Claims

1. Process for the purification of a sialic acid from a fermentation broth, comprising the following steps:

   removing biomass from a fermentation broth comprising a sialic acid, wherein a clarified solution is provided,

   providing a purified solution by subjecting the clarified solution to

   a cationic ion exchanger treatment with a cationic ion exchanger material, wherein the cationic ion exchanger treatment is performed under conditions in which the sialic acid passes the cationic ion exchanger material and is present in the flowthrough; and

   an anionic ion exchanger treatment with an anionic ion exchange material, wherein the anionic ion exchanger treatment is performed under conditions in which the sialic acid passes the anionic ion exchanger material and is present in the flowthrough; and

   removing salts from the purified solution by electrodialysis.

2. Process according to the preceding claim, characterized in that the process does not comprise

   i) a chromatographic separation; and/or

   ii) a use of ethanol and/or ethyl acetate, optionally does not comprise the use of an organic solvent; and/or

   iii) a step of eluting the sialic acid from a stationary phase with a solution comprising an organic solvent; and/or

   iv) a use of a heavy metal; and/or

   v) a step of heating the fermentation broth, the clarified solution and/or purified solution to a temperature of more than 45°C.

3. Process according to one of the preceding claims, characterized in that the biomass is removed from the fermentation broth by centrifugation

and/or filtration.

4. Process according to one of the preceding claims, characterized in that in the cationic ion exchanger treatment, a strong cationic ion exchanger is used and/or in the anionic ion exchanger treatment, a strong anionic exchanger is used.

5. Process according to one of the preceding claims, characterized in that the cationic ion exchanger treatment is performed to remove unspecific cations and replace them by specific cations, preferably to replace them by the specific cation H^+ or Na^+, wherein if the unspecific cations are replaced by H^+, the pH of the flowthrough is preferably adjusted to a pH of 6 to 8 before performing a further treatment step, most preferably by addition of NaOH to the flowthrough.

6. Process according to one of the preceding claims, characterized in that the anionic exchanger step is performed to remove unspecific anions and replace them by specific anions, preferably by the specific anion Cl^-or OH^-,wherein if the unspecific anions are replaced by Cl^-, the pH of the flowthrough is preferably adjusted to a pH of 6 to 8 before performing a further treatment step, most preferably by addition of NaOH to the flowthrough.

7. Process according to one of the preceding claims, characterized in that the conditions under which the sialic acid passes the anionic exchanger material and cationic exchanger material are established by adjusting the pH and/or salt concentration of the clarified solution, preferably by adjusting the pH of the clarified solution to a pH in the range of 6 to 8.

8. Process according to one of the preceding claims, characterized in that after the cationic ion exchanger treatment and the anionic ion exchanger treatment, the purified solution comprises the sialic acid, colour-giving substances and salt, wherein the salt is preferably NaCl.

9. Process according to one of the preceding claims, characterized in that in the anionic ion exchanger treatment, an anionic exchanger material in the chloride form is used and/or in the cationic ion exchanger

treatment, a cationic ion exchanger material in the hydrogen form is used.

10. Process according to one of the preceding claims, characterized in that the clarified solution is subjected firstly to the cationic ion exchanger treatment and subsequently to the anionic ion exchanger treatment.

11. Process according to one of the preceding claims, characterized in that the purified solution is concentrated, preferably by nanofiltration and/or reverse osmosis, more preferably by nanofiltration, wherein most preferably a nanofiltration membrane is used which has a molecular weight cut-off in the range of 100 to 200 kDa.

12. Process according to one of the preceding claims, characterized in that clarified solution and/or purified solution is concentrated

i) up to a concentration of $\geq$ 100 g/L, preferably $\geq$ 200 g/L, more preferably $\geq$ 300 g/L, of the sialic acid; and/or

ii) by nanofiltration at a temperature of < 80 °C, preferably < 50°C, more preferably 4 °C to 45 °C, more preferably 10 °C to 40 °C, even more preferably 15 to 30 °C, most preferably 15 to 20 °C; and/or

iii) by reverse osmosis at a temperature of 20 °C to 50 °C, more preferably 30 °C to 45 °C, most preferably 35 °C to 45 °C; and/or

iv) at a pressure between >5 bar and <50 bar, preferably at a pressure between >10 bar and <40 bar, more preferably at a pressure between >15 and <30 bar.

13. Process according to one of the preceding claims, characterized in that the electrodialysis is an electrodialysis under neutral conditions or an electrodialysis under acidic conditions.

14. Process according to one of the preceding claims, characterized in that after removing salts from the purified solution,

i) the amount of salt in the purified solution is <10% (w/w), preferably <5% (w/w), more preferably <1 % (w/w); and/or

ii) the conductivity is between 0.2 and 10.0 mS/cm^2, preferably between 0.4 and 5.0 mS/cm^2, more preferably between 0.5 and 1.0 mS/cm^2.

15. Process according to one of the preceding claims, characterized in that the clarified solution and/or purified solution is subjected to a step of discolouring, preferably by a treatment with activated charcoal, wherein said removal is optionally performed

i) before or after a step of diafiltration and/or concentration of the clarified solution; and/or

ii) before or after a step of electrodialysis and/or diafiltration of the clarified solution.

16. Process according to one of the preceding claims, characterized in that the sialic acid comprised in the clarified solution and/or purified solution is converted into its sodium form, preferably by is treating the purified solution with a strong cationic ion exchanger material in the sodium form.

17. Process according to one of the preceding claims, characterized in that the purified solution is spray-dried, wherein the purified solution preferably comprises the sialic acid in the sodium form.

18. Process according to one of the preceding claims, characterized in that the purified solution is subjected to crystallisation, preferably by addition of acetic acid to the purified solution, wherein particularly preferred, sialic acid is provided in the dihydrate crystal form.