

preferably employed for this purpose. Examples of suitable compounds are vinyltriethoxysilane, vinyltrichlorosilane, vinyltrimethoxysilane, allyldimethylchlorosilane, γ -methacryloxypropyltrimethoxysilane, β -(3,4-epoxycyclohexyl-ethyltrimethoxysilane and γ -glycidoxy-propyltrimethoxysilane, and also disilazanes, such as hexamethyldisilazane or vinyldisilazanes.

The fillers to be used according to the invention can be employed by themselves or together with other fillers, preferably microfine fillers (particle size < 500 nm), which are known per se, and which can optionally also be silanized or grafted with (meth)acrylates. These fillers can be added in amounts of, for example, 1-40% by weight, preferably 5-20% by weight, based on the polymerizable composition.

The monomers to be used in the compositions according to the invention contain at least one double bond which can undergo free radical polymerization. Monomers with more than one double bond and with boiling points above 100° C. at 13 mbar are preferably used, by themselves or, if appropriate, mixed with monofunctional monomers. Highly crosslinked polymers or copolymers are thereby obtained. The molecular weights of the monomers can be between about 70 and 20,000, preferably between about 150 and 1,000. The viscosity of the monomers can be adjusted by suitable mixing of monomers of higher viscosity or higher molecular weight with low-viscosity monomers. If appropriate, the monomers contain small amounts of polymerization inhibitors, such as, for example, 0.01-0.2% of 2,6-di-t-butyl-p-cresol.

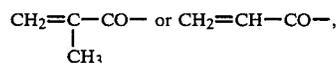
Examples of possible polymerizable monomers to be used according to the invention are: esters of unsaturated mono- or di-carboxylic acids, for example esters of acrylic, methacrylic, α -cyanoacrylic, crotonic, cinnamic, sorbic, maleic, fumaric or itaconic acid with aliphatic, cycloaliphatic or aromatic-aliphatic mono-, di-, tri- or tetra-hydric alcohols with 2-30 carbon atoms, for example methyl (meth)acrylate, n-, i- or t-butyl (meth)acrylate, 2-ethylhexyl (meth)acrylate, lauryl (meth)acrylate, dihydrodicyclopentadienyl (meth)acrylate, di-hydroxymethyl-tricyclo [5,2,1,0,2,6]decane di(meth)acrylate according to German Patent Specification No. 2,200,021, methylglycol di(meth)acrylate, hydroxyethyl (meth)acrylate, hydroxypropyl (meth)acrylate, ethylene glycol di(meth)acrylate, diethylene glycol di(meth)acrylate, triethylene glycol di(meth)acrylate, neopentylglycol di(meth)acrylate, 1,4-dimethylolcyclohexane di-(meth)acrylate, pentaerythritol tri- and tetra-(meth)acrylate, trimethylolpropane tri-(meth)acrylate, ethyl α -cyanoacrylate, ethyl crotonate, ethyl sorbate, diethyl maleate, diethyl fumarate and the di(meth)acrylate of oxyalkylated bisphenol A according to U.S. Pat. Nos. 3,810,938 and 3,923,740, di(meth)acrylic acid esters of oxyalkylated trimethylolpropane or pentaerythritol according to U.S. Pat. No. 3,380,831, and also the (meth)acrylic acid esters of oxyalkylated di-(hydroxymethyl)tricyclo[5,2,1,0,2,6]-decane, such

as are described in DE-OS (German Published Specification) Nos. 2,931,925 and 2,931,926.

Other monomers which can be employed in the compositions according to the invention are amides of (meth)acrylic acid, which can optionally be substituted on the nitrogen atom by alkyl, alkoxyalkyl or hydroxyalkyl radicals, such as, for example, N-isobutylacrylamide, diacetoneacrylamide, N-methylolacrylamide, N-methoxymethylacrylamide, N-butoxymethylmethacrylamide, ethylene glycol bis-(N-methylolacrylamide) ether and methylene-bis-acrylamide; triacrylfomal; vinyl esters of mono- and di-carboxylic acids with 2 to 20 carbon atoms, for example vinyl acetate, vinyl propionate, vinyl 2-ethylhexanoate, vinyl versatate and divinyl adipate; vinyl ethers of monohydric or dihydric alcohols with 3 to 20 carbon atoms, for example isobutyl vinyl ether, octadecyl vinyl ether, ethylene glycol divinyl ether and diethylene glycol divinyl ether; mono-N-vinyl compounds, for example N-vinylpyrrolidone, N-vinylpiperidone, N-vinylcaprolactam, N-vinylmorpholine, N-vinylloxazolidone, N-vinylsuccinimide, N-methyl-N-vinylformamide and N-vinylcarbazole; allyl ethers and esters, for example trimethylolpropane diallyl ether, trimethylolpropane triallyl ether, allyl (meth)acrylate, diallyl maleate, diallyl phthalate and prepolymers thereof, and any desired mixtures of all the unsaturated compounds mentioned.

The epoxide acrylates and urethane acrylates are particularly suitable for medical purposes. Examples of such compounds which may be mentioned are: (a) reaction products of monofunctional epoxides and (meth)acrylic acid according to U.S. Pat. Nos. 2,484,487 and 2,575,440; (b) reaction products of bifunctional epoxides and unsaturated fatty acids according to U.S. Pat. No. 2,456,408; (c) reaction products of polyfunctional aromatic or aliphatic glycidyl ethers and (meth)acrylic acid according to U.S. Pat. Nos. 3,179,623, 3,066,112 and 2,824,851 and German Patent Specification No. 1,644,817; (d) reaction products of epoxy resins and (meth)acryloyl chloride according to U.S. Pat. Nos. 3,427,161 and 2,890,202; and (e) unsaturated polyurethanes (urethane acrylates) and polyureas of hydroxyalkyl (meth)acrylates, aminoalkyl (meth)acrylates and, if appropriate, polyols or polyamines, such as are described in U.S. Pat. Nos. 3,425,988, 3,709,866, 3,629,187, 4,089,763 and 4,110,184, and German Patent Specification Nos. 1,644,798 and 1,644,797 and DOS (German Published Specification) Nos. 2,357,402, 2,357,324 and 2,358,948.

Other examples of suitable comonomers can be seen from the summary below; in the structural formulae, R represents



R' represents H or CH₂-OR

n represents a number between 1 and 4 and

m represents a number between 0 and 4

