

Claims

1. Process for the production of alkanesulfonic acids from an alkane and SO₃ with the help of an initiator comprising a distillation step, wherein the total energy consumption of the process is reduced by heat integration, wherein the feed to the distillation step is heated by heat integration with the hot stream of purified alkanesulfonic acid, and/or the feed to the distillation is heated by heat integration with the hot distillation residue, and/or the feed to the distillation is first heated by heat integration with the hot purified alkanesulfonic acid and then by heat integration with the hot distillation residue, and/or the feed to the distillation is heated by heat integration with the hot stream from mixing the alkanesulfonic acid with water to yield an aqueous solution.
2. Process for the production of alkanesulfonic acids from an alkane and SO₃ with the help of an initiator according to claim 1, comprising the following steps
 - A. synthesis of initiator and reaction of alkane with SO₃ to form alkanesulfonic acid,
 - B. quench to convert SO₃ into a heavy boiler,
 - C. removal of unreacted alkane by decompression (degassing),
 - D. purification of alkanesulfonic acid by distillation,
 - D*. pre-heating of feed to distillation by heat integration, and
 - E. discarding of waste streams (purge)
3. Process according to any one of claims 1 to 2, characterized in that the alkane is methane and the alkanesulfonic acid is methanesulfonic acid.
4. Process according to any one of claims 1 to 3, characterized in that the feed to the distillation is further heated to the distillation temperature at the feeding point after the heat integration.
5. Process according to any one of claims 1 to 4, characterized in that heat exchangers are used for heat integration, and in that the heat exchangers used for heat integration are preferably made of silicon carbide.
6. Process according to claim 5, characterized in that the heat exchangers are monoliths made of pressureless sintered silicon carbide (SSiC).
7. Process according to any one of claims 1 to 6, characterized in that the heat in the heat integration step is transferred from the hot streams leaving the distillation to the cold feed directly without a heat transfer fluid in one apparatus per hot stream.
8. Process according to any one of claims 1 to 7, characterized in that the heat in the heat integration step is transferred from the hot streams leaving the distillation to the cold feed with the help of a heat transfer fluid.

9. Process according to any one of claims 1 to 8, characterized in that aliphatic and/or cyclic hydrocarbons and/or as silicon oils are used as heat transfer fluids for heat integration.
- 5 10. Process according to any one of claims 1 to 9, characterized in that the quench step is operated adiabatically.
11. Process according to any one of claims 1 to 10, characterized in that remaining alkane from the synthesis of alkanesulfonic acids is incinerated to supply heat to the process.
- 10 12. Process according to any one of claims 1 to 11, characterized in that the heat supplied by the incineration of alkane, preferably methane, can be used to generate steam or to heat up heat transfer fluids.
- 15 13. Process according to any one of claims 1 to 12, characterized in that the heat supplied by the incineration of methane can be used to heat up the feed to the distillation or to power the evaporators of the distillation.
- 20 14. Process according to any one of claims 1 to 13, characterized in that the evaporators of the distillation are powered by steam and steam condensate coming from the evaporators of the distillation is used to heat the feed to the distillation.
15. Process according to any one of claims 1 to 14, characterized in that the energy released in the condensers of the distillation step is used to heat up the feed to the distillation.