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OXYGEN-PERMEABLE CONTACT LENS COMPOSITION, METHODS AND ARTICLE OF MANUFACTURE

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U.S. Cl. 260—86.1 E 2 Claims

ABSTRACT OF THE DISCLOSURE

Contact lenses are fabricated from a copolymer of a polysiloxanylalkyl acrylic ester and an alkyl acrylic ester. The copolymer has increased oxygen permeability.

This invention relates to novel copolymer compositions.

In another aspect, the invention relates to methods for increasing the oxygen permeability of polymerized acrylates and methacrylates.

In still another respect, the invention concerns contact lenses having increased oxygen permeability.

In yet another respect, the invention relates to wettable contact lens materials.

In a further aspect, the invention concerns oxygen-permeable, wettable transparent copolymers which can be cast, molded or machined to provide improved contact lenses.

The prior art teaches the use of many different polymeric materials in contact lenses. However, although these polymers possess the optical clarity necessary for corrective lenses, they suffer from other characteristics which reduce their potential utility.

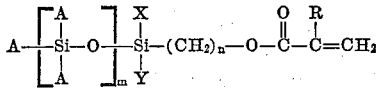
Polymethylmethacrylate is rigid and durable but relatively impermeable to oxygen. The hydrogel materials based on hydrophilic polymers such as polyhydroxyethylmethacrylate are soft and have poor durability. In addition, they provide an environment which is favorable for bacterial growth and are also relatively impermeable to oxygen.

Silicone rubber is soft and resilient and is highly permeable to oxygen. However, due to the low strength of polysiloxanes, a filler which increases the refractive index of the mixture, must be added to improve the durability. Further, the precision machining and polishing which is necessary in the fabrication of a corrective contact lens is extremely difficult with the elastomeric silicone rubbers.

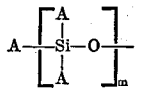
Accordingly, it would be highly desirable to provide a polymeric material suitable for use in fabricating contact lenses having increased oxygen permeability, improved mechanical strength, and which is sufficiently rigid to permit precision machining and polishing. I have now discovered novel copolymer materials which possess these properties.

The novel copolymers which I have discovered are prepared by copolymerizing a polysiloxanylalkyl ester of acrylic or methacrylic acid with an alkanol ester of acrylic or methacrylic acid.

The polysiloxanylalkyl ester monomer has the structural formula



wherein X and Y are selected from the class consisting of C_1–C_5 alkyl groups, phenyl groups and Z groups; Z is a group of the structure

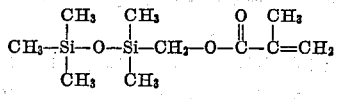


A is selected from the class consisting of C_1–C_5 alkyl groups and phenyl groups; R is selected from the class consisting of methyl groups and hydrogen; m is an integer from one to five; and n is an integer from one to three.

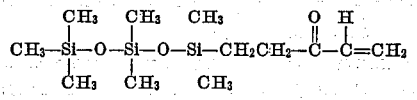
In the alkanol ester comonomers, the alkyl group contains from 1 to 20 carbon atoms.

Representative polysiloxanylalkyl ester comonomers which may be employed in the practice of the invention include:

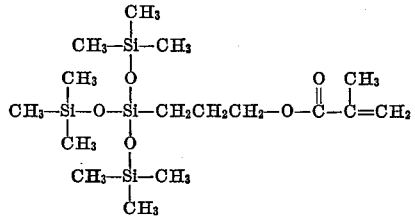
pentamethyldisiloxanylmethyl methacrylate



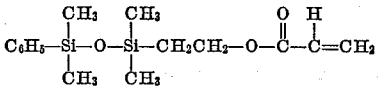
heptamethyltrisiloxanylethyl acrylate



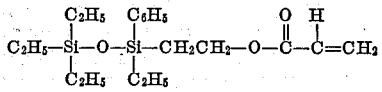
tris(trimethylsiloxy-γ-methacryloxypropylsilane



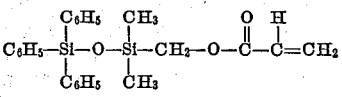
phenyltetramethyldisiloxanylethyl acrylate



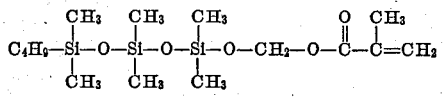
phenyltetraethyldisiloxanylether methacrylate



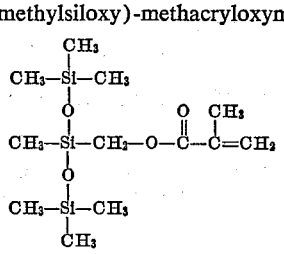
triphenyldimethyldisiloxanylmethyl acrylate



isobutylhexamethyltrisiloxanylmethyl methacrylate



methyldi(trimethylsiloxy)-methacryloxymethylsilane



n-propyloctamethyltetrasiloxanylpropyl methacrylate