the phosphorylcholine group, the silicone cannot necessarily be said to be safe owing to the presence of the amino group.

[0009] In Patent Literature 8, there is a proposal of a polysiloxane monomer having a phosphorylcholine group introduced via an ester group. Owing to having the ester group, the monomer cannot be said to have high compatibility with a hydrophilic monomer, such as 2-hydroxyethyl (meth)acrylate, which has a hydroxy group.

Citation List

Patent Literature

[0010] [PTL 1] WO 92/07885 A1

[PTL 2] JP 2007-197513 A

[PTL 3] WO 2010/147779 A2

[PTL 4] WO 2001/057047 A1

[PTL 5] WO 2012/1043349 A1

[PTL 6] WO 2008/023604 A1

[PTL 7] JP 2004-175830 A

[PTL 8] JP 2013-139567 A

Non Patent Literature

[0011] [NPL 1] "Six month clinical evaluation of a biomimetic hydrogel contact lens," The CLAO Journal, 23(4): 226-36 (1997)

Summary ~~of Invention~~

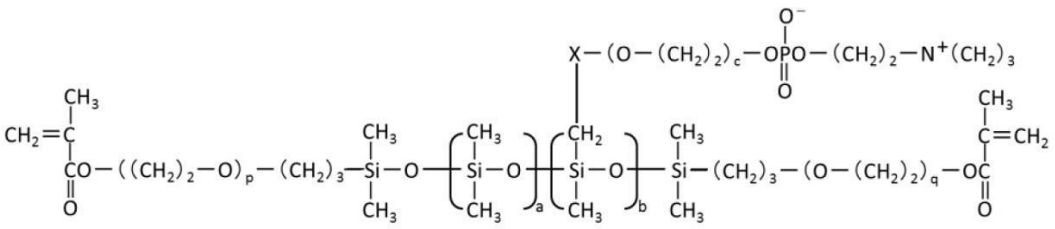
Technical Problem

[0012] The present ~~invention~~disclosure provides a phosphorylcholine group-containing polysiloxane monomer that shows high surface hydrophilicity, a high oxygen transmissibility, and appropriate mechanical physical properties (particularly suitable for application to an ophthalmic device) when copolymerized with a polymerizable monomer, such as a hydrophilic monomer.

Solution to Problem

[0013] The inventors of the present ~~invention~~disclosure have recognized that a phosphorylcholine group-containing polysiloxane monomer represented by the formula (1) can solve the problems. Thus, the present ~~invention~~ disclosure has been completed.

[0014]



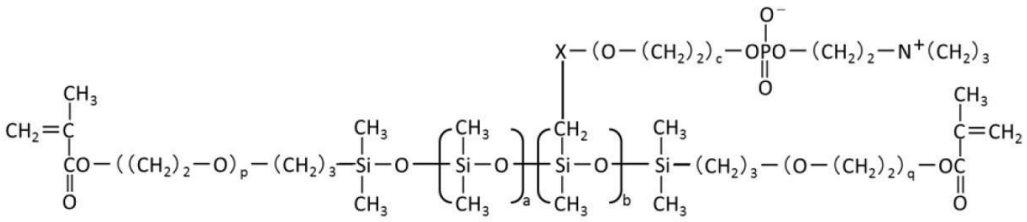
(1)

[0015] In the formula, "a" represents an integer of from 20 to 500, "b" represents an integer of from 1 to 70, "c" represents 0 or 1, "p" and "q" each represent 0 or 1, and X represents $-CH_2-$ or $-CH_2CH_2-$.

[0016] That is, the present ~~invention~~disclosure is as

described below.

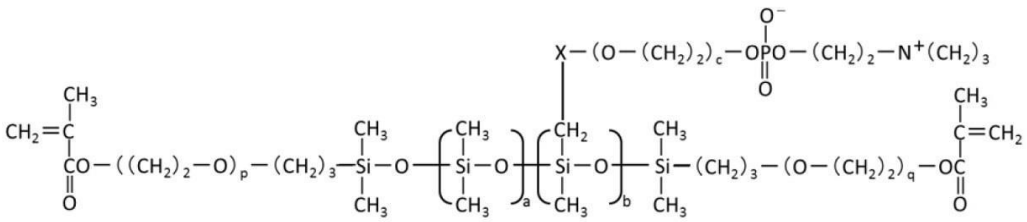
1. In an aspect, there is provided ~~A~~a phosphorylcholine group-containing polysiloxane monomer, which is represented by the formula (1):



(1)

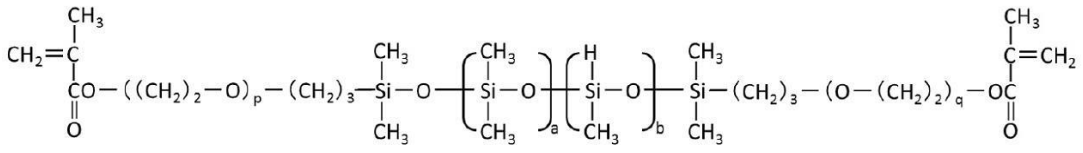
where "a" represents an integer of from 20 to 500, "b" represents an integer of from 1 to 70, "c" represents 0 or 1, "p" and "q" each represent 0 or 1, and X represents $-CH_2-$ or $-CH_2CH_2-$.

2. In another aspect, there is provided ~~A~~a method of producing a phosphorylcholine group-containing polysiloxane monomer represented by the formula (1), the method ~~including~~ comprising a step of subjecting a hydrosilyl group-containing di-methacrylate-terminated silicone represented by the formula (4) and an allyl group-containing phosphorylcholine compound represented by the formula (5) to an addition reaction:



(1)

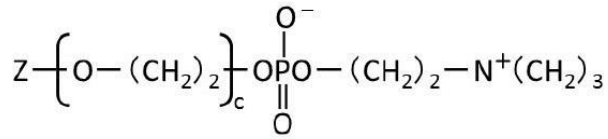
where "a" represents an integer of from 20 to 500, "b" represents an integer of from 1 to 70, "c" represents 0 or 1, "p" and "q" each represent 0 or 1, and X represents $-CH_2-$ or $-CH_2CH_2-$;



(4)

where "a" represents an integer of from 20 to 500, "b" represents an integer of from 1 to 70, and "p" and "q" each represent 0 or

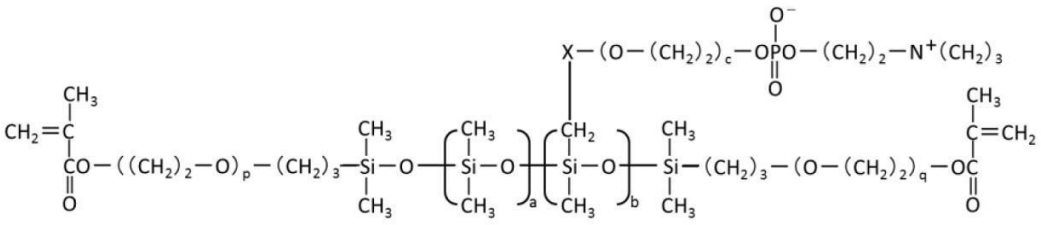
1;



(5)

where "c" represents 0 or 1, and Z represents $CH_2=CHCH_2-$ or $CH_2=CH-$.

3. In another aspect, there is provided a~~A~~ monomer composition, ~~including~~comprising: 10 parts by weight to 60 parts by weight of a phosphorylcholine group-containing polysiloxane monomer represented by the formula (1); and 40 parts by weight to 90 parts by weight of one kind or a plurality of kinds of hydrophilic monomers:



(1)

where "a" represents an integer of from 20 to 500, "b" represents an integer of from 1 to 70, "c" represents 0 or 1, "p" and "q" each represent 0 or 1, and X represents $-CH_2-$ or $-CH_2CH_2-$.

4. The monomer composition ~~according to the above-mentioned item 3~~as defined above, wherein the hydrophilic monomers are any one or more selected from the group consisting of 2-hydroxyethyl (meth)acrylate, N-vinylpyrrolidone, N,N-dimethylacrylamide, 2-(methacryloyloxyethyl)-2-(trimethylammonioethyl) phosphate, methyl methacrylate, and hydroxypropyl (meth)acrylate.

5. In another aspect, there is provided ~~A~~a polymer, which is obtained by polymerizing the monomer

composition ~~of the above-mentioned item 3 or 4~~as defined above.

6. A polymer, which is obtained by polymerizing the monomer composition ~~of the above-mentioned item 3 or 4~~as defined above, wherein the hydrophilic monomers are N-vinylpyrrolidone, 2-(methacryloyloxyethyl)-2-(trimethylammonioethyl) phosphate, and hydroxypropyl (meth)acrylate.

7. A polymer, which is obtained by polymerizing the monomer composition ~~of the above-mentioned item 3 or 4~~as defined above, wherein the hydrophilic monomers are N-vinylpyrrolidone, 2-(methacryloyloxyethyl)-2-(trimethylammonioethyl) phosphate, and 2-hydroxyethyl (meth)acrylate.

8. A polymer, which is obtained by polymerizing the monomer composition ~~of the above-mentioned item 3 or 4~~as defined above, wherein the hydrophilic monomers are N-vinylpyrrolidone, 2-(methacryloyloxyethyl)-2-(trimethylammonioethyl) phosphate, and N,N-dimethylacrylamide.

9. The composition ~~according to any one of the above-mentioned items 1 to 4~~as defined above, wherein the composition is a composition for an ophthalmic device.

10. In another aspect, there is provided ~~A~~an ophthalmic device, ~~including~~ comprising the polymer ~~of any one of the above-mentioned items 5 to 8~~as defined above.

Advantageous Effects ~~of Invention~~

[0017] The phosphorylcholine group-containing polysiloxane monomer of the present ~~invention~~ disclosure has a high silicone content and