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ORGANOPOLYSILOXANE COMPOSITIONS CONVERTIBLE INTO TRANSPARENT ORGANOSILOXANE ELASTOMERS

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ABSTRACT OF THE DISCLOSURE

Clear transparent elastomers especially useful as embeddings are produced by admixing a platinum catalyst with an organopolysiloxane composition essentially consisting of a vinyldimethylsiloxy terminated linear diorganopolysiloxane, a methyl-diallylsiloxy terminated linear diorganopolysiloxane, an allyl-methyl cyclotrisiloxane or cyclotetrasiloxane, and a trimethylsiloxy terminated linear methyl-hydrogen lower polysiloxane.

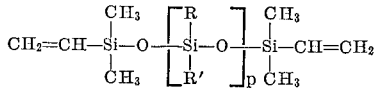
This invention relates to organopolysiloxane compositions and especially to liquid organopolysiloxane mixtures which can be cross-linked to give water-clear elastomers. Such mixtures are of considerable use as pourable sealing compounds for embedding sensitive structural units of electrical devices, known in the art as "potting" compounds, their transparency enabling the fault to be located, in the case of disturbances occurring in such devices, before any action is taken.

It is known, for example from U.S. patent specification No. 3,284,406, to use as potting compounds casting compositions of linear diorganosiloxane polymers having terminal, olefinically-substituted units, e.g. vinyl-dimethylsiloxane units, organo-hydrogen-polysiloxanes and resinous organopolysiloxanes, i.e. organopolysiloxanes which consist to a considerable extent of tri- or tetrafunctional siloxane units and are partly olefinically-substituted, in admixture with a platinum catalyst. The function of the resinous component in casting compositions of this type is to impart to the elastic substance formed therefrom by cross-linking addition reactions a sufficient solidity which can otherwise only be achieved for organosiloxane elastomers by the use of active fillers with resultant loss of transparency.

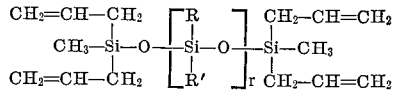
However, these resinous siloxane components have proved, in practice, to be an inconvenient source of defects, since it is very difficult, on account of their cumbersome production, to reproduce a definite structure found to be satisfactory. Due to the complicated and unpredictable condensation reactions and the multiplicity of structural possibilities of such resins, considerable variations of quality, which have an effect on the solidifying process in the sealing composition and on its mechanical behaviour in a manner which cannot be predetermined, have to be taken into account, even when taking the greatest care. The known casting compositions have therefore a very substantial disadvantage which it is the object of the present invention to obviate.

According to the present invention an organopolysiloxane composition convertible upon admixture with a platinum catalyst into a clear, transparent elastomer, containing olefinically-substituted polysiloxanes and methyl-hydrogen-polysiloxanes and especially suitable as a potting compound for embedding or encapsulating sensitive electrical structural units, comprises (a) 100 parts by

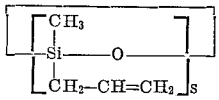
weight of an α,ω-bis-(vinyldimethylsiloxy)-polydiorganosiloxane of the general formula



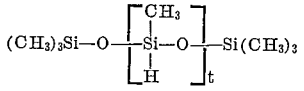
in which R and R' (same or different) are hydrocarbon radicals which are free from aliphatic multiple bonds, or are halogen derivatives thereof, and p is a number having such a value that the viscosity of the polysiloxane is at least 1000 cp. at 20° C.; (b) 5 to 15 parts by weight of an α,ω-bis-(methyl-diallylsiloxy)-polydiorganosiloxane of the general formula



in which R and R' are as above and r is a number having a value such that the polysiloxane has a viscosity between 5 and 200 cp. at 20° C.; (c) 5 to 15 parts by weight of an allylmethyl-cyclopolysiloxane of the general formula



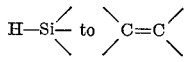
in which s is 3 or 4; and (d) an α,ω-bis-(trimethylsiloxy)-polymethyl-hydrogen-siloxane of the general formula



in which t is an integer from 2 to 5, in such an amount that the molar ratio of the $HSi(CH_3)O$-units to the olefinic hydrocarbon radicals in the whole composition is 0.7:1 to 1.5:1.

It is not necessary that component (c) be pure; it is only necessary that it consist of at least 50 percent of its weight of the specified cyclotri- and cyclotetrasiloxanes. The remainder may be an impurity not accurately determined, e.g. caused by the production, consisting of cyclopenta- to cyclohepta-siloxanes and open chains of less than 200 siloxane units terminated by HO—, RO— or methyl-diallylsiloxyl radicals, care being taken, however, that the viscosity of the whole component (c) does not exceed 100 cp. at 20° C. The last mentioned open siloxane chains may also contain minor amounts of $CH_3SiO_{3/2}$ units; if sporadic branchings thus occur, these are immaterial for the advantageous behaviour of the casting compositions of the invention.

As the hydrocarbon radicals R and R' in the above formulae, we prefer methyl radicals. A range between 10 and 50 cp. at 20° C. is preferred for the viscosity of component (b), and for the value t of the methyl-hydrogen-siloxane units in component (d) the number 3 is preferred. The proportions of the various components (a) to (d) are preferably 10 to 15 g. of (b) and 5 to 10 g. of (c) for each 100 g. of (a), and a sufficient amount of (d) that the calculated molar ratio of



is 1:1.

The viscosity of the non-cross-linked compositions as well as the mechanical values of their elastomeric conversion products can be adjusted to the requirements of their application in each case by the choice of the viscosity of the polysiloxane components (a) and the proportions of the components (a) to (d). An increase in the viscosity of component (a) results in an increase in the tensile strength and in the maximum elongation of the elastomers;