CLAIMS

What is claimed is:

1. A method for the production of purified *C. difficile* toxin comprising *C. difficile* toxin A and/or *C. difficile* toxin B, the method comprising:

   a) applying an impure aqueous solution comprising *C. difficile* toxin to a hydrophobic interaction support to bind *C. difficile* toxin thereto;

   b) eluting the bound *C. difficile* toxin from the hydrophobic interaction support;

   c) applying the eluted *C. difficile* toxin from step (b) to an anion-exchange support selected from the group consisting of: (i) a polymethacrylate resin with quaternary amine functional groups; and (ii) a polyethersulfone membrane with quaternary amine functional groups, to bind *C. difficile* toxin thereto; and,

   d) eluting the bound *C. difficile* toxin from the anion-exchange support.

2. The method of claim 1 further comprising subjecting the impure aqueous solution comprising *C. difficile* toxin to tangential flow filtration before step (a).

3. The method of claim 1 or 2 further comprising recovering purified *C. difficile* toxin following step (d).

4. The method of any one of claims 1-3 wherein the toxin is *C. difficile* toxin A.

5. The method of any one of claims 1-3 wherein the toxin is *C. difficile* toxin B.

6. The method of any one of claims 1-5 wherein the hydrophobic interaction support is a matrix with attached butyl S groups or a matrix with attached propyl groups.

7. The method of claim 6 wherein the hydrophobic interaction support is a matrix with attached propyl groups and the impure aqueous solution is applied to the hydrophobic interaction support in the presence of ammonium sulphate.

8. The method of claim 7 wherein the impure aqueous solution is applied to the hydrophobic interaction support in the presence of about 0.8 to about 1.0M ammonium sulphate.

9. The method of any one of claims 1-8 wherein step (b) is performed in the absence of an organic solvent.

10. The method of claim 6 wherein the hydrophobic interaction support is a Sepharose resin with attached butyl S groups.

11. The method of claim 6 or 9 wherein about 70% of the toxin A and / or about 90% of the toxin B in the impure aqueous solution is recovered after steps (a) and (b).

12. The method of any one of claim 10 or 11 wherein step (b) is performed in the absence of an organic solvent.

13. The method of claim 1 wherein the aqueous solution comprising *C. difficile* toxin comprises *C. difficile* toxin A and *C. difficile* toxin B and, in step (c), *C. difficile* toxin A and *C. difficile* toxin B are individually eluted from the anion-exchange support.

14. The method of any one of claims 1-13 wherein the anion exchange support is a non-polysaccharide-based material.

15. The method of any one of claims 14 wherein the anion exchange support is a polymethacrylate resin with bound quaternary amine functional groups.

16. The method of any one of claims 15 wherein the anion exchange support comprises a strong anion exchanger, the moiety $–O\text{-}R\text{-}N^{+}\text{-}(CH_3)_3$ wherein R is a polymer; and / or, the anion exchange support is Tosoh Super Q 650M.

17. The method of any one of claims 13-16 wherein toxin A is eluted using a low salt buffer.

18. The method of claim 17 wherein the low salt buffer comprises 2 to about 32 mM $MgCl_2$ or about 125 to about 160 mM NaCl.

19. The method of any one of claims 13-18 wherein toxin B is eluted using a high salt buffer.

20. The method of claim 19 wherein the high salt buffer comprises about 120 to about 150 mM $MgCl_2$ or about 450 to about 550 mM NaCl.

21. The method of any one of claims 1 to 20 wherein the impure aqueous solution of *C. difficile* toxin is obtained by growing cells of *C. difficile* in a growth medium to provide a culture broth containing *C. difficile* toxin and grown cells, and separating the culture broth from the grown cells to provide the impure aqueous solution of *C. difficile* toxin.

22. The method of claim 21 wherein the growth medium comprises sorbitol.

23. The method of any one of claims 1-22 further comprising inactivating recovered purified *C. difficile* toxin with a chemical agent to provide a *C. difficile* toxoid.

24. The method of claim 23 wherein the recovered purified *C. difficile* toxin is inactivated with formaldehyde to provide a *C. difficile* toxoid.

25. The method of claim 1 wherein the *C. difficile* toxin is a genetically detoxified version thereof.

26. The method of claim 25 wherein the *C. difficile* toxin is a genetically detoxified version of *C. difficile* toxin A.

27. The method of claim 25 wherein the *C. difficile* toxin is a genetically detoxified version of *C. difficile* toxin B.

28. A method for the production of purified *C. difficile* toxin comprising *C. difficile* toxin A and/or *C. difficile* toxin B, the method comprising: applying an impure aqueous solution comprising *C. difficile* toxin to hydrophobic interaction chromatography; and, applying *C. difficile* toxin to an anion-exchange chromatography comprising a matrix comprising quaternary amine functional groups; wherein the *C. difficile* toxin A and/or B is first subjected to the anion-exchange chromatography, and then the product thereof is subjected to hydrophobic interaction chromatography.

29. The method of claim 28 wherein the *C. difficile* toxin is a genetically detoxified version thereof.

30. The method of claim 29 wherein the *C. difficile* toxin is genetically detoxified version of *C. difficile* toxin A.

31. The method of claim 29 wherein the *C. difficile* toxin is genetically detoxified version of *C. difficile* toxin B.