

ORGANOPOLYSILOXANE COMPOSITION FOR THE FORMATION OF A RELEASE FILM

BACKGROUND OF THE INVENTION

The present invention relates to an organopolysiloxane composition for the formation of a release film, and, more particularly, relates to such a composition which evidences a rapid curing rate at low temperatures (not exceeding 100 degrees Centigrade) and which develops an extremely good release performance against tacky substances.

It is well known that such properties as water repellency, slickness, releaseability from tacky substances, and the like, can be generated by forming a cured film from an organopolysiloxane composition on the surface of various substrates, for example, various types of paper, laminated paper, synthetic films, knitted or woven fabrics, metal foils, etc. For example, Japanese Patent Publication Number 52-40918 discloses an organopolysiloxane composition comprising vinyl-containing organopolysiloxane, organohydrogenpolysiloxane, and platinum-type compound, while Japanese Patent Application Laid Open (Kokai) Number 62-86061 (86,061/87) discloses an organopolysiloxane composition comprising platinum-type compound, organohydrogenpolysiloxane, and low-viscosity organopolysiloxane possessing higher alkenyl groups such as the hexenyl group.

However, the former organopolysiloxane composition has a slow curing rate, and, in order to induce its curing in a short period of time, it becomes necessary to implement a high-temperature heat treatment on the level of at least 140 degrees Centigrade. This causes such problems as heat shrinkage and blistering in the substrate as well as a decline in gloss by mirror-finish $\text{\textcircled{d}}$ surfaces. In the case of the latter organopolysiloxane composition, while the curing rate is in fact rapid, this composition is not entirely satisfactory in its applications due to a somewhat inferior release performance.

BRIEF SUMMARY OF THE INVENTION

The present inventors achieved the present invention as a consequence of investigations directed at solving the aforementioned problems.

The present invention takes as its object the introduction of a release film-forming organopolysiloxane composition which, prior to curing, evidences an excellent standing or storage stability, which cures rapidly, and which, upon curing, affords a cured film having a particularly good release performance.

This object, and others which will become apparent to one of ordinary skill in the organosilicone art, is obtained by the compositions of the present invention which, briefly stated, comprises an organopolysiloxane bearing at least two higher alkenyl groups, an organohydrogenpolysiloxane crosslinker therefor, a platinum group metal-containing compound, an inhibitor therefor and an organopolysiloxane which does not contain silicon-bonded alkenyl groups or silicon-bonded hydrogen atoms.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to an organopolysiloxane composition for the formation of a cured release film, said composition comprising

- (A) 100 weight parts organopolysiloxane which contains in each molecule at least two alkenyl groups as represented by the general formula $\text{Hhd } 2, \text{C}=\text{CH}(\text{CH}_2, -)_a$ wherein the subscript a has a value of from 2 to 8,
- (B) 0.3 to 40 weight parts organohydrogenpolysiloxane having at least two silicon-bonded hydrogen atoms in each molecule,
- (C) 4 to 100 weight parts organopolysiloxane whose molecule does not contain silicon-bonded alkenyl groups or silicon-bonded hydrogen atoms,
- (D) addition-reaction inhibitor in an effective amount, and
- (E) a platinum group metal-containing compound in a catalytic quantity.

To explain the preceding in greater detail, the organopolysiloxane constituting the component (A) used by the present invention is the major, i.e. principal, component of the composition of the present invention, and comprises an organopolysiloxane having in each molecule at least two higher alkenyl groups as represented by the general formula $\text{H}_2, \text{C}=\text{CH}(\text{CH}_2, -)_a$. The value of a in this formula is to be 2 through 8, and the range of 3 through 8 is preferred. When a falls below 2, the rate of cured-film formation is slow. It becomes difficult or impossible to prepare this organopolysiloxane at values beyond 8.

With regard to this organopolysiloxane's degree of polymerization (DP), compounds can be used which range from low DPs corresponding to 100 centipoise at 25 degrees Centigrade to the high DPs corresponding to gums.

However, organopolysiloxane gums are preferred when the composition of the present invention will be used in applications requiring strength performance by the release film, for example, tensile strength, elongation, tear strength, abrasion resistance, etc.

Such organopolysiloxane gums will generally have the same plasticity and fluidity as the organopolysiloxane gums used as base components for silicone rubbers. An organopolysiloxane gum is a slowly to non-flowing material having a viscosity of at least 10, centipoise at 25° C. For polydimethylsiloxane gums this viscosity value corresponds to a plasticity number of approximately 75. A plasticity of at least 100 as stipulated in JIS C 2123 is generally preferred.

To measure the plasticity of unvulcanized silicone rubber JIS C 2123 requires that a spherical (diameter approximately 1.56 cm) or a cylindrical (diameter approximately 1.43 cm height approximately 1.27 cm) test specimen having a volume of $2 \pm 0.02 \text{ cm}^3$ be prepared, using a pair of dies, from test material which has been maintained at a known temperature of $25 \pm 5^\circ \text{C}$. for 5 hours. The test specimen is lightly dusted with talc, placed between two sheets of cellophane, maintained at a known temperature of $25 \pm 5^\circ \text{C}$. for 15 ± 0.5 minutes and then the test specimen with cellophane sheets is placed between the gap of two parallel plates of a Williams Plastometer which has been previously set to a gage reading of zero with two sheets