Non-Patent Document 2: Mukul M, Sharma et. al, Journal of Colloid and Interface Science, 157, 244-253 (1993).

Non-Patent Document 3: J. Agric. Food Chem., 59, 263-2645 (2011).

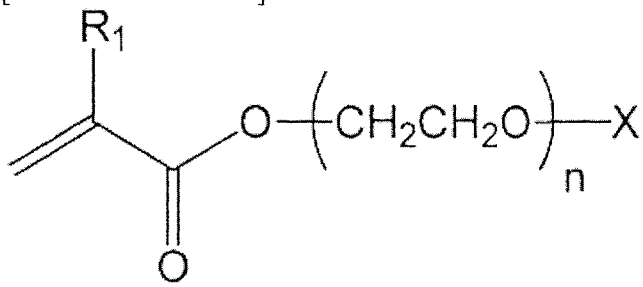
Non-Patent Document 4: J. Colloid Interface Sci., 274, 49 (2004).

SUMMARY

[0022a] In one aspect, there is provided a raw material for cosmetics comprising: a core-corona type microgel dispersion that is obtained by the radical polymerization of: a polyethylene oxide macromonomer having chemical formula (1), a hydrophobic monomer having chemical formula (2), and a cross-linking monomer having chemical formula (3), wherein (A) the mole ratio of said polyethylene oxide macromonomer versus said hydrophobic monomers is in the range of 1/1 to 10:/ 250 (mole/mole), (B) said cross-linking monomers is in the range of 0.1 to 1.5 % by weight relative to said hydrophobic monomers, (C) said hydrophobic monomer is a monomer composition comprising at least one methacrylic acid selected from the group consisting of methacrylic acid derivatives that have alkyl groups having 1 to 8 carbon atoms,

(D) solvent used for polymerization is a mixed solvent of water and polyol that is at least one polyol selected from the group consisting of dipropylene glycol, 1,3-butylene glycol, and isoprene glycol, and (E) said mixed solvent of water and polyol has water versus said polyol ratio that is in the range of 90/10 to 10/90 % by mass at 20 °C; and further wherein

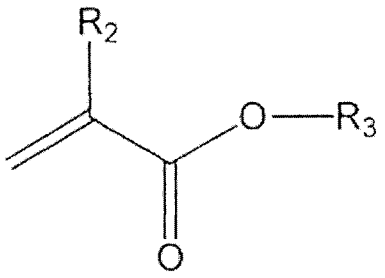
[Chemical Formula 1]



(1)

wherein R_1 is an alkyl group having 1 to 3 carbon atoms, and n is a number of 8 to 200 and X is H or CH_3.

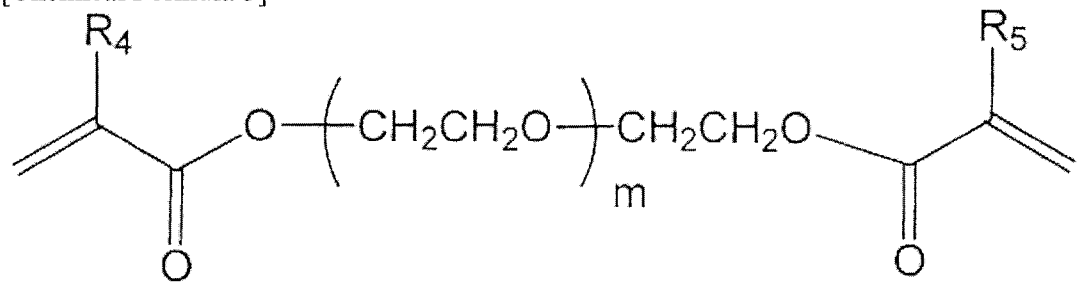
[Chemical Formula 2]



(2)

wherein R_2 is an alkyl group having 1 to 3 carbon atoms, and R_3 is an alkyl group having 1 to 12 carbon atoms.

[Chemical Formula 3]



(3)

wherein R_4 and R_5 are respectively independent alkyl groups having 1 to 3 carbon atoms, and m is a number of 0 to 2.

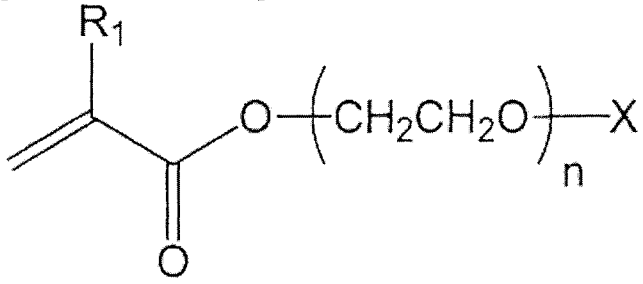
[0022b]In another aspect, there is provided an emulsifier comprising said raw material for cosmetics according to the present invention.

[0022c] In another aspect, there is provided a clouding agent comprising said raw material for cosmetics according to the present invention.

[0022d]In a further aspect, there is provided a production method of raw material for cosmetics consisting of a core-corona type microgel dispersion comprising: the step of the radical polymerization of: a polyethylene oxide macromonomer having chemical formula (1), a hydrophobic monomer having chemical formula (2), and a cross-linking monomer having chemical formula (3), wherein (A) the mole ratio of said polyethylene oxide macromonomer versus said hydrophobic monomers is in the range of 1/1 to 10/ 250 (mole/mole), (B) said cross-linking monomers is in the range of 0.1 to 1.5 % by weight relative to said hydrophobic monomers, (C) said hydrophobic monomer is a monomer composition comprising at least one methacrylic acid selected from the group consisting of methacrylic acid derivatives that

have alkyl groups having 1 to 8 carbon atoms, (D) solvent used for polymerization is a mixed solvent of water and polyol that is at least one polyol selected from the group consisting of dipropylene glycol, 1,3-butylene glycol, and isoprene glycol, and (E) said mixed solvent of water and polyol has water versus said polyol ratio that is in the range of 90/10 to 10/90 % by mass at 20 °C; and further wherein

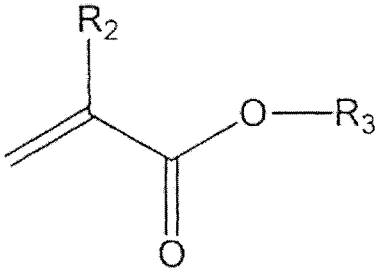
[Chemical Formula 1]



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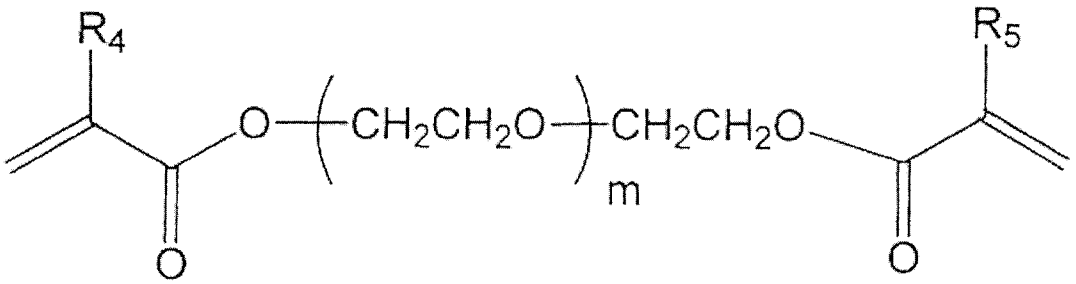
[Chemical Formula 2]



(2)

wherein R_2 is an alkyl group having 1 to 3 carbon atoms, and R_3 is an alkyl group having 1 to 12 carbon atoms.

[Chemical Formula 3]



(3)

wherein R_4 and R_5 are respectively independent alkyl groups having 1 to 3 carbon atoms, and m is a number of 0 to 2.

[0022e] In yet a further aspect, there is provided a production method of emulsifier comprising said production method of raw material for cosmetics according to the present invention.

[0022f] In yet a further aspect, there is provided a production method of white cloudy agent comprising said production method of raw material for cosmetics according to the present invention.

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0023] The present invention was made in view of the above-described conventional art. An object of the invention is to develop a production method of raw material for cosmetics and to provide an oil-in-water emulsion cosmetic and a white cloudy cosmetic that is without skin irritation, excellent in stability, and low in thickening feeling and powdery sensation.

MEANS TO SOLVE THE PROBLEM

[0024] That is, the raw material for cosmetics of the present invention is characterized by comprising a core-corona type microgel dispersion liquid characteristically obtained by polymerizing polyethylene oxide macromonomers of the following chemical formula (1), hydrophobic monomers of the following chemical formula (2), and cross-linking monomers of the following chemical formula (3) under the following conditions (A) to (E).

(A) the mole ratio of the feed mole amount of said polyethylene oxide versus the feed mole amount of the hydrophobic monomers is 1 to 1:10 to 250,

(B) the feed amount of the cross-linking monomers is 0.1 to 1.5% by weight relative to the feed amount of the hydrophobic monomers,

(C) the hydrophobic monomer represented by the following chemical formula (2) is a monomer composition, wherein one or more selected from methacrylic acid derivatives

having alkyl groups of 1 to 8 carbon atoms are mixed,

(D) the polymerization solvent is a water-polyol mixed solvent, and the polyol is one or more selected from the group consisting of dipropylene glycol, 1,3-butylene glycol, and isoprene glycol, and

(E) the solvent composition of the water-polyol mixed solvent is water : polyol = 90/10 :

is necessary that dipropylene glycol, 1,3-buthylene glycol, and isoprene glycol are used in the present invention.

Under consideration of that when the polymer solution as-is is used for is the raw material applicable to an industrial production without further purification process such as dialysis, the solvent to be mixed with water should not be an organic solvent such as ethanol, propanol, or butanol, because such solvents may cause irritation when applied on the skin; so that polyol that is generally blendable into cosmetics is inevitable.

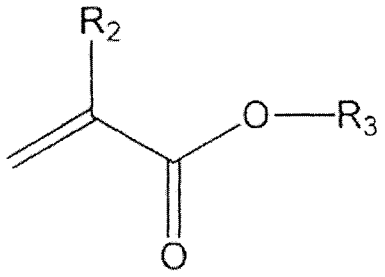
[0043] (Condition (E))

It is necessary that the solvent composition of the water-polyol mixed solvent, used as the polymerization solvent, is water : polyol = 90/10 : 10/0 in the mass ratio at 20 °C. The solvent composition of the water-polyol mixed solvent, used as the polymerization solvent, is preferably water : polyol = 90/10 : 10/ 90 (mass/mass : mass/mass at 20 °C) and more preferably water : polyol = 80/ 20 : 20/ 80 (mass/mass : mass/mass at 20 °C).

For the polymerization solvent, it is necessary to add polyol for homogeneous dissolution of the hydrophobic monomer. The mix ratio of polyol is 10 to 90 (v/v). When the mix volume of polyol is lower than 10 % by volume , the dissolution of the hydrophobic monomer becomes extremely poor, and polymerization proceeds in the state in which the monomer is as droplets, so that gigantic masses can be formed but no microgel can be formed. When the mix volume of polyol exceeds 90 % by volume, an emulsion of the hydrophobic monomer cannot be formed by hydrophobic interaction, so that no emulsion polymerization can proceed and no microgel can be obtained.

[0044] The thus obtained raw material for cosmetics of the present invention does not contain ethanol because the polymerization solvent is water-polyol mixed solvent. By using the raw material which does not contain ethanol according to the present invention, cosmetics without skin irritation to the users with sensitive skin can be easily obtained.

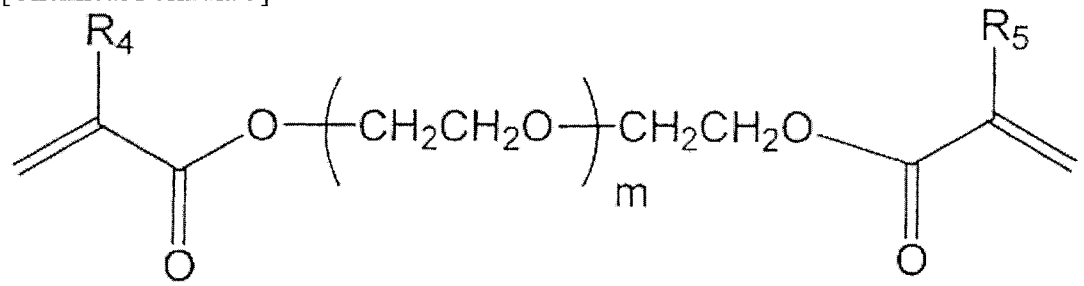
[0045] The use of polyols, which are widely-used cosmetic raw material, as the polymerization solvent is not common, and it is limited to very a special application such as “to allow the polymerization solvent to remain as it is as a raw material body” of the present invention. As the polymerization solvent, those with a high solubility of monomers are often



(2)

wherein R_2 is an alkyl group having 1 to 3 carbon atoms, and R_3 is an alkyl group having 1 to 12 carbon atoms.

[Chemical Formula 3]



(3)

wherein R_4 and R_5 are respectively independent alkyl groups having 1 to 3 carbon atoms, and m is a number of 0 to 2.

2. The raw material for cosmetics according to claim 1, wherein said raw material for cosmetics does not contain ethanol.

3. An emulsifier comprising:

said raw material for cosmetics according to claim 1 or 2.

4. A clouding agent comprising

said raw material for cosmetics according to claim 1 or 2.

5. A production method of raw material for cosmetics consisting of a core-corona type microgel dispersion comprising:

the step of the radical polymerization of:

a polyethylene oxide macromonomer having chemical formula (1),

a hydrophobic monomer having chemical formula (2), and

a cross-linking monomer having chemical formula (3),

wherein

(A) the mole ratio of said polyethylene oxide macromonomer versus said hydrophobic monomers is in the range of 1/1 to 10/ 250 (mole/mole),

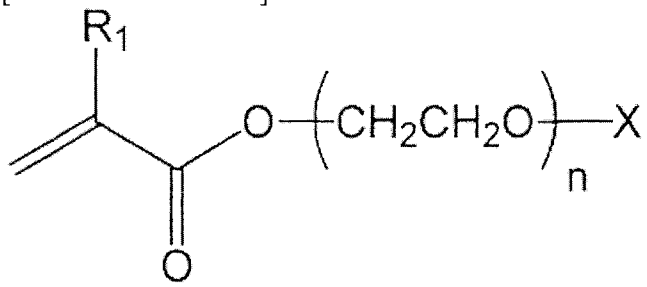
(B) said cross-linking monomers is in the range of 0.1 to 1.5 % by weight relative to said hydrophobic monomers,

(C) said hydrophobic monomer is a monomer composition comprising at least one methacrylic acid selected from the group consisting of methacrylic acid derivatives that have alkyl groups having 1 to 8 carbon atoms,

(D) solvent used for polymerization is a mixed solvent of water and polyol that is at least one polyol selected from the group consisting of dipropylene glycol, 1,3-butylene glycol, and isoprene glycol, and

(E) said mixed solvent of water and polyol has water versus said polyol ratio that is in the range of 90/10 to 10/90 % by mass at 20 °C; and further wherein

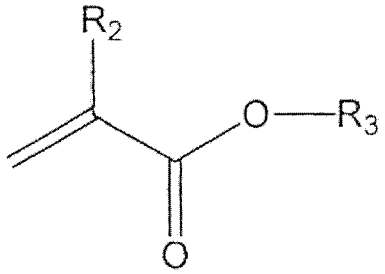
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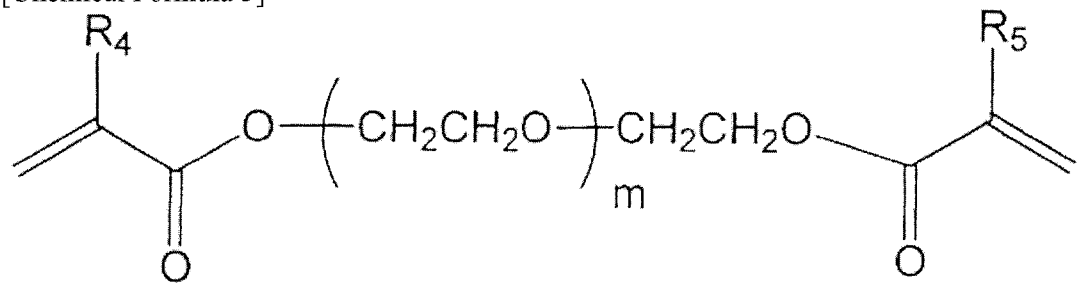
[Chemical Formula 2]



(2)

wherein R_2 is an alkyl group having 1 to 3 carbon atoms, and R_3 is an alkyl group having 1 to 12 carbon atoms.

[Chemical Formula 3]



(3)

wherein R_4 and R_5 are respectively independent alkyl groups having 1 to 3 carbon atoms, and m is a number of 0 to 2.

6. The production method of raw material for cosmetics according to claim 5, wherein said production method of raw material for cosmetics does not contain ethanol.

7. A production method of emulsifier comprising

said production method of raw material for cosmetics according to claim 5 or 6.

8. A production method of white cloudy agent comprising

said production method of raw material for cosmetics according to claim 5 or 6.