

**Claims**

1. Method for reducing the SO<sub>3</sub> concentration in a mixture comprising methane sulfonic acid and SO<sub>3</sub>, the method comprising:
  - 5 i. providing a mixture comprising methane sulfonic acid and SO<sub>3</sub>,
  - ii. determining the amount of an additive necessary to reduce the concentration of SO<sub>3</sub> in the mixture by forming a reaction product between the additive and SO<sub>3</sub>,
  - iii. introducing said predetermined amount of the additive into the mixture;
  - iv. optionally repeating steps ii. and iii.,
- 10 wherein the determination of the amount of additive necessary to reduce the concentration of SO<sub>3</sub> in the mixture is performed by measuring conductivity and/or density of the reaction mixture, and wherein the additive comprises water.
2. Method according to claim 1, wherein conductivity and density are measured.
- 15 3. Method according to claim 1 or 2, wherein further the acoustic velocity of the reaction mixture is determined in step a).
4. Method according to any of claims 1 to 3, wherein the concentration of SO<sub>3</sub> is reduced by 90% or more, especially by 95% or more, preferably by 98% or more, especially preferred by at least 99%.
- 20 5. Method according to any of claims 1 to 4, wherein in step ii) additionally RAMAN and/or IR and/or UV-Vis spectroscopy and/or viscosity and/or gravimetric measurements and/or refractive index and/or titration and/or thermal conductivity are determined.
- 25 6. Method according to any of claims 1 to 5, wherein the mixture further comprises methane and/or sulfuric acid.
- 30 7. Method according to claim 1, wherein the additive additionally comprises hydrogenperoxide, sulfuric acid, alkane sulfonic acid, ALK-SO<sub>2</sub>-O-OX, and/or ALK-SO<sub>2</sub>-O-O-SO<sub>2</sub>-OX, wherein ALK is methane, and X is hydrogen, as well as mixtures of two or more of them.
8. Method according to any of claims 1 or 7, wherein the amount of additive added in step iii is at least stoichiometric compared to the concentration of SO<sub>3</sub> in the mixture.
- 35 9. Method according to any of claims 1 to 8, wherein the determination of the amount of additive needed in the process is performed at least in one position, preferably in at least two

different positions, preferably at three or more different positions of the reactor in which the method is performed.

10. Method according to any of claims 1 to 9, wherein addition of the additive in step iii. is  
5 performed under mixing.
11. Method according to any of claims 1 to 10, further comprising  
v. purification of the obtained mixture, preferably by distillation.
- 10 12. Method according to any of claims 1 to 11, wherein the method is a continuous or a non-continuous process, preferably it is a continuous process.