It was therefore an object of the embodiments described hereininvention to develop a process for regenerating aluminosilicate-based catalysts for the cleavage of *tert*-alkyl ethers, which can be performed without deinstallation from the reactor, i.e. *in situ*, and ensures the reestablishment of the necessary selectivities with regard to isobutene and methanol formation.

This object is achieved by a process for regenerating catalysts containing mixed oxides from the group of alkali metals and/or alkaline earth metals, aluminium oxide and silicon oxide, characterized in that the regeneration comprises the following features:

i) treatment of the catalyst in situ,
ii) contacting of the catalyst with water,
iii) treatment of the catalyst within a temperature range from 100 to 400°C,
iv) treatment of the catalyst within a pressure range from 0.1 to 2 MPa,
v) treatment of the catalyst over a period of 0.1 to 24 h,
vi) treatment of the catalyst with a specific catalyst hourly space velocity of 0.1 to 100 h^{-1}.

In one aspect, there is provided a process for gas phase cleavage of methyl tert-butyl ether (MTBE) to isobutene and methanol over a catalyst installed in a reactor and subsequent regeneration of the catalyst used in situ,
wherein the catalyst comprises mixed oxides from the group of alkali metals and/or alkaline earth metals, aluminium oxide and silicon oxide,
wherein MTBE is evaporated before entry into the reactor,
wherein the regeneration is performed with steam, by first shutting down the MTBE feedstream and then using steam as a feed, and wherein the regeneration of the catalyst with steam takes place under the following conditions:

i) treatment of the catalyst within a temperature range from 100 to 400°C,
ii) treatment of the catalyst within a pressure range from 0.1 to 2 MPa,
iii) treatment of the catalyst over a period of 0.1 to 24 h,
iv) treatment of the catalyst with a specific catalyst hourly space velocity of 0.1 to 100 h^{-1}.

The treatment of the catalysts for cleavage of *tert*-alkyl ethers, the main constituents of which in a formal sense are aluminium oxide and silicon oxide, with steam is found to be advantageous within a temperature range from 150 to 380°C, more preferably from 200 to 350°C. Deinstallation of the catalyst from the reactor is not necessary.

The duration of the steam treatment is preferably 1 to 10 h, more preferably 2 to 6 h. The pressure range is preferably from 2 to 10 bar. The specific catalyst hourly space velocity (WHSV; grams of water at room temperature per gram of catalyst per hour) is preferably within a range from 0.5 to 30 h^{-1}.

Example: Gas phase cleavage of MTBE to isobutene and methanol, and subsequent regeneration of the catalyst

The cleavage was carried out in a fixed bed reactor with a heating jacket,