

COMPOSITION FOR INTRAOCULAR LENS

This application is a continuation of U.S. application Ser. No. 07/405,584 filed Sep. 11, 1989, now abandoned, which is a continuation of U.S. application Ser. No. 07/164,415 filed Mar. 4, 1988, now abandoned.

FIELD OF THE INVENTION AND RELATED ART

The present invention relates to a composition for an intraocular lens capable of providing a transparent elastomeric member used as an intraocular lens, i.e., a substitute or ersatz for a crystalline lens nucleus.

Hitherto, the treatment of cataract has been conducted by enucleating a clouded crystalline lens under a surgical operation and transplanting an artificial lens into the crystalline lens cavity thereby to recover the sight after the operation. Recently, the "in the bag" method, i.e., a method wherein such artificial lens is inserted into the crystalline capsule or capsula lentis, has been a leading method since this method has been considered to cause little complication disease involved in the transplantation.

In such artificial lenses, there are naturally no large differences in the shapes of their lens portion, but the shapes of a lens-supporting member called as "haptic" have mostly been improved and modified repeatedly. As the material for the artificial lens, polymethyl methacrylate has mainly been used. On the other hand, the material for the lens-supporting member, polymethyl methacrylate, polyvinylidene fluoride, etc., have been used. Further, there have recently been developed artificial lenses comprising a silicone resin or a hydrogel such as Hydron (Am. Hydron Corp.) since the size of incision for the operation may be reduced by using these materials.

However, all of these conventional artificial lenses have been shaped into a lens in advance and thereafter inserted into the crystalline capsule. Therefore, these artificial lenses have some problems including molding precision such as flash or fin often involved in molded products, and toxicity based on a residual disinfectant (e.g., ethylene oxide), a residual monomer, etc.

In addition to the above-mentioned method wherein an artificial lens shaped in advance is inserted into an incised crystalline capsule, there has been proposed a method wherein a cataractous lens nucleus is removed while preserving the crystalline capsule, and the resultant empty crystalline capsule is then refilled with a substitute for the lens nucleus. With respect to such method, for example, J-M. Parel et al. have proposed a surgery procedure wherein a silicone resin is injected into an animal crystalline capsule and then cured or hardened (Graefe's Archive Ophthalmology) 224, 165-173 (1986)).

However, according to our study, in a case where the above-mentioned Parel's method is used, the curing velocity of the silicone resin injected into a crystalline capsule is extremely small and it is difficult to obtain an artificial lens excellent in transparency and homogeneity.

SUMMARY OF THE INVENTION

A principal object of the present invention is to solve the above-mentioned problems accompanying the prior art and to provide a composition for an intraocular lens capable of providing an intraocular lens having excel-

lent characteristics when it is injected into a mold such as a crystalline capsule through a slender tube.

As a result of our study, it has been found that when a polysiloxane is injected into a crystalline capsule through a slender tube under pressure in the prior art, the polysiloxane molecules oriented or aligned in the direction of flow cause inhomogeneity or irregularity in the polysiloxane whereby an intraocular lens excellent in transparency and homogeneity cannot be obtained.

The composition for an intraocular lens according to the present invention is based on such discovery and comprises: an organopolysiloxane (A) having a viscosity of 10,000 cp or below at normal temperature and comprising at least one unsaturated aliphatic group in an average polymer molecule, an organopolysiloxane (B) comprising at least three hydrogenated silyl units in an average polymer molecule, and a platinum compound; wherein the platinum compound based on its platinum content constitutes 10-200 ppm by weight of the composition.

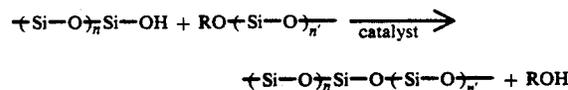
Incidentally, according to our knowledge, a composition for an intraocular lens (i.e., a material for the lens before curing) which provides a desirable intraocular lens (substitute for a lens nucleus) when injected into a crystalline capsule may particularly preferably satisfy the following requirements.

(1) Room-Temperature Curing Type

When the temperature of a human body is assumed to be 35°-37° C., the above-mentioned composition may preferably be one capable of being cured in a relatively short period of time at such temperature. The reason for this is that it is naturally impossible to considerably elevate the temperature of the composition which has been injected into the human body. Further, when a composition capable of being cured in a long period of time is used, a serious problem such as the leakage of the injected fluid can be caused.

(2) Addition-Type Curing Reaction

With respect to this viewpoint, in the above-mentioned Parel's method, there has been used a condensation-type silicone resin capable of being cured by the following reaction.



In the above reaction an alcohol (ROH) is necessarily eliminated, and this ROH generally comprises methanol. Because the ROH is incompatible with the polysiloxane, it is phase-separated and aggregates thereby to cause light scattering. Further, a catalyst such as dibutyltin laurate is generally used in the reaction as mentioned above. This type of reaction, however, has a small reaction velocity and it takes a period of one to several days to complete the reaction. Moreover, because the above-mentioned catalyst has a low solubility in the silicone resin produced by the curing reaction, it is generally difficult to obtain a silicone resin excellent in transparency.

On the contrary, the above-mentioned composition for an intraocular lens according to the present invention can retain a relatively low viscosity for a certain long period of time before curing (i.e., immediately after