SUMMARY

The process of the present disclosure is simple and cost-efficient due to reduced energy consumption in the downstream purification steps (e. g. distillation) and the possibility to refrain from using additional decolorizing agents, e.g. oxidizing agents, and offers the possibility to achieve a high MSA yield and/or a highly pure MSA with low colorization.
The inventive process for manufacturing of methane sulfonic acid (MSA) thus overcomes at least some of the disadvantages known in the art.

The problem is solved by the features of the independent claims. Preferred examples of the present disclosure are provided by the dependent claims.
The disclosure therefore relates, in one example, to a process for the manufacturing of an alkanesulfonic acid by reaction (for example radical reaction, mainly or partially radical reaction) of an initiator composition with an alkane and sulfur trioxide comprising the steps:

i. Preparation of the initiator composition by reacting aqueous hydrogen peroxide with the components alkanesulfonic acid and/or H_2SO_4,
ii. Reaction of initiator composition from step i. with sulfur trioxide and alkane to form an alkanesulfonic acid, for example by partially, mainly or completely radical reaction,

Wherein alkane with a purity of at least 98.0 mol-% is used.

In an aspect, there is provided a process for the manufacturing of an alkanesulfonic acid by reaction of an initiator compo-sition with an alkane and sulfur trioxide comprising the steps:

i. Preparation of the initiator composition by reacting aqueous hydrogen peroxide with the components alkanesulfonic acid and/or H2SO4,
ii. Reaction of initiator composition from step i. with sulfur trioxide and alkane to form an alkanesulfonic acid at a temperature in the range from 25°C and 80°C and at a pressure in the range from 10 bar to 150 bar,

wherein alkane with a purity of at least 98.0 mol-% is used, and wherein the alkanesulfonic acid is methanesulfonic acid and wherein the alkane is methane, and wherein the methane has a maximum content of hydrocarbons of 500 ppm.

In the inventive process, step ii. may comprise or consist of a radical reaction. Step ii. may partially or mainly run according to a radical mechanism.
In the inventive process, methane with a purity of at least 98.0 mol-% is used.
In a preferred example of the inventive process, methane with a purity of at least 98.5 mol-% is used.

In a further preferred example of the inventive process, methane with a purity of at least 99.0 mol-% or 99.5 mol-% or even 99.7 or 99.8 or 99.9 mol-% is used.

CLAIMS:

1. Process for the manufacturing of an alkanesulfonic acid by reaction of an initiator composition with an alkane and sulfur trioxide comprising the steps:
   i. Preparation of the initiator composition by reacting aqueous hydrogen peroxide with the components alkanesulfonic acid and/or H_2SO_4,
   ii. Reaction of initiator composition from step i. with sulfur trioxide and alkane to form an alkanesulfonic acid at a temperature in the range from 25°C and 80°C and at a pressure in the range from 10 bar to 150 bar,

   wherein alkane with a purity of at least 98.0 mol-% is used, and wherein the alkanesulfonic acid is methanesulfonic acid and wherein the alkane is methane, and wherein the methane has a maximum content of hydrocarbons of 500 ppm.

2. Process according to claim 1, wherein methane, with a purity of at least 98.5 mol-% is used.

3. Process according to any of claims 1 to 2, wherein the initiator composition in step i. further comprises sulfur trioxide.

4. Process according to any one of claims 1 to 3, wherein the initiator composition in step i. further comprises a recycle stream from the bottom purge of the distillation of methanesulfonic acid comprising methanesulfonic acid and sulfuric acid.

5. Process according to any one of the preceding claims, wherein the reaction in step ii. is a radical reaction and, preferably, comprises an initiation reaction and a propagation reaction.

6. Process according to any one of the preceding claims, wherein the MSA from step ii. has an HAZEN number of less than 300.

7. Process according to any one of the preceding claims, wherein the process further comprises a step iii. for purification of methanesulfonic acid obtained from step ii.

8. Process according to any one of the preceding claims, wherein the purification step iii. is a single step distillation or a multi step distillation.

9. Process according to any one of the preceding claims, wherein the purification step iii. for purification of methanesulfonic acid obtained from step ii. is a crystallization followed by a solid-liquid separation.

10. Process according to any one of the preceding claims, wherein the MSA from step iii. has an HAZEN number of less than 300.

11. Process according to any one of the preceding claims, wherein step i. is conducted in a reactor A, step ii. is conducted in a reactor B or a set of reactors B and step iii. is conducted in a column or set of columns C, and whereas reactor A, reactor B or a set of reactors B and column C are connected to conduct the process for the manufacturing of methanesulfonic acid continuously.

12. Process according to any one of the preceding claims, wherein step iii. is conducted in a distillation unit, where the bottom product of the distillation is recycled into the upstream distillation column or into the reactor A or into the reactor or set of reactors B or drained.

13. Process according to any one of the claims 1 to 11, wherein step iii. is conducted in a crystallization unit, where the mother liquor is recycled into the crystallization unit or into the reactor A or into the reactor B or drained.

14. Process according to any one of the preceding claims, wherein in an additional step iv., after methanesulfonic acid is obtained from step iii., methanesulfonic acid anhydride is provided for subsequent charging of reactor A with methanesulfonic acid anhydride.

15. Process according to any one of the preceding claims, wherein the provision of methanesulfonic acid anhydride in step iv. for subsequent charging of reactor A, comprises a separated methanesulfonic acid anhydride manufacturing step after step iii. or a separation of methanesulfonic acid anhydride as side-component from step iii.

16. Process according to any one of the preceding claims, wherein the temperature in step i. is in the range from -5°C to 25°C, and the temperature in step iii. in the bottom of the column is in the range from 30°C to 220°C.

17. Process according to any one of the preceding claims, wherein the pressure in step i. is about 1013 mbar or beyond 1013 mbar, and the pressure in step iii. in the column is in the range from 2 mbar to 1000 mbar.

18. Process according to any one of the preceding claims, wherein between step ii. and step iii. a flash is installed.

19. Process according to any one of the preceding claims, wherein methane is used for the manufacture of the corresponding methanesulfonic acid which has undergone purification in a pressure swing absorption unit.