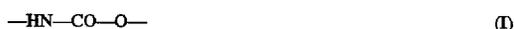


**PLASTICS WITH A CONTENT OF SILANE,
ETHER, URETHANE AND UREA GROUPS
AND THEIR USE AS DENTAL
COMPOSITION**

The invention relates to plastics with at least one polyaddition product which contains silane, ether, urethane and urea groups and has a predominantly linear molecular structure with exclusively aliphatically or cycloaliphatically bonded ether, urethane and urea segments and a number-average molecular weight in the range from 800 to 20,000, the polyaddition product having the following features:

- a) a content of polyether groups of 25 to 90, in particular 50 to 80 parts by weight per 100 parts by weight of polyaddition product;
- b) a content of urethane groups of the formula I



of 0.5 to 10, in particular 1 to 8 parts by weight per 100 parts by weight of polyaddition product;

- c) a content of urea groups of the formula II



of 0.5 to 10, in particular 1 to 8 parts by weight per 100 parts by weight of polyaddition product;

- d) a content of alkoxy-silyl groups, located on both ends of the predominantly linear molecular structure, of the formula III



in which

m is the number 3,

R is hydrogen or a group of the formula (IV)



with the meanings given here for m, R¹, R² and R³, and at least one of the groups R¹, R² and R³ is a group of the formula V



in which

p is the number 3 and

q is a number in the range from 1 to 100, in particular from 2 to 4, and

A is a single bond and

R⁴ is an alkyl, aralkyl, vinyl, vinylcarbonyl, aliphatic vinylcarbonyl or beta-methylvinylcarbonyl group, and in which the remaining groups R¹, R² and R³ are methyl, ethyl or C₁- to C₄-alkoxy, if they are not groups of the above definitions, and the plastics furthermore comprising at least one catalyst for condensation of the silane groups.

Further advantageous embodiments of the invention can be seen from the following description and the subclaims.

The plastics of the invention are particularly suitable as impression and modelling compositions, in particular for dental purposes and for mould construction, which have a low tendency to shrink after complete curing.

Plastics based on polyaddition products containing silane, ether, urethane and urea groups mixed with polymerizable compounds are known from EP-A 0 170 865 and EP-A 0 410 199; the polyaddition products as such are described in DE-A 36 36 974; reference is made to the content of these publications.

The alkoxy-silyl groups which occur in the plastics which are already known or in the polyaddition products contained in these have a structure according to the above formula III, in which at least one of the groups R¹, R² and R³ is C₁-C₄-alkoxy, preferably methoxy or ethoxy, and R² and R³ can have the same meaning as R¹ or are methyl or ethyl groups.

It is preferable if one or two of the groups R¹, R² and R³ in the silyl groups of the formula III are methyl, ethyl or methoxy.

As a result of their content of alkoxy-silane groups, these compounds are capable of condensation in the presence of suitable acidic catalysts, elastic, gelatinous polymers being formed as it were as the first stage of curing. Depending on the nature of the polymerizable olefins added, these polymers can then be after-cured to dimensionally stable rigid materials. However, the curing in the first stage specifically leads to unwanted shrinkage processes in impression or modelling compositions, since the condensation products formed during the condensation are incompatible with the polymer material and emerge from the resulting shaped articles, with shrinkage thereof. Thus, products formed during the condensation are incompatible with the polymer material and emerge from the resulting shaped articles, with shrinkage thereof. Thus, for example, in DE-A 36 36 974 a value of 2.2% after 120 minutes is stated for the change in dimensions of the shaped article cured in the first stage for one of the systems mentioned therein; such a material is unusable, in particular, for such dental purposes where extremely high dimensional accuracy is important.

For the plastics known from EP 0 170 865, no data at all have been disclosed on the shrinkage properties during complete curing and on their suitability for dental purposes; furthermore, these plastics have certain disadvantages inasmuch as they are hydrophilic, because of their content of ethyleneoxy groups, and can swell in the presence of water.

The present invention is aimed at plastics of the above-mentioned type in which no tendencies to shrink, or considerably reduced tendencies to shrink compared with the prior art, occur after curing and which do not swell on access of water. The invention is based on the finding that the tendencies to shrink can be avoided or reduced if the condensation products liberated in the course of curing are formulated such that they are as compatible as possible with the polyaddition products present as the base structure and therefore do not have the tendency to emerge from the polymer body with shrinkage thereof or to collect on the surface thereof, which means that they are particularly suitable for dental materials. This object is achieved by the above-mentioned plastics of the invention.

The polyaddition products on which the plastics of the invention are based can be prepared by reacting aliphatic or cycloaliphatic diisocyanates or mixtures thereof with linear polyethers which have terminal free hydroxyl groups and have a number-average molecular weight in the range from 250 to 6,000, it optionally additionally also being possible to add aliphatic or cycloaliphatic alkanediols or mixtures thereof with a number-average molecular weight in the range from 62 to less than 300. The resulting prepolymers are usually reacted with alkoxy-silylmonoamines; aliphatic and/or cycloaliphatic diamines which have primary amino groups and a number-average molecular weight of from 60 to 300 can optionally also be co-used here. The diamines optionally employed serve to establish the particular desired molecular weight.

Diisocyanates which are suitable for this reaction are, in particular, aliphatic or cycloaliphatic diisocyanates in which