

5 Claims

1. A process for purifying a recombinant polypeptide comprising the steps of: i) providing a solution comprising the recombinant polypeptide; ii) adding an alkyl glycoside to the solution; and iii) purifying the recombinant polypeptide by carrying out a step of chromatography on the solution.
2. The process of claim 1, wherein the alkyl glycoside is additionally included in the wash buffer of the chromatography step; or alternatively wherein the alkyl glycoside is not added to the solution in step ii), but only included in the wash buffer of the chromatography step.
3. The process of claim 1 or claim 2, wherein step (iii) results in separation of the recombinant polypeptide from host cell DNA and/or host cell protein in the solution and/or from other protein impurities in the solution.
4. The process of claim 3, wherein step (iii) results in improved separation of the recombinant polypeptide from the host cell DNA and/or host cell protein in the solution compared to the same process without adding the alkyl glycoside to the solution.
5. The process of any preceding claim, wherein the chromatography is immunoaffinity chromatography, affinity chromatography, hydrophobic interaction chromatography, ion exchange chromatography, multimodal chromatography, size exclusion chromatography or metal chelate chromatography.
6. The process of claim 5, wherein the chromatography is immunoaffinity chromatography.
7. The process of any preceding claim, wherein an ion exchange chromatography step is carried out on the solution before the step of adding the alkyl glycoside to the solution.
8. The process of any preceding claim, wherein a hydrophobic interaction chromatography step is carried out on the solution after step (iii).

9. The process of any preceding claim, wherein a multimodal chromatography step is carried out on the solution after step (iii).

10. The process of claim 8 or claim 9, wherein an ion exchange chromatography step is carried out on the solution after the hydrophobic interaction or multimodal chromatography step.

11. The process of any preceding claim, wherein the process is for separating the recombinant polypeptide from host cell DNA and/or host cell protein and comprises the steps of: a) providing the solution comprising the recombinant polypeptide; b) purifying the recombinant polypeptide by carrying out a step of ion exchange chromatography on the solution; c) adding an alkyl glycoside to the solution; d) purifying the recombinant polypeptide by carrying out a step of immunoaffinity chromatography on the solution; e) purifying the recombinant polypeptide by carrying out a step of hydrophobic interaction or multimodal chromatography on the solution; and f) purifying the recombinant polypeptide by carrying out a further step of ion exchange chromatography on the solution.

12. The process of any one of claims 5, 7, 10 and 11, wherein the ion exchange chromatography is anion exchange chromatography.

13. The process of any preceding claim, wherein the process provides a solution comprising a level of host cell DNA contamination that is less than 5000 pg/ml; and/or wherein the process provides a solution of the recombinant polypeptide comprising a level of host cell DNA contamination that is reduced by a factor of at least 1.5, preferably at least 2, at least 5, at least 10, at least 20, at least 50, at least 100, at least 150 or at least 200, when compared to a reference process which is identical to said process with the exception that no alkyl glycoside is used or with the exception that a conventional S/D treatment such as TNBP/PS 80 is used.

14. The process of any preceding claim, wherein the process provides a solution comprising a level of host cell protein contamination that is less than 5000 ng/ml; and/or wherein the process provides a solution of the recombinant polypeptide comprising a level of host cell protein (HCP) contamination that is reduced by a factor of at least 1.5, preferably at least 2, at least 2.5, at least 3, or at least 3.5, when compared to a reference process which is identical to said process with the exception that no alkyl glycoside is used or with the exception that a conventional S/D treatment such as TNBP/PS 80 is used.

15. The process of any preceding claim, wherein step ii) further comprises incubating the solution.
16. A process for inactivating one or more viruses that may be in a solution comprising a step
5 of adding an alkyl glycoside to the solution and incubating the solution.
17. The process of claim 16, wherein the solution is i) a solution comprising a recombinant polypeptide or ii) plasma-derived material.
18. The process of any one of claims 15-17, wherein the incubation is carried out for between
10 20 minutes and 5 hours.
19. The process of any of claims 15-18, wherein the incubation is carried out at room temperature or between 4 °C and 10 °C.
20. The process of any of claims 15-19, wherein the final concentration of the alkyl glycoside before incubation is above the critical micelle concentration (CMC) of the alkyl glycoside.
21. The process of any of claims 15-20, wherein the incubation is carried without agitation.
22. The process of any preceding claim, wherein the polypeptide is from a cell line recombinantly producing the polypeptide.
23. The process of any preceding claim, wherein the polypeptide is a blood coagulation
25 protein, albumin, an immunoglobulin or a fusion protein.
24. The process of any preceding claim, wherein the solution in step (i) has between 0.1 µg/ml and 50 µg/ml of host cell DNA and/or between 50 µg/ml and 1000 µg/ml of host cell protein.
25. The process of any preceding claim, wherein the alkyl glycoside is n-octyl-β-D-glucopyranoside, or is selected from the group consisting of n-decyl-beta-D-glucopyranoside, n-octyl-beta-D-maltoside, n-dodecyl-beta-D-maltoside, n-dodecyl-beta-D-glucopyranoside and n-decyl-beta-D-maltoside.
26. The process of any preceding claim, wherein the solution is further treated after step (iii)
35 and any additional purification steps by a step of viral filtration.

27. The process of any preceding claim, wherein the solution is further treated after step (iii) and any additional purification steps by one or more steps of ultrafiltration and/or diafiltration.
- 5 28. The process of any preceding claim, wherein the purified recombinant polypeptide is mixed with a pharmaceutically-acceptable carrier to make a pharmaceutical composition.
29. The process of any preceding claim, wherein the alkyl glycoside is added without any organic solvent and/or the alkyl glycoside is added without any prior mixing with an
10 organic solvent.
30. A solution comprising a recombinant polypeptide and an alkyl glycoside, wherein the solution is obtained from step (ii) of any preceding claim.
- 15 31. A solution comprising a purified recombinant polypeptide, wherein the solution is obtained by the process of any of claims 1-29.

CLAIMS

1. A method for purifying a recombinant polypeptide comprising the steps of: i) providing a solution comprising the recombinant polypeptide; ii) adding an alkyl glycoside to the solution; and iii) purifying the recombinant polypeptide by carrying out a step of chromatography on the solution.

2. The method of claim 1, wherein the alkyl glycoside is additionally included in the wash buffer of the chromatography step

3. The method of claim 1, wherein step (iii) results in separation of the recombinant polypeptide from host cell DNA and/or host cell protein in the solution and/or from other protein impurities in the solution.

4. The method of claim 3, wherein step (iii) results in improved separation of the recombinant polypeptide from host cell DNA and/or host cell protein in the solution compared to the same process without adding the alkyl glycoside to the solution.

5. The method of claim 1, wherein the chromatography is immunoaffinity chromatography, affinity chromatography, hydrophobic interaction chromatography, ion exchange chromatography, multimodal chromatography, size exclusion chromatography, or metal chelate chromatography.

6. The method of claim 5, wherein the chromatography is immunoaffinity chromatography.

7. The method of claim 1, wherein an ion exchange chromatography step is carried out on the solution before the step of adding the alkyl glycoside to the solution.

8. The method of claim 1, wherein a hydrophobic interaction chromatography step is carried out on the solution after step (iii), and/or wherein a multimodal chromatography step is carried out on the solution after step (iii).

9. The method of claim 8, wherein an ion exchange chromatography step is carried out on the solution after the hydrophobic interaction or multimodal chromatography step.

5 10. The method of claim 1, wherein the method is for separating the recombinant polypeptide from host cell DNA and/or host cell protein and comprises the steps of: a) providing the solution comprising the recombinant polypeptide; b) purifying the recombinant polypeptide by carrying out a step of ion exchange chromatography on the solution; c) adding an alkyl glycoside to the solution; d) purifying the recombinant polypeptide by carrying out a step of immunoaffinity chromatography on the solution; e) purifying the recombinant polypeptide by
10 carrying out a step of hydrophobic interaction or multimodal chromatography on the solution; and f) purifying the recombinant polypeptide by carrying out a further step of ion exchange chromatography on the solution.

15 11. The method of claim 5, wherein the ion exchange chromatography is anion exchange chromatography.

20 12. The method of claim 1, wherein the method provides a solution comprising a level of host cell DNA contamination that is less than 5000 pg/ml; and/or wherein the method provides a solution of the recombinant polypeptide comprising a level of host cell DNA contamination that is reduced by a factor of at least 1.5, when compared to a reference method in which no alkyl glycoside is used or a conventional S/D treatment is used.

25 13. The method of claim 1, wherein the method provides a solution comprising a level of host cell protein contamination that is less than 5000 ng/ml; and/or wherein the method provides a solution of the recombinant polypeptide comprising a level of host cell protein (HCP) contamination that is reduced by a factor of at least 1.5, when compared to a reference method in which no alkyl glycoside is used or a conventional S/D treatment is used.

30 14. The method of claim 1, wherein step ii) further comprises incubating the solution.

15. A method for inactivating one or more viruses in a solution comprising a step of adding an alkyl glycoside to the solution and incubating the solution.

16. The method of claim 15, wherein the solution is i) a solution comprising a recombinant polypeptide, or ii) plasma-derived material.

5 17. The method of claim 15, wherein the incubation is carried out for between 20 minutes and 5 hours.

18. The method of claim 15, wherein the incubation is carried out at room temperature or between 4 °C and 10 °C.

10 19. The method of claim 15, wherein the final concentration of the alkyl glycoside before the incubation is above the critical micelle concentration (CMC) of the alkyl glycoside.

20. The method of claim 15, wherein the incubation is carried without agitation.

15 21. The method of claim 1, wherein the recombinant polypeptide is from a cell line recombinantly producing the polypeptide.

22. The method of claim 1, wherein the recombinant polypeptide is a blood coagulation protein, albumin, an immunoglobulin, or a fusion protein.

20

23. The method of claim 1, wherein the solution in step (i) has between 0.1 µg/ml and 50 µg/ml of host cell DNA and/or between 50 µg/ml and 1000 µg/ml of host cell protein.

25 24. The method of claim 1, wherein the alkyl glycoside is n-octyl-beta-D-glucopyranoside, or is selected from the group consisting of n-decyl-beta-D-glucopyranoside, n-octyl-beta-D-maltoside, n-dodecyl-beta-D-maltoside, n-dodecyl-beta-D-glucopyranoside, and n-decyl-beta-D-maltoside.

30 25. The method of claim 1, wherein the solution is further treated after step (iii) and any additional purification steps by a step of viral filtration.

26. The method of claim 1, wherein the solution is further treated after step (iii) and any additional purification steps by one or more steps of ultrafiltration and/or diafiltration.

27. The method of claim 1, further comprising mixing the purified recombinant polypeptide with a pharmaceutically-acceptable carrier to make a pharmaceutical composition.

5 28. The method of claim 1, wherein the alkyl glycoside is added without any organic solvent and/or the alkyl glycoside is added without any prior mixing with an organic solvent.

29. A solution comprising a recombinant polypeptide and an alkyl glycoside, wherein the solution is obtained from step ii) of the method of claim 1.

10 30. A solution comprising a purified recombinant polypeptide, wherein the solution is obtained by the method of claim 1.

31. A method for purifying a recombinant polypeptide comprising the steps of: i) providing a solution comprising the recombinant polypeptide, and ii) purifying the recombinant polypeptide by carrying out a step of chromatography on the solution, wherein an alkyl glycoside is included in the wash buffer of the chromatography step.

15

32. The method of claim 31, wherein step ii) results in separation of the recombinant polypeptide from host cell DNA, host cell protein, and/or other protein impurities in the solution.

20

33. The method of claim 32, wherein step ii) results in improved separation of the recombinant polypeptide from host cell DNA, host cell protein, and/or other protein impurities in the solution, as compared to a reference method in which the alkyl glycoside is not included in the wash buffer.