol.

37. The external preparation for skin according to claim 35 or 36, wherein the polyol which suppresses the phase separation is one kind or two or more kinds of polyols selected from the group consisting of glycerin, diglycerin, sorbitol, and maltitol.

38. The external preparation for skin according to any one of claims 35 to 37, wherein the mass ratio of the total amount of the polyol which promotes the phase separation and the polyol which suppresses the phase separation to the total amount of the amphipathic copolymer and the water-soluble polymer is from 5 : 1 to 20 : 1.

39. The external preparation for skin according to any one of claims 35 to 38, the mass ratio of the polyol which promotes the phase separation to the polyol which suppresses the phase separation is from 3.5 : 1 to 1 : 2.5.

40. The external preparation for skin according to any one of claims 30 to 39, the content of the amphipathic copolymer is from 0.1% to 5% by mass.

41. The external preparation for skin according to any one of claims 30 to 40, wherein the content of the oil agent is 1% by mass or less.

ABSTRACT

COPOLYMER

It is an object to provide a novel copolymer exhibiting elastic feel. It is an object to provide a novel copolymer exhibiting elastic feel.

Provided is a copolymer having one kind or two or more kinds of constitutional units (a) derived from a hydrophobic monomer having a specific structure and one kind or two or more kinds of constitutional units (b) derived from a hydrophilic monomer represented by the following general formula (2) as essential constitutional units and has a weight average molecular weight of from 20,000 to 110,000.

[Fig. 1]