[where R^1s are each independently a monovalent hydrocarbon group, R^2s are each independently a straight-chain or a branched-chain alkylene group having 1 to 6 carbon atoms, R^3s are each independently an oxyalkylene group represented by a formula: -[R^6-O-]m- (where R^6 represents a straight-chain or a branched-chain alkylene group having 1 to 6 carbon atom(s) and m represents an integer of 1 to 55), R^4 represents -O- or -NH-, R^5 represents a divalent aliphatic hydrocarbon group, a divalent alicyclic hydrocarbon group, or a divalent aromatic hydrocarbon group, and n represents an integer of 1 to 100]. When the compound represented by the formula (2) is used as the urethane pre-polymer (II), the cell diameters of the obtained polyurethane foam are uniformed, the foaming property becomes excellent, and the sealing property can further be improved.

[0028]

For R^1 of the formula (2), examples of the monovalent hydrocarbon group include, for example, groups such as a methyl group, an ethyl group, a propyl group, an isopropyl group, an n-butyl group, an s-butyl group, and a t-butyl group; $C_{6\ to\ 12}$ aryl groups such as a benzene ring; and $C_{5\ to\ 8}$ cycloalkyl groups such as a cyclopentyl group and a cyclohexyl group. Among these monovalent hydrocarbon groups, preferably, a methyl group and an ethyl group are used from the viewpoint of the foaming property. R^1s may be different from each other or may be same as each other.

[0029]

For R^2 of the formula (2), examples of the straight-chain or the branched-chain alkylene group having 1 to 6 carbon atoms include, for example, a methylene group, an ethylene group, a propylene group, a trimethylene group, an n-butylene group (a tetra methylene group), an i-butylene group, an s-butylene group, and a t-butylene group. Among these, preferably, an ethylene group, a propylene group, and the like are used. R^2s may be different from each other or may be same as each other.

[0030]

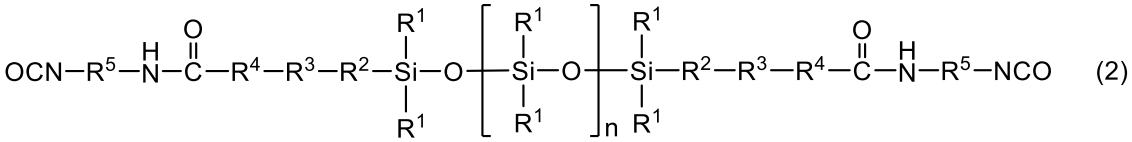
For the formula: -[R^6-O-]m- of R^3 of the formula (2), examples of the

CLAIMS

1. A curable composition to be used to produce a polyurethane foam, the curable composition comprising:

an isocyanate group-containing urethane pre-polymer (I) that has an oxyalkylene ether skeleton and no siloxane skeleton; and

an isocyanate group-containing urethane pre-polymer (II) represented by the following formula (2):



(2)

where R^1s are each independently a monovalent hydrocarbon group, R^2s are each independently a straight-chain or a branched-chain alkylene group having 1 to 6 carbon atoms, R^3s are each independently an oxyalkylene group represented by a formula: $-[R^6\text{-}O-]_m-$ (where R^6 represents a straight-chain or a branched-chain alkylene group having 1 to 6 carbon atom(s) and m represents an integer of 1 to 55), R^4 represents -O- or -NH-, R^5 represents a divalent aliphatic hydrocarbon group, a divalent alicyclic hydrocarbon group, or a divalent aromatic hydrocarbon group, and n represents an integer of 1 to 100.

2. The curable composition according to claim 1, wherein

the content of the siloxane skeleton in the urethane pre-polymer (II) is 0.001 to 5% by mass relative to 100% by mass of the total amount of an overall NCO group-containing compound contained in the curable composition.

3. The curable composition according to claim 1 or 2, wherein

R^1s in the formula (2) are each independently a methyl group or an ethyl group.

4. The curable composition according to any one of claims 1 to 3, wherein

the content of the siloxane skeleton in the curable composition is 0.001 to 5% by mass relative to 100% by mass of the curable composition, and wherein

R^1s in the formula (2) are each a methyl group.

5. The curable composition according to any one of claims 1 to 4, wherein

at least a portion of the urethane pre-polymer (I) and/or the urethane pre-polymer (II) is chain-elongated.

6. The curable composition according to any one of claims 1 to 5, further comprising a latent curing agent.

7. The curable composition according to claim 6, wherein

the latent curing agent is a fine particles-coated amine whose surface of a solid amine is coated with fine particles.

8. The curable composition according to claim 7, wherein

the fine particles-coated amine has the surface of the solid amine that has a melting point equal to or higher than 50°C and a central particle diameter equal to or smaller than 20 μm, coated with the fine particles having a central particle diameter equal to or smaller than 2 μm, and has a heat amount equal to or smaller than 220 J/g at a second absorption peak measured using a differential scanning calorimeter.

9. The curable composition according to any one of claims 1 to 8,

further comprising a plasticizer and a filler.

10. The curable composition according to claim 9, wherein

the plasticizer is an alkyl sulfonic acid phenyl-based ester.

11. A polyurethane foam produced using the curable composition according to any one of claims 1 to 10.

12. A method for producing the polyurethane foam according to claim 11, the method comprising the steps of:

(i)mixing a gas into the curable composition according to any one of claims 1 to 10;

(ii)discharging the curable composition having the gas mixed therein obtained at step (i), from a nozzle; and

(iii)curing the discharged curable composition, wherein

steps (i) and (ii) are conducted using a mechanical foaming apparatus.

13. The method according to claim 12, wherein

at step (i), a discharging exit is closed that is disposed in the mechanical foaming apparatus such that a pipe path through which the curable composition can flow and a cylinder communicate with each other,

a piston disposed inside the cylinder is moved to leave the discharging exit to thereby form a cylinder space having a predetermined volume in the cylinder,

the cylinder space is filled with a gas at a predetermined pressure,

the piston is moved toward the discharging exit to thereby compress the gas, and

the discharging exit is opened to thereby mix the compressed gas into the

curable composition flowing through the pipe path.