[PTL 2] WO 2010/147779 A2

[PTL 3] WO 2001/057047 A1

[PTL 4] WO 2012/104349 A1

Summary

Technical Problem

[0007] Currently, the widely used silicone hydrogel contact lenses need to be replaced every certain period, and the replacement period is, for example, 1 day, or between 2 weeks and 1 month. A lens having a long replacement period is used by repeatedly wearing the same lens, and hence it is important for the lens not to change in shape when repeatedly used.

[0008] The shape stability of a contact lens is significantly affected by the modulus and elongation at break of the contact lens. However, a contact lens using a polysiloxane monomer has room for improvement in modulus and elongation at break, though being satisfactory in terms of surface hydrophilicity of the surface of the lens and oxygen permeability.

[0009] In view of the foregoing, an object of the present disclosure is to provide a monomer composition for contact lenses, which uses a polysiloxane monomer to produce a polymer that shows satisfactory surface hydrophilicity and oxygen permeability, and that is excellent in modulus and elongation at break.

Solution to Problem

[0010] The inventors of the present disclosure have made extensive investigations in order to achieve the above-mentioned object, and as a result, have found that a monomer composition containing a phosphorylcholine group-containing polysiloxane monomer, a monovinyl ether monomer, and the like can achieve the above-mentioned object. Thus, the present disclosure has been completed.

[0011] According to one example of the present disclosure, there is provided a monomer composition for contact lenses, including the following components: (A) a phosphorylcholine group-containing polysiloxane monomer represented by the following formula (1); (B) a phosphorylcholine group-containing methacrylic monomer represented by the following formula (2); (C) a trimethylsiloxysilyl group-containing silicone monomer having at least one or more hydroxy groups in a molecule; (D) a monovinyl ether monomer having at least one or more hydroxy groups in a molecule; (E) one or more kinds of hydroxy group-containing monomers selected from: hydroxyethyl (meth)acrylate; hydroxypropyl (meth)acrylate; hydroxybutyl (meth)acrylate; and hydroxyethylacrylamide; and (F) a crosslinker, wherein, with respect to 100 mass% in total of all monomer components in the composition, a content ratio of the component (A) is from 10 mass% to 50 mass%, a content ratio of the component (B) is from 5 mass% to 20 mass%, a content ratio of the component (C) is from 5 mass% to 40 mass%, a content ratio of the component (D)

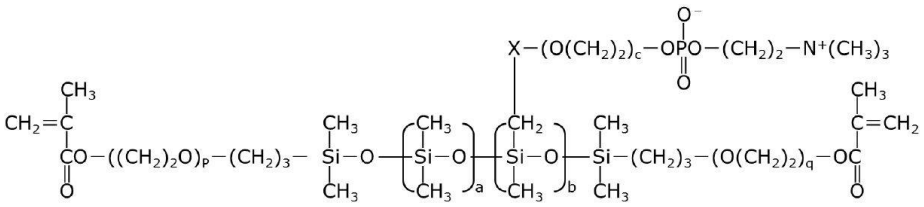
is from 5 mass% to 40 mass%, a content ratio of the component (E) is from 5 mass% to 30 mass%, and a content ratio of the component (F) is from 0.1 mass% to 15 mass%.

According to one example of the present disclosure, there is provided a monomer composition for contact lenses, including the following components: (A) a phosphorylcholine group-containing polysiloxane monomer represented by the following formula (1); (B) a phosphorylcholine group-containing methacrylic monomer represented by the following formula (2); (C) a trimethylsiloxysilyl group-containing silicone monomer having at least one or more hydroxy groups in a molecule; (D) a monovinyl ether monomer having at least one or more hydroxy groups in a molecule; (E) one or more kinds of hydroxy group-containing monomers selected from: hydroxyethyl (meth)acrylate; hydroxypropyl (meth)acrylate; hydroxybutyl (meth)acrylate; and hydroxyethylacrylamide; (F) a crosslinker; and (G) a monomer other than the components (A) to (F), wherein, with respect to 100 mass% in total of all monomer components in the composition, a content ratio of the component (A) is from 10 mass% to 50 mass%, a content ratio of the component (B) is from 5 mass% to 20 mass%, a content ratio of the component (C) is from 5 mass% to 40 mass%, a content ratio of the component (D) is from 5 mass% to 40 mass%, a content ratio of the component (E) is from 5 mass% to 30 mass%, a content ratio of the component (F) is from 0.1 mass% to 15 mass%, and a content ratio of the component (G) is

from 0 mass% to 50 mass%.

In addition, a content ratio (mass ratio) among the components (A), (B), (C), (D), (E), (F), and (G) may be 100:from 10 to 200:from 10 to 400:from 10 to 400:from 10 to 300:from 1 to 150:from 0 to 500.

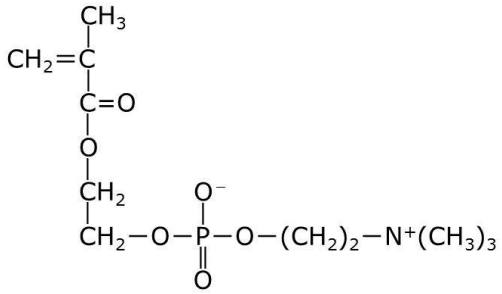
[0012]



(1)

[0013] In the formula (1), "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 $-CH_2CH_2-$.

[0014]



(2)

[0014a] In an aspect, there is provided a monomer composition for contact lenses, comprising the following components:

(A) a phosphorylcholine group-containing polysiloxane monomer represented by the following formula (1);

(B) a phosphorylcholine group-containing methacrylic monomer represented by the following formula (2);

(C) a trimethylsiloxysilyl group-containing silicone monomer having at least one or more hydroxy groups in a molecule;

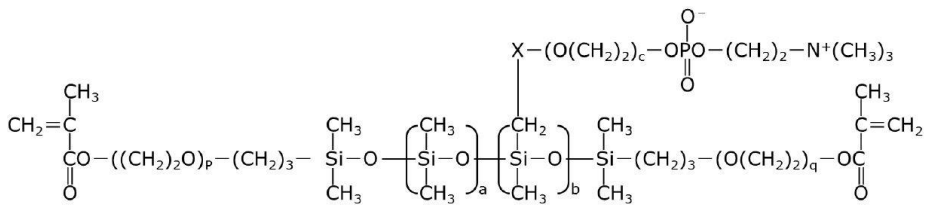
(D) a monovinyl ether monomer having at least one or more hydroxy groups in a molecule;

(E) one or more kinds of hydroxy group-containing monomers selected from: hydroxyethyl (meth)acrylate; hydroxypropyl (meth)acrylate; hydroxybutyl (meth)acrylate; and hydroxyethylacrylamide;

(F) a crosslinker; and

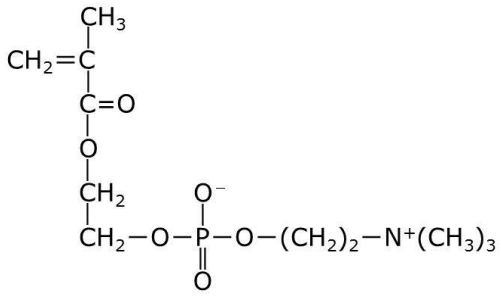
(G) a monomer other than the components (A) to (F),

wherein, with respect to 100 mass% in total of all monomer components in the composition, a content ratio of the component (A) is from 10 mass% to 50 mass%, a content ratio of the component (B) is from 5 mass% to 20 mass%, a content ratio of the component (C) is from 5 mass% to 40 mass%, a content ratio of the component (D) is from 5 mass% to 40 mass%, a content ratio of the component (E) is from 5 mass% to 30 mass%, a content ratio of the component (F) is from 0.1 mass% to 15 mass%, and a content ratio of the component (G) is from 0 mass% to 50 mass%:



(1)

in the formula (1), "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).

[0015] According to another example of the present disclosure, there is provided a polymer for contact lenses, including a polymer of the monomer composition for contact lenses.

[0015a] In another aspect, there is provided a polymer for contact lenses, comprising a polymer of the monomer composition for contact lenses as defined above.

[0016] According to still another example of the present disclosure, there are provided a contact lens, including a hydrate

of the polymer for contact lenses, and a method of producing the same.

[0016a] In another aspect, there is provided a contact lens, comprising a hydrate of the polymer for contact lenses as defined above.

[0016b] In another aspect, there is provided a method of producing a contact lens, comprising the steps of:

mixing the polymer for contact lenses as defined above with one or more kinds of solvents selected from: water; methanol; ethanol; 1-propanol; and 2-propanol to wash the polymer; and

immersing the polymer in saline to hydrate the polymer.

[0017] That is, the present disclosure is as described below.

1. A monomer composition for contact lenses, including the following components:

(A) a phosphorylcholine group-containing polysiloxane monomer represented by the following formula (1);

(B) a phosphorylcholine group-containing methacrylic monomer represented by the following formula (2);

(C) a trimethylsiloxysilyl group-containing silicone monomer having at least one or more hydroxy groups in a molecule;

(D) a monovinyl ether monomer having at least one or more hydroxy groups in a molecule;

(E) one or more kinds of hydroxy group-containing monomers

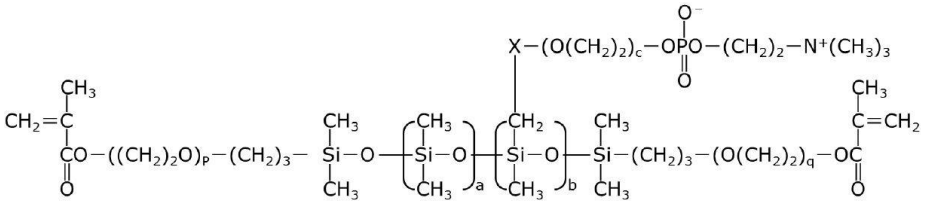
selected from: hydroxyethyl (meth)acrylate; hydroxypropyl (meth)acrylate; hydroxybutyl (meth)acrylate; and hydroxyethylacrylamide;

(F) a crosslinker; and

(G) a monomer other than the components (A) to (F),

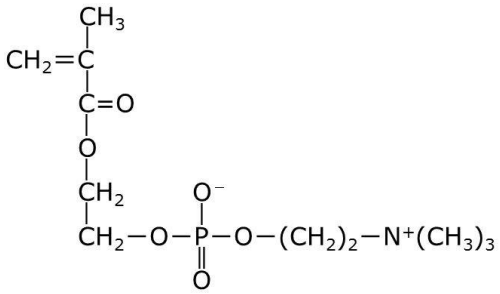
wherein, with respect to 100 mass% in total of all monomer components in the composition, a content ratio of the component (A) is from 10 mass% to 50 mass%, a content ratio of the component (B) is from 5 mass% to 20 mass%, a content ratio of the component (C) is from 5 mass% to 40 mass%, a content ratio of the component (D) is from 5 mass% to 40 mass%, a content ratio of the component

component (G) is from 0 mass% to 50 mass%:



(1)

in the formula (1), "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)

11. The use of the monomer composition for a polymer for contact lenses according to the above-mentioned item 10, the composition further including a component (H) a solvent having a hydroxy group, wherein a content ratio of the component (H) is 30 parts by mass or less with respect to 100 parts by mass in total of all monomer components in the composition.

Advantageous Effects

[0018] The contact lens of the present disclosure is produced using the monomer composition for contact lenses of the present disclosure, and hence can be simultaneously excellent in surface