Claims:

1. A method for producing silicone hydrogel contact lenses, comprising the steps of:

(1) obtaining a polymerizable composition which is a clear fluid at room temperature, wherein the polymerizable composition comprises (a) at least 15% by weight of at least one hydrophilic vinylic monomer, (b) at least 15% by weight of at least one siloxane-containing polymerizable component that comprises at least one siloxane-containing vinylic monomer, at least one polysiloxane vinylic crosslinker, or a combination thereof, (c) from 1% to 30% by weight of at least one silicone fluid (or so-called silicone oil) which is used as a non-reactive diluent in the polymerizable composition and is capable of reducing mold separation force by at least 20% at room temperature compared to control formulation that comprises 1-propanol as sole non-reactive diluent and differs from the polymerizable composition only in non-reactive diluent, wherein said at least one silicone fluid is free of any ethylenically unsaturated group, does not participate in free-radical polymerization, and has a molecular weight or number-averaged molecular weight of 2000 Daltons or less, wherein said at least one silicone fluid is selected from the group consisting of hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane, dodecamethylpentasiloxane, tetradecamethylhexasiloxane, poly(dimethylsiloxane), hexamethylcyclotrisloxane, octamethylcyckitetrasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, (3-hydroxypropyl)pentamethyldisiloxane, (3-aminopropyl)pentamethyl-disiloxane, 1,3-bis(hydroxypropyl)tetramethyldisiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyl-disiloxane, 1,3-bis(4-hydroxybutyl)tetramethyldisiloxane, 1,3-bis(3-aminopropyl)tetramethyl-disiloxane, (γ-aminopropyl)heptamethyltrisiloxane, 3-(3-hydroxypropyl)-heptamethyltrisiloxane, 3-(3-aminopropyl)heptamethyltrisiloxane, 1,3-bis(3-hydroxypropyl)-hexamethyltrisiloxane, 1,3-bis(3-aminopropyl)hexamethyltrisiloxane, propyltris(trimethylsiloxy)silane, hydroxypropyltris(trimethylsiloxy)silane, aminopropyl-tris(trimethylsiloxy)silane, N-methylaminopropyltris(trimethylsiloxy)silane, poly[dimethylsiloxane-*co*-(3-aminopropyl)methylsiloxane], mono-hydroxypropyl-, mono-butyl-terminated poly(dimethylsiloxane), mono-hydroxyethoxypropyl-, mono-butyl-terminated poly(dimethylsiloxane), mono-aminopropyl-, mono-butyl-terminated poly(dimethylsiloxane), α,ω-bis(hydroxypropyl)-terminated poly(dimethylsiloxane), α,ω-bis(hydroxyethoxypropyl)-terminated poly(dimethylsiloxane), α,ω-bis(aminopropyl)-terminated poly(dimethylsiloxane), poly(dimethylsiloxane-co-nonafluorohexylmethylsiloxane), and combinations thereof, and (d) at least one free radical initiator;

(2) introducing the polymerizable composition into a lens mold, wherein the lens mold comprises a male mold half having a first molding surface and a female mold half having a second molding surface, wherein the male and female mold halves are configured to receive each other such that a mold cavity is formed between the first and second molding surfaces when the mold is closed;

(3) curing thermally or actinically the polymerizable composition in the lens mold to form an unprocessed SiHy contact lens;

(4) separating the lens mold obtained in step (3) into the male and female mold halves, with the unprocessed SiHy contact lens adhered on a lens-adhered mold half which is one of the male and female mold halves;

(5) mechanically or manually removing the unprocessed SiHy contact lens from the lens-adhered mold half before the unprocessed SiHy contact lens is contact with water or any liquid; and

(6) subjecting the unprocessed SiHy contact lens to one or more post-molding processes selected from the group consisting of extraction, hydration, surface treatment, packaging, sterilization, and combinations thereof.

2. The method of claim 1, wherein the polymerizable composition further comprises at least one non-reactive diluent other than silicone fluid, wherein said at least one silicone fluid is present in an amount of at least 60% or 70% by weight relative to the total weight of all non-reactive diluent, wherein at least one non-reactive diluent other than silicone fluid has 1 to 8 carbon atoms and a boiling point of lower than 105°C and is free of silicone.

3. The method of claim 1 or 2, wherein said at least one silicone fluid comprises hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane, dodecamethylpentasiloxane, tetradecamethylhexasiloxane, poly(dimethylsiloxane), (3-hydroxypropyl)pentamethyldisiloxane, 1,3-bis(hydroxypropyl)tetramethyl-disiloxane, 1,3-bis(3-hydroxyisobutyl)tetramethyldisiloxane, 1,3-bis(4-hydroxybutyl)tetramethyldisiloxane, 3-(3-hydroxypropyl)-heptamethyltrisiloxane, 1,3-bis(3-hydroxypropyl)-hexamethyl-trisiloxane, mono-hydroxypropyl-, mono-butyl-terminated poly(dimethylsiloxane), mono-hydroxyethoxypropyl-, mono-butyl-terminated poly(dimethylsiloxane), α,ω-bis(hydroxypropyl)-terminated poly(dimethylsiloxane), α,ω-bis(hydroxyethoxypropyl)-terminated poly(dimethylsiloxane), or combinations thereof.

4. The method of any one of claims 1 to 3, wherein said at least one hydrophilic vinylic monomer comprises at least one hydrophilic (meth)acrylamido monomer selected from the group consisting of (meth)acrylamide, N-methyl (meth)acrylamide, N,N-dimethyl (meth)acrylamide, N-ethyl (meth)acrylamide, N,N-diethyl (meth)acrylamide, N-propyl (meth)acrylamide, N-isopropyl (meth)acrylamide, N-3-methoxypropyl

(meth)acrylamide, N-2-hydroxylethyl (meth)acrylamide, N-3-hydroxypropyl (meth)acrylamide, N-2-hydroxypropyl (meth)acrylamide, N-2,3-dihydroxypropyl (meth)acrylamide, N-4-hydroxybutyl (meth)acrylamide, N,N-bis(2-hydroxyethyl) (meth)acrylamide, *N*-tris(hydroxymethyl) methyl (meth)acrylamide, 2-(meth)acrylamidoglycolic acid, 3-(meth)acrylamidopropionic acid, 4-(meth)acrylamido-butanoic acid, 3-(meth)acrylamido-2-methylbutanoic acid, 3-(meth)acrylamido-3-methylbutanoic acid, 2-(meth)acrylamido-2-methyl-3,3-dimethyl butanoic acid, 5-(meth)acrylamidopentanoic acid, 3-(meth)acrylamidohaxanoic acid, 4-(meth)acrylamido-3,3-dimethylhexanoic acid, (3-(meth)acrylamidophenyl)boronic acid, 3-((3-methacrylamidopropyl)dimethylammonio)-propane-1-sulfonate; 3-((3-acrylamidopropyl)dimethylammonio)propane-1-sulfonate, N-2-aminoethyl (meth)acrylamide, N-2-methylaminoethyl (meth)acrylamide, N-2-ethylaminoethyl (meth)acrylamide, N-2-dimethylaminoethyl (meth)acrylamide, N-3-aminopropyl (meth)acrylamide, N-3-methylaminopropyl (meth)acrylamide, N-3-dimethylaminopropyl (meth)acrylamide, poly(ethylene glycol)ethyl (meth)acrylamide having a number average molecular weight of up to 700, methoxy-poly(ethylene glycol)ethyl (meth)acrylamide having a number average molecular weight of up to 700, and combinations thereof.

5. The method of any one of claims 1 to 4, wherein said at least one hydrophilic vinylic monomer comprises:

(i) at least one hydrophilic (meth)acryloxy monomer selected from the group consisting of 2-hydroxyethyl (meth)acrylate, 3-hydroxypropyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, glycerol methacrylate (GMA), di(ethylene glycol) (meth)acrylate, tri(ethylene glycol) (meth)acrylate, tetra(ethylene glycol) (meth)acrylate, poly(ethylene glycol) (meth)acrylate having a number average molecular weight of up to 1500, (meth)acrylic acid, ethylacrylic acid, propylacrylic acid, butylacrylic acid, 2-aminoethyl (meth)acrylate, 2-methylaminoethyl (meth)acrylate, 2-ethylaminoethyl (meth)acrylate, 3-aminopropyl (meth)acrylate, 3-methylaminopropyl (meth)acrylate, 3-ethylaminopropyl (meth)acrylate, 3-amino-2-hydroxypropyl (meth)acrylate, trimethylammonium 2-hydroxy propyl (meth)acrylate hydrochloride, dimethylaminoethyl (meth)acrylate, ethylene glycol methyl ether (meth)acrylate, di(ethylene glycol) methyl ether (meth)acrylate, tri(ethylene glycol) methyl ether (meth)acrylate, tetra(ethylene glycol) methyl ether (meth)acrylate, C_1-C_4-alkoxy poly(ethylene glycol) (meth)acrylate having a number average molecular weight of up to 1500, and combinations thereof;

(ii) at least one hydrophilic N-vinyl amide monomer selected from the group consisting of N-vinylpyrrolidone, N-vinyl-3-methyl-2-pyrrolidone, N-vinyl-4-methyl-2-

pyrrolidone, N-vinyl-5-methyl-2-pyrrolidone, N-vinyl-6-methyl-2-pyrrolidone, N-vinyl-3-ethyl-2-pyrrolidone, N-vinyl-4,5-dimethyl-2-pyrrolidone, N-vinyl-5,5-dimethyl-2-pyrrolidone, N-vinyl-3,3,5-trimethyl-2-pyrrolidone, N-vinyl piperidone (*aka*, N-vinyl-2-piperidone), N-vinyl-3-methyl-2-piperidone, N-vinyl-4-methyl-2-piperidone, N-vinyl-5-methyl-2-piperidone, N-vinyl-6-methyl-2-piperidone, N-vinyl-6-ethyl-2-piperidone, N-vinyl-3,5-dimethyl-2-piperidone, N-vinyl-4,4-dimethyl-2-piperidone, N-vinyl caprolactam (*aka*, N-vinyl-2-caprolactam), N-vinyl-3-methyl-2-caprolactam, N-vinyl-4-methyl-2-caprolactam, N-vinyl-7-methyl-2-caprolactam, N-vinyl-7-ethyl-2-caprolactam, N-vinyl-3,5-dimethyl-2-caprolactam, N-vinyl-4,6-dimethyl-2-caprolactam, N-vinyl-3,5,7-trimethyl-2-caprolactam, N-vinyl-N-methyl acetamide, N-vinyl formamide, N-vinyl acetamide, N-vinyl isopropylamide, N-vinyl-N-ethyl acetamide, N-vinyl-N-ethyl formamide, and mixtures thereof;

(iii) at least one methylene-containing pyrrolidone monomer selected from the group consisting of 1-methyl-3-methylene-2-pyrrolidone, 1-ethyl-3-methylene-2-pyrrolidone, 1-methyl-5-methylene-2-pyrrolidone, 1-ethyl-5-methylene-2-pyrrolidone, 5-methyl-3-methylene-2-pyrrolidone, 5-ethyl-3-methylene-2-pyrrolidone, 1-n-propyl-3-methylene-2-pyrrolidone, 1-n-propyl-5-methylene-2-pyrrolidone, 1-isopropyl-3-methylene-2-pyrrolidone, 1-isopropyl-5-methylene-2-pyrrolidone, 1-n-butyl-3-methylene-2-pyrrolidone, 1-tert-butyl-3-methylene-2-pyrrolidone, and combinations thereof;

(iv) at least one vinyl ether monomer selected from the group consisting of ethylene glycol monovinyl ether, di(ethylene glycol) monovinyl ether, tri(ethylene glycol) monovinyl ether, tetra(ethylene glycol) monovinyl ether, poly(ethylene glycol) monovinyl ether, ethylene glycol methyl vinyl ether, di(ethylene glycol) methyl vinyl ether, tri(ethylene glycol) methyl vinyl ether, tetra(ethylene glycol) methyl vinyl ether, poly(ethylene glycol) methyl vinyl ether, and combinations thereof;

(v) at least one allyl ether monomer selected from the group consisting of ethylene glycol monoallyl ether, di(ethylene glycol) monoallyl ether, tri(ethylene glycol) monoallyl ether, tetra(ethylene glycol) monoallyl ether, poly(ethylene glycol) monoallyl ether, ethylene glycol methyl allyl ether, di(ethylene glycol) methyl allyl ether, tri(ethylene glycol) methyl allyl ether, tetra(ethylene glycol) methyl allyl ether, poly(ethylene glycol) methyl allyl ether, and combinations thereof;

(vi) at least one phosphorylcholine-containing vinylic monomer selected from the group consisting of (meth)acryloyloxyethyl phosphorylcholine, (meth)acryloyloxypropyl phosphorylcholine, 4-((meth)acryloyloxy)butyl-2'-(trimethylammonio)ethylphosphate, 2-[(meth)acryloylamino]-ethyl-2'-(trimethylammonio)-ethylphosphate, 3-[(meth)acryloylamino]propyl-2'-

(trimethylammonio)ethylphosphate, 4-[(meth)acryloylamino]butyl-2'-(trimethylammonio)-ethylphosphate, 5-((meth)acryloyloxy)pentyl-2'-(trimethylammonio)ethyl phosphate, 6-((meth)acryloyloxy)hexyl-2'-(trimethylammonio)-ethylphosphate, 2-((meth)acryloyloxy)-ethyl-2'-(triethylammonio)ethylphosphate, 2-((meth)acryloyloxy)ethyl-2'-(tripropylammonio)ethylphosphate, 2-((meth)acryloyloxy)ethyl-2'-(tributylammonio)ethyl phosphate, 2-((meth)acryloyloxy)propyl-2'-(trimethylammonio)-ethylphosphate, 2-((meth)acryloyloxy)butyl-2'-(trimethylammonio)ethylphosphate, 2-((meth)acryloyloxy)-pentyl-2'-(trimethylammonio)ethylphosphate, 2-((meth)acryloyloxy)hexyl-2'-(trimethylammonio)ethyl phosphate, 2-(vinyloxy)ethyl-2'-(trimethylammonio)-ethylphosphate, 2-(allyloxy)ethyl-2'-(trimethylammonio)ethylphosphate, 2-(vinyloxycarbonyl)ethyl-2'-(trimethylammonio)ethyl phosphate, 2-(allyloxycarbonyl)ethyl-2'-(trimethylammonio)-ethylphosphate, 2-(vinylcarbonylamino)ethyl-2'-(trimethylammonio)-ethylphosphate, 2-(allyloxycarbonylamino)ethyl-2'-(trimethylammonio)ethyl phosphate, 2-(butenoyloxy)ethyl-2'-(trimethylammonio)ethylphosphate, and combinations thereof;

(vii) allyl alcohol;

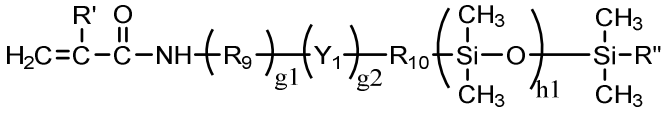
(viii) N-2-hydroxyethyl vinyl carbamate;

(ix) N-vinyloxycarbonyl-β-alanine (VINAL);

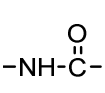
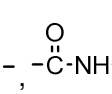
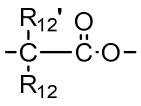
(x) N-vinyloxycarbonyl-α-alanine; or

(xi) combinations thereof.

6. The method of any one of claims 1 to 5, wherein the component (b) comprises at least one siloxane-containing (meth)acrylamido monomer containing a tris(trialkylsiloxy)silyl group or a bis(trialkylsilyloxy)-alkylsilyl group and/or at least one mono-(meth)acrylamido-terminated oligo- or polysiloxane of formula (IIa)



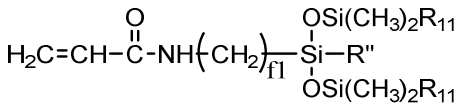
(IIa)

in which R' is hydrogen or methyl, R" independent of each other is C_1-C_6 alkyl, g1 and g2 independent of each other are integer of 0 or 1, h1 is an integer of 2 to 25, R_9 and R_{10} independent of each other are a substituted or unsubstituted C_1–C_{10} alkylene divalent radical, Y_1 is a linkage of , , or  in which R_{12} and R_{12}' independent of each other are C_1-C_6 alkyl.

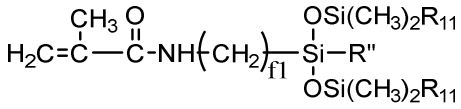
7. The method of claim 6, wherein said at least one siloxane-containing (meth)acrylamido

monomer containing a tris(trialkylsiloxy)silyl group is selected from the group consisting of N-[tris(trimethylsiloxy)silylpropyl] (meth)acrylamide, N-[tris(dimethylethylsiloxy)-silylpropyl] (meth)acrylamide, N-[tris(dimethylpropylsiloxy)silylpropyl] (meth)acrylamide, N-[tris(dimethylphenylsiloxy)silylpropyl] (meth)acrylamide, N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl)-2-methyl (meth)acrylamide, N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl) (meth)acrylamide, N,N-bis[2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl]-2-methyl (meth)acrylamide, N,N-bis[2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl] (meth)acrylamide, and combinations thereof,

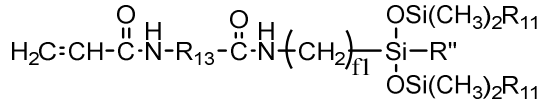
wherein said at least one siloxane-containing (meth)acrylamido monomer containing a bis(trialkylsilyloxy)alkylsilyl group is selected from the group consisting of N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl)-2-methyl (meth)acrylamide, N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)-propyl) (meth)acrylamide, N,N-bis[2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)-propyloxy)propyl]-2-methyl (meth)acrylamide, N,N-bis[2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)-propyl] (meth)acrylamide, N-[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]-2-methyl acrylamide, a siloxane-containing (meth)acrylamido monomer of one of formula (Ia) to (Ih), and combinations thereof,



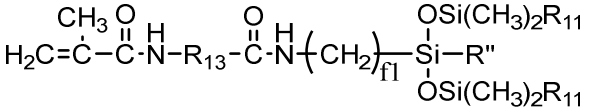
(Ia);



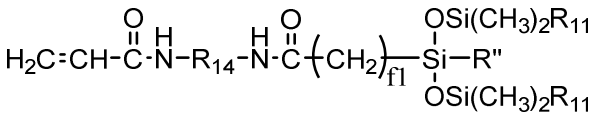
(Ib);



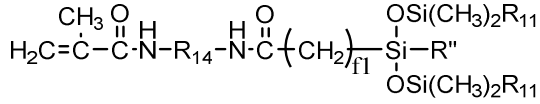
(Ic);



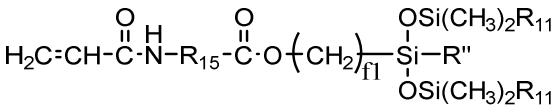
(Id);



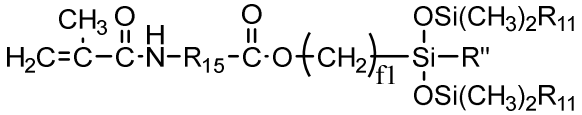
(Ie);



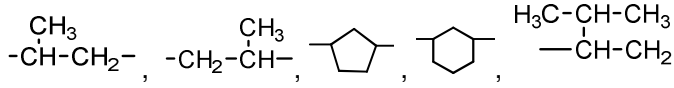
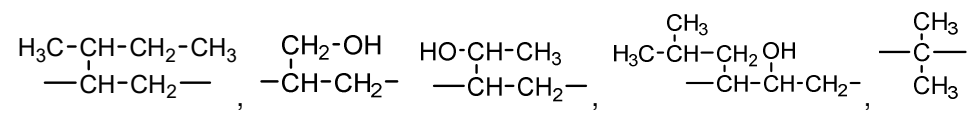
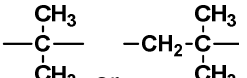
(If);



(Ig);



(Ih),

in which R_{13} is a divalent alkylene radical of $–CH_2CH_2–$, $–CH_2CH_2CH_2–$, $–CH_2CH_2CH_2CH_2–$, , , or , R_{14} is a divalent alkylene radical of $–CH_2CH_2–$ or $–CH_2CH_2CH_2–$, and R_{15} is a divalent alkylene radical of  or , R" and R_{11} independent of each other is C_1-C_4 alkyl, and f1 is an integer of from 3 to 5;

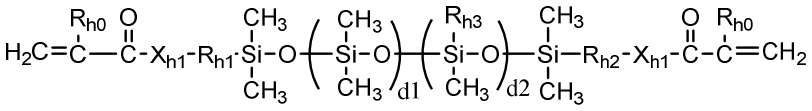
wherein at least one mono-(meth)acrylamido-terminated oligo- or polysiloxane is selected from the group consisting of α-(meth)acryloyl-amidopropyloxypropyl terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, α-N-methyl-(meth)acryloylamidopropyloxypropyl terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, α-[3-(meth)acrylamidoethoxy-2-hydroxypropyloxy-propyl]-terminated ω-C_1-C_4-alkyl polydimethylsiloxane, α-[3-(meth)acrylamidopropyloxy-2-hydroxypropyloxy-propyl]-terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, α-[3-(meth)acrylamido-isopropyloxy-2-hydroxypropyloxypropyl]-terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, α-[3-(meth)acrylamidobutyloxy-2-hydroxypropyloxypropyl]-terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, α-[3-(meth)acryloylamido-2-hydroxypropyloxypropyl] terminated ω-C_1-C_4-alkyl polydimethylsiloxane, α-[3-[N-methyl-(meth)acryloylamido]-2-hydroxypropyloxypropyl] terminated ω-C_1-C_4-alkyl terminated polydimethylsiloxane, N-methyl-N'-(propyltetra(dimethylsiloxy)dimethylbutylsilane) (meth)acrylamide, N-(2,3-dihydroxypropane)-N'-(propyltetra(dimethylsiloxy)dimethyl-butylsilane) (meth)acrylamide, (meth)acryloylamidopropyltetra(dimethylsiloxy)-dimethylbutylsilane, and combinations thereof.

8. The method of any one of claims 1 to 7, wherein the component (b) comprises

(1) at least one polysiloxane vinylic crosslinker selected from the group consisting of:

an α,ω-(meth)acryloxy-terminated polydimethylsiloxane; an α,ω-(meth)acrylamido-terminated polydimethylsiloxane; an α,ω-vinyl carbonate-terminated polydimethylsiloxane; an α,ω-vinyl carbamate-terminated polydimethylsiloxane; a bis-3-methacryloxy-2-hydroxypropyloxypropyl polydimethylsiloxane; N,N,N',N'-tetrakis(3-methacryloxy-2-hydroxypropyl)-alpha,omega-bis-3-aminopropyl-polydimethylsiloxane of various molecular weight; a reaction product of glycidyl methacrylate with a di-amino-functionalized polydimethylsiloxane; a reaction product of an azlactone-containing vinylic monomer with a d-hydroxyl-functionalized polydimethylsiloxane; and combinations thereof;

(2) at least one polysiloxane vinylic crosslinker of formula (H)



(H)

in which:

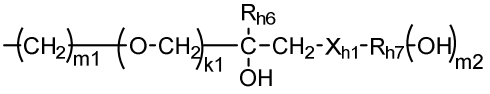
d1 is an integer of from 30 to 500 and d2 is an integer of from 1 to 75, provided that d2/d1 is from 0.035 to 0.15;

X_{h1} is O or NR_{hN} in which R_{hN} is hydrogen or C_1-C_{10}-alkyl;

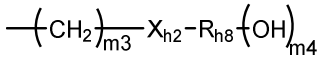
R_{h0} is hydrogen or methyl;

R_{h1} and R_{h2} independently of each other are a substituted or unsubstituted C_1–C_{10} alkylene divalent radical or a divalent radical of $–R_{h4}–O–R_{h5}–$ in which R_{h4} and R_{h5} independently of each other are a substituted or unsubstituted C_1–C_{10} alkylene divalent radical;

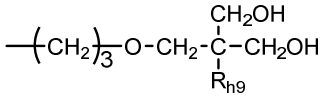
R_{h3} is a monovalent radical of any one of formula (H-a) to (H-e)



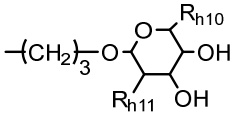
(H-a)



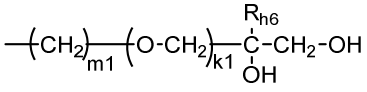
(H-b)



(H-c)



(H-d)



(H-e)

k1 is zero or 1; m1 is an integer of 2 to 4; m2 is an integer of 1 to 5; m3 is an integer of 3 to 6; m4 is an integer of 2 to 5;

R_{h6} is hydrogen or methyl;

R_{h7} is a C_2-C_6 hydrocarbon radical having (m2+1) valencies;

R_{h8} is a C_2-C_6 hydrocarbon radical having (m4+1) valencies;

R_{h9} is ethyl or hydroxymethyl;

R_{h10} is methyl or hydromethyl;

R_{h11} is hydroxyl or methoxy;

X_{h1} is a sulfur linkage of –S– or a teriary amino linkage of $–NR_{h12}–$ in which R_{h12} is C_1-C_1 alkyl, hydroxyethyl, hydroxypropyl, or 2,3-dihydroxypropyl; and

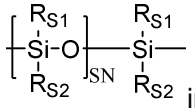
X_{h2} is a linkage of $-NR_{h13}-\overset{O}{\overset{\|}{C}}-$ or $-\overset{O}{\overset{\|}{C}}\cdot NR_{h13}-$ in which R_{h13} is hydrogen or C_1-C_{10} alkyl;

(3) at least one polysiloxane vinylic crosslinker having one sole polydiorganosiloxane segment and two terminal ethylenically-unsaturated groups selected from the group consisting of (meth)acryloyloxy groups, (meth)acryloylamino groups, vinyl carbonate groups, vinylcarbamate groups;

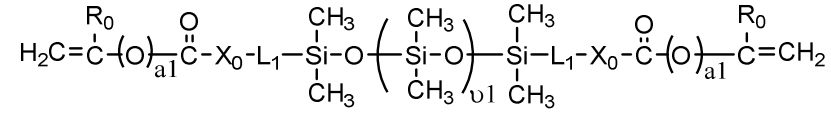
(4) at least one chain-extended polysiloxane vinylic crosslinker having at least two polydiorganosiloxane segment and a covalent linker between each pair of polydiorganosiloxane segments and two two terminal ethylenically-unsaturated groups selected from the group consisting of (meth)acryloyloxy groups, (meth)acryloylamino groups, vinyl carbonate groups, vinylcarbamate groups;

(5) at least one polysiloxane vinylic crosslinker selected from the group consisting of α,ω-bis[3-(meth)acrylamidopropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxyethoxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxypropyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxy-isopropyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxybutyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamidoethoxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamidopropyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamidoisopropyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamidobutyloxy-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxyethylamino-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acryloxypropylamino-2-hydroxypropyloxypropyl]-terminated

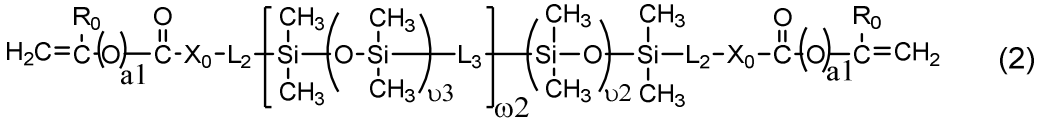
polydimethylsiloxane, α,ω-bis[3-(meth)acryloxybutylamino-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acrylamidoethylamino-2-hydroxypropyloxy-propyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamidopropylamino-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[3-(meth)acrylamide-butylamino-2-hydroxypropyloxypropyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acryloxy-2-hydroxypropyloxy-ethoxypropyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acryloxy-2-hydroxypropyl-N-ethylaminopropyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acryloxy-2-hydroxypropyl-aminopropyl]-polydimethylsiloxane, α,ω-bis[(meth)acryloxy-2-hydroxypropyloxy-(polyethylenoxy)propyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acryloxyethylamino-carbonyloxy-ethoxypropyl]-terminated polydimethylsiloxane, α,ω-bis[(meth)acryloxyethylamino-carbonyloxy-(polyethylenoxy)propyl]-terminated polydimethylsiloxane, and combinations thereof;

(6) at least one polysiloxane vinylic crosslinker having a polymer chain segment (i.e., a divalent radical) of  in which SN is an integer of 3 or larger and each of R_{S1} and R_{S2} independent of one another are selected from the group consisting of: C_1-C_{10} alkyl; phenyl; C_1-C_4-alkyl-substituted phenyl; C_1-C_4-alkoxy-substituted phenyl; phenyl-C_1-C_6-alkyl; C_1-C_{10} fluoroalkyl; C_1-C_{10} fluoroether; aryl; aryl C_1-C_{18} alkyl; –alk–$(OC_2H_4)_{\gamma 1}$–OR^o (in which alk is C_1-C_6 alkylene diradical, R^o is H or C_1-C_4 alkyl and γ1 is an integer from 1 to 10); a C_2–C_{40} organic radical having at least one functional group selected from the group consisting of hydroxyl group (-OH), carboxyl group (-COOH), amino group (-$NR_{N1}R_{N1}$'), amino linkages of –NR_{N1}–, amide linkages of –$CONR_{N1}$–, amide of –$CONR_{N1}R_{N1}$', urethane linkages of –OCONH–, and C_1-C_4 alkoxy group, or a linear hydrophilic polymer chain, in which R_{N1} and R_{N1}' independent of each other are hydrogen or a C_1-C_{15} alkyl;

(7) at least one polysiloxane vinylic crosslinker of formula (1) or (2)



(1)



(2)

in which:

R_o is H or methyl;

$\upsilon 1$ is an integer of from 30 to 500; $\upsilon 2$ and $\upsilon 3$ independent of each other are an integer of from 5 to 100; $\omega 2$ and $\omega 3$ independent of each other are an integer of from 1 to 15;

a1 and g1 independent of each other is zero or 1;

L_1 is a C_2-C_8 alkylene divalent radical or a divalent radical of $-L_1'-X_1-L_1''-$, $-(C_2H_4O)_{q1}-L_1''-$, $-(C_2H_4O)_{q1}-CONH-L_1''-$, $-L_1'-NHCOO-(C_2H_4O)_{q1}-L_1''-$, $-CH_2-CH(OH)-CH_2-X_1'-(C_2H_4O)_{q2}-L_1''-$, $-L_1'-X_1'-CH_2-CH(OH)-CH_2-O-L_1''-$, or $-(C_2H_4O)_{q1}-CH_2-CH(OH)-CH_2-O-L_1''-$;

L_1' is a C_2-C_8 alkylene divalent radical which has zero or one hydroxyl group;

L_1" is C_3-C_8 alkylene divalent radical which has zero or one hydroxyl group;

L_2 is a divalent radical of $-C_2H_4-NHCO-O-(C_2H_4O)_{q2}-L_3'-$, $-(C_2H_4O)_{q1}-CONH-R_2-NHCO-O-(C_2H_4O)_{q2}-L_3'-$, $-R_3-O-CONH-R_2-NHCO-O-(C_2H_4O)_{q2}-L_3'-$, $-CH_2-CH(OH)-CH_2-O-(C_2H_4O)_{q2}-L_3'-$, or $-(C_2H_4O)_{q2}-L_3'-$;

L_3 is a divalent radical of

$-L_3'-O-(C_2H_4O)_{q2}-CONH-R_2-(NHCO-PE-CONH-R_2)_{g1}-NHCO-(OC_2H_4)_{q2}-O-L_3'-$ in which

PE is a divalent radical of

$-(CH_2CH_2O)_{q3}-Z_0-CF_2-(OCF_2)_x-(OCF_2CF_2)_y-OCF_2-Z_0-(OCH_2CH_2)_{q3}-$ or

$-Z_0-(CH_2CH_2O)_{q4}-(CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}H-O)_{q5}-(CH_2-\underset{\displaystyle C_2H_5}{\underset{|}{C}}H-O)_{q6}-Z_0-$;

L_3' is C_3-C_8 alkylene divalent radical;

R_2 is a C_4-C_{14} hydrocarbon divalent radical;

R_3 is a C_2-C_6 alkylene divalent radical;

X_o, X_1', and X_{o1} independent of one another are O or NR_1;

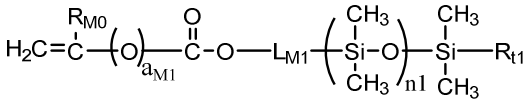
X_1 is O, NR_1, NHCOO, OCONH, $CONR_1$, or NR_1CO;

Z_0 is a direct bond or a C_1-C_{12} alkylene divalent radical; or

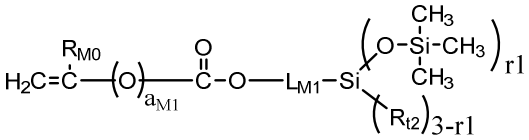
(8) combinations thereof.

9. The method of any one of claims 1 to 8, wherein the component (b) comprises:

(1) at least one siloxane-containing vinylic monomer of formula (M1) or (M2):



(M1)



(M2)

in which: a_{M1} is zero or 1; R_{M0} is H or methyl; X_{M0} is O or NR_{M1}; L_{M1} is a C_2-C_8 alkylene divalent radical or a divalent radical of $-L_{M1}'-X_{M1}-L_{M1}''-$, $-(C_2H_4O)_{v1}-CONH-L_{M1}''-$, $-(C_2H_4O)_{v1}-L_{M1}''-$, $-L_{M1}'-NHCOO-(C_2H_4O)_{v1}-L_{M1}''-$, $-CH_2-CH(OH)\cdot CH_2-X_{M1}'-(C_2H_4O)_{v2}-L_{M1}''-$, $-L_{M1}'-X_{M1}'-CH_2-CH(OH)\cdot CH_2-O-L_{M1}''-$, or $-(C_2H_4O)_{v1}-CH_2-CH(OH)\cdot CH_2-O-L_{M1}''-$; L_{M1}' is a C_2-C_8 alkylene divalent radical which has zero or one hydroxyl group; L_{M1}" is C_3-C_8 alkylene divalent radical which has zero or one hydroxyl group; X_{M1} is O, NR_{M1}, NHCOO, OCONH, $CONR_{M1}$, or $NR_{M1}CO$; R_{M1} is H or a C_1-C_4 alkyl having 0 to 2 hydroxyl group; R_{t1} and R_{t2} independent of each other are a C_1-C_6 alkyl; X_{M1}' is O or NR_1; v1 is an integer of 1 to 30; m2 is an integer of 0 to 30; n1 is an integer of 3 to 40; and r1 is an integer of 2 or 3;

(2) at least one non-silicone hydrophobic vinylic monomer;

(3) at least one non-silicone vinylic crosslinker;

(4) at least one UV-absorbing vinylic monomer and/or at least one UV/HEVL-Absorbing vinylic monomer;

(5) at least one photochromic vinylic monomer; or

(6) combinations thereof.

10. The method of any one of claims 1 to 9, wherein step of curing is performed actinically with a UV or visible light.

11. The method of any one of claims 1 to 9, wherein step of curing is performed actinically with a visible light in a region of from 420 nm to 500 nm, wherein said at least one free radical initiator comprises a benzoylphosphine initiator and/or an acylgermanium photoinitiator.

12. The method of any one of claims 1 to 9, wherein said at least one free radical initiator comprises a thermal polymerization initiator, wherein the step of curing is carried out thermally in an oven at one or more curing temperatures of from 45°C to 100°C under a nitrogen environment for at least 45 minutes to form an unprocessed silicone hydrogel lens contact lens, wherein the nitrogen environment in the oven is maintained by flowing nitrogen gas through the oven at a first flow rate.

13. The method of claim 12, further comprising a post-curing treatment process between

steps (3) and (4).

14. The method of claim 13, wherein the post-curing treatment process comprises the steps of: raising oven temperature to a post-curing temperature of 110°C or higher while increasing the flow rate of nitrogen gas through the oven to a second flow rate which is at least 2.0 folds of the first flow rate; and heating the lens mold with the unprocessed silicone hydrogel contact lens therewithin in the oven at the post-curing temperature under nitrogen gas flow through the oven at the second flow rate for at least 30 minutes.

15. The method of any one of claims 1 to 14, wherein the step (5) of removing is performed, before the unprocessed silicone hydrogel contact lens is contact with water or any liquid, by (a) bring a ultrasonic horn in direct contact with at least one area of a non-optical surface of the lens-adhered mold half having the unprocessed silicone hydrogel lens precursor attached thereon and (b) applying a ultrasonic vibrational energy of from 0.2 to 18 J to the at least one area of the non-optical surface of the lens-adhered mold half having the unprocessed silicone hydrogel contact lens adhered thereon so as to remove the unprocessed silicone hydrogel contact lens from the lens-adhered mold half.