CLAIMS

[Claim 1]
A process for producing high-reactivity isobutene homo- or copolymers having terminal vinylidene double bond content per polyisobutene chain end of at least 50 mol%, by polymerization of isobutene or of an isobutene-comprising monomer mixture in the presence of at least one Lewis acid suitable as a polymerization catalyst or in the presence of a complex comprising at least one Lewis acid and one donor that acts as a polymerization catalyst, and in the presence of at least one initiator, and wherein at least one initiator is used that is an organic sulfonic acid of general formula $Z-SO_3H$ (in which the variable Z denotes a C_1- to C_{20}-alkyl radical, C_1- to C_{20}-haloalkyl radical, C_5- to C_8-cycloalkyl radical, C_6- to C_{20}-aryl radical or a C_7- to C_{20}-arylalkyl radical).
[Claim 2]
The process according to claim 1, wherein at least one initiator used is an organic sulfonic acid selected from methanesulfonic acid, trifluoromethanesulfonic acid, trichloromethanesulfonic acid and toluenesulfonic acid, or mixtures thereof.
[Claim 3]
The process according to claim 1 or 2, wherein the Lewis acid used for the complex that acts as a polymerization catalyst is at least one compound selected from the binary chlorine and fluorine compounds of the elements of transition groups 1 to 8 and main groups 3 to 5 of the Periodic Table or mixture thereof.
[Claim 4]

The process according to claim 3, wherein the binary chlorine or fluorine compound used as a Lewis acid is selected from BCl_3, $AlCl_3$, $TiCl_4$, $FeCl_2$, $FeCl_3$, $ZnCl_2$, BF_3, AlF_3, TiF_4, FeF_2, FeF_3 and ZnF_2.

[Claim 5]

The process according to any one of claims 1 to 4, wherein a complex acting as a polymerization catalyst is used comprising an organic compound having at least one ether functional group or carboxylic acid ester functional group as the donor.

[Claim 6]

The process according to claim 5, in which the organic compound functioning as the donor is a dihydrocarbyl ether of the general formula R^1-O-R^2 (in which the variables R^1 and R^2 are each independently C_1- to C_{20}-alkyl radicals, C_5- to C_8-cycloalkyl radicals, C_6- to C_{20}-aryl radicals or C_7- to C_{20}-arylalkyl radicals) or a hydrocarbyl carboxylate of the general formula R^3-COOR^4 (in which the variables R^3 and R^4 are each independently C_1- to C_{20}-alkyl radicals, C_5- to C_8-cycloalkyl radicals, C_6- to C_{20}-aryl radicals or C_7- to C_{20}-arylalkyl radicals).

[Claim 7]

The process according to claim 6, in which the organic compound functioning as the donor has a total carbon number of 3 to 16.

[Claim 8]

The process according to any one of claims 1 to 7, in which the polymerization is performed with additional use of at least one further initiator which is mono- or polyfunctional and selected from among organic hydroxyl compounds, organic halogen compounds, protic acids and water.

[Claim 9]

The process according to claim 8, wherein the at least one further initiator is selected from water, one or more protic acids, methanol, ethanol, 1-phenylethanol, 1-(p-methoxyphenyl)ethanol, n-propanol, isopropanol, 2-

phenyl-2-propanol, n-butanol, isobutanol, s-butanol, t-butanol, 1-phenyl-1-chloroethane, 2-phenyl-2-chloropropane, t-butyl chloride and 1,3-bis(1-hydroxy-1-methylethyl)benzene or 1,4-bis(1-hydroxy-1-methylethyl)benzene, and mixtures thereof.

[Claim 10]

The process according to any one of claims 1 to 9, in which the polymerization is performed in the presence of 0.01 to 10 mmol of nitrogen-containing basic compound relative to 1 mole of isobutene monomer used in the case of homopolymerisation of isobutene or is performed in the presence of 0.01 to 10 mmol of nitrogen-containing basic compound relative to 1 mole of the total amount of polymerisable monomer used in the case of copolymerization of isobutene.

[Claim 11]

The process according to claim 10, wherein the nitrogen-containing basic compound used is pyridine or a derivative of pyridine.

[Claim 12]

The process according to any one of claims 1 to 11 for producing high-reactivity isobutene homo- or copolymers with a number-average molecular weight M_n of 500 to 250,000.

[Claim 13]

The process according to any one of claims 1 to 12 for preparing high-reactivity isobutene homo- or copolymers with a polydispersity of 1.05 to less than 3.5.

[Claim 14]

The process according to any one of claims 1 to 13, wherein the polymerization is performed at a temperature of -30°C to +50°C.

[Claim 15]

The process according to any one of claims 1 to 14, wherein the polymerization is performed in an aliphatic hydrocarbon, cycloaliphatic hydrocarbon or aromatic hydrocarbon, in a halogenated aliphatic hydrocarbon or in a mixture of aliphatic, cycloaliphatic and/or

aromatic hydrocarbons or of halogenated aliphatic hydrocarbons, or in a mixture of at least one halogenated aliphatic hydrocarbon and at least one aliphatic hydrocarbon, cycloaliphatic hydrocarbon or aromatic hydrocarbon as an inert diluent.