

Claims

1. Use of a cation being stable under super acid conditions as catalyst in the preparation of alkanes sulfonic acids from alkanes and sulfur trioxide, especially in the preparation of methane sulfonic acid from methane and sulfur trioxide, said cation being able to react with the alkane to form an alkyl cation.
2. Use according to claim 1, wherein the cation is formed *in situ* in acid or super acid conditions during the preparation of alkane sulfonic acids.
3. Use according to claim 1, wherein the cation is formed prior to addition to the reaction for obtaining an alkane sulfonic acid.
4. Use according to claim 1 or 2, wherein the cation is selected from a halogen cation, especially I^+ and Br^+ , S^+ , Se^+ , Te^+ , As^+ , Sb^+ , P^+ and/or Si^+ .
5. Process for the preparation of alkane sulfonic acids, especially of methane sulfonic acid, comprising the steps of
 - i) providing sulfur trioxide and an alkane, especially methane, to a reaction chamber,
 - ii) setting a pressure of from 1 to 200 bar to the reactor,
 - iii) introducing a compound forming *in situ* a cation into said reactor,
 - iv) controlling the temperature in the reactor to be at 0 °C to 100 °C,
 - v) after the reaction is finished, if necessary, purifying the reaction product.
6. Process for the preparation of alkane sulfonic acids, especially of methane sulfonic acid, comprising the steps of
 - i) providing sulfur trioxide and an alkane, especially methane, to a reaction chamber,
 - ii) setting a pressure of from 1 to 200 bar to the reactor,
 - iii) introducing a cation being stable under super acid conditions into said reactor,
 - iv) controlling the temperature in the reactor to be at 0 °C to 100 °C,
 - v) after the reaction is finished, if necessary, purifying the reaction product.
7. Process according to claim 5 or 6, wherein the purification is performed by distillation.
8. Process according to one or more of claims 5 to 7, wherein the sulfur trioxide is provided as oleum with a sulfur trioxide content of above 0 % by weight to 65 % by weight or as pure sulfur trioxide.
9. Process according to one or more of claims 5 to 8, wherein the temperature is within a range of from above 0 °C to 70 °C, especially from 10 °C to 65 °C, preferably from 20 °C to 60 °C.
10. Process according to one or more of claims 5 to 9, wherein the cation formed *in situ* or added in step iii) reacts with the alkane to form an alkane cation,

said alkane cation reaction with SO_3 to form an alkane sulfur cation,
said alkane sulfur cation reacting again with the alkane to form the alkane sulfonic acid and
again an alkane cation.

- 5 11. Process according to claim 10, wherein the alkane is methane, the alkane sulfonic acid is methane sulfonic acid, and the alkane cation is CH_3^+ .
12. A mixture comprising an alkane, sulfur trioxide, a cation being able to react with the alkane to form an alkane cation, and optionally a solvent.
- 10 13. A mixture comprising an alkane, sulfur trioxide, a compound forming *in situ* a cation under super acid conditions, said cation being able to react with the alkane to form an alkane cation, and optionally a solvent.
- 15 14. Mixture according to claim 12 or 13, wherein the solvent is sulfuric acid and/or the alkane it methane.