XXIV (part 2), p. 713-733 (editor: Edward C. Leonard), J. Wiley & Sons publishers, New York, 1971.

In the literature article "Novel initiating system based on $AlCl_3$ etherate for quasiliving cationic polymerization of styrene" in Polymer Bulletin Vol. 52, p. 227-234 (2004), Sergei V. Kostjuk et al. describe a catalyst system composed of 2-phenyl-2-propanol and an aluminum trichloride/di-n-butyl ether complex for polymerization of styrene. The polydispersities M_w/M_n of the styrene polymers thus prepared are "~2.5" (see summary) or "~3" (see page 230).

Dmitriy I. Shiman, Irina V. Vasilenko, Sergei V. Kostjuk, Journal of Polymer Science, Part A: Polymer Chemistry 2014, 52, 2386–2393 disclose the preparation of polyisobutene polymers by polymerizing isobutene in the presence of an alkylaluminum halogenide an ether complex as a polymerization catalyst.

DE 10 2007 046159 A1 discloses polymerization of isobutene and isobutene containing hydrocarbon mixtures in the presence of ionic liquids, *inter alia* imidazolium and pyridinium salts. Anions to the ionic liquids may be *inter alia* halides and ferrates, such as tetrachloroferrates.

DE 10 2007 046159 A1, however, discloses conducting the reaction in anhydrous or aprotic solvents, water, acids and other protic impurities are to be removed prior to polymerization.

The only example uses 1-butyl-3-methylimidazolium tetrachloroferrat(III) as ionic liquid and yields a polyisobutene with a high polydispersity of 3.3. The catalyst is prepared with an intricate chage of solvent in which the preparation is conducted in dichloromethane, which is removed after preparation and replaced by hexane. Hence, there is a need for catalyst which can be prepared easier without the need for an exchange of the solvent.

It was an object of the present disclosure to provide a process for preparing high-reactivity isobutene homo- or copolymers with an increased content of terminal vinylidene double bonds per polyisobutene chain end of at least 70 mol% and simultaneously with a narrow molecular weight distribution (i.e. low polydispersities) in acceptable yields. The catalyst system should at the same time have sufficient activity and service life, the handling thereof should be unproblematic and it should not be prone to failure.

The object was achieved by providing, in an aspect, a process for preparing high-reactivity isobutene homo- or copolymers with a content of terminal vinylidene double bonds per polyisobutene chain end of at least 70, preferably at least 75 and very preferably at least 80 mol%, which comprises polymerizing isobutene or an isobutene-comprising monomer mixture in the presence of at least one Lewis Acid effective as a polymerization catalyst, selected from the group consisting of an aluminum trihalide-donor complex, an alkylaluminum halide-donor complex, an iron trihalide-donor complex, a gallium trihalide-donor complex, a titanium tetrahalide-donor complex, a zinc dihalide-donor complex, a tin dihalide-donor complex, and a tin tetrahalide-donor complex, said complex