CLAIMS

What is claimed:

1. A method for obtaining a composition comprising an anti-α4β7 antibody from a liquid solution comprising the anti-α4β7 antibody and one or more impurities, said method comprising

contacting a matrix comprising Protein A with the liquid solution comprising the anti-α4β7 antibody and one or more impurities, such that the anti-α4β7 antibody binds to the Protein A;

washing the matrix comprising Protein A with a wash solution; and

eluting the anti-α4β7 antibody from the matrix comprising Protein A by contacting the matrix with an elution solution having a pH of 3.2 to 4, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the anti-α4β7 antibody is a humanized antibody, is an IgG1 antibody, comprises a heavy chain variable region comprising a CDR3 domain as set forth in SEQ ID NO: 4, a CDR2 domain as set forth in SEQ ID NO: 3, and a CDR1 domain as set forth in SEQ ID NO: 2; and comprises a light chain variable region comprising a CDR3 domain as set forth in SEQ ID NO: 8, a CDR2 domain as set forth in SEQ ID NO: 7, and a CDR1 domain as set forth in SEQ ID NO: 6.

2. The method of claim 1, wherein the composition comprising the anti-α4β7 antibody comprises less than 1% high molecular weight (HMW) aggregate.

3. The method of claim 1 or 2, wherein the wash solution has a pH of about 7.

4. The method of any one of claims 1 to 3, wherein the elution solution comprises citric acid and/or the elution solution has a pH of 3.2 to 3.7 or 3.3 to 3.8.

5. A method for obtaining a composition comprising an anti-α4β7 antibody from a liquid solution comprising an anti-α4β7 antibody and one or more impurities, said method comprising

contacting a solution comprising an anti-α4β7 antibody and at least one impurity with a hydrophobic interaction chromatography (HIC) resin under conditions that allow flow through of the anti-α4β7 antibody through the HIC resin, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the HIC resin is characterized as a high hydrophobic HIC resin,

wherein the anti−α4β7 antibody is a humanized antibody, is an IgG1 antibody, comprises a heavy chain variable region comprising a CDR3 domain as set forth in SEQ ID NO: 4, a CDR2 domain as set forth in SEQ ID NO: 3, and a CDR1 domain as set forth in SEQ ID NO: 2; and comprises a light chain variable region comprising a CDR3 domain as set forth in SEQ ID NO: 8, a CDR2 domain as set forth in SEQ ID NO: 7, and a CDR1 domain as set forth in SEQ ID NO: 6.

6. The method of claim 5, wherein the composition comprising the anti-α4β7 antibody, comprises less than 0.6% HMW aggregate.

7. The method of claim 5 or 6, wherein the HIC resin is equilibrated with a phosphate buffer having a pH of less than about 7.2.

8. The method of claim 7, wherein the phosphate buffer comprises about 0.35 M to about 0.15 M potassium phosphate.

9. The method of any one of claims 5 to 8, wherein the resin load is about 55 to 75 mg/ml.

10. The method of any one of claims 5 to 9, wherein the composition comprises less than about 0.22 ppm residual protein A and/or the composition contains less than about 0.3 ppm host cell protein (HCP).

11. The method of any one of claims 5 to 10, wherein the high hydrophobic HIC resin has a mean pore size of about 50 to 150 μm.

12. A method for producing a composition comprising an anti-α4β7 antibody from a liquid solution comprising the anti-α4β7 antibody and one or more impurities, said method comprising

contacting the liquid solution comprising the anti-α4β7 antibody and one or more impurities with a mixed mode chromatography resin, such that the anti-α4β7 antibody binds to the resin;

washing the mixed mode chromatography resin with a wash solution; and

eluting the anti-α4β7 antibody from the mixed mode chromatography resin by contacting the resin with an elution solution having a pH at or above pH 3.9, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the anti-α4β7 antibody comprises a heavy chain variable region set forth in SEQ ID NO:1, and a light chain variable region set forth in SEQ ID NO:2.

13. The method of claim 12, wherein the composition comprising the anti-α4β7 antibody, comprises less than 1% HMW aggregate.

14. The method of claim 12 or 13, wherein the elution solution has a pH of about pH 3.9 to about pH 4.4.

15. The method of any one of claims 12 to 14, wherein the elution solution has a conductivity of 30 mS/cm or less, or wherein the elution solution has a conductivity of about 20 mS/cm to about 30 mS/cm.

16. The method of any one of claims 12 to 15, wherein the elution solution comprises NaCl at a concentration of about 160 mM to about 240 mM.

17. The method of any one of claims 12 to 16, wherein the method further comprises purifying the anti-α4β7 antibody using a cation exchange (CEX) resin.

18. The method of claim 17, wherein the CEX resin is operated in bind/elute mode.

19. A method for producing a composition comprising an anti-α4β7 antibody from a liquid solution comprising an anti-α4β7 antibody and one or more impurities, said method comprising

contacting the liquid solution comprising the anti-α4β7 antibody and one or more impurities with a mixed mode chromatography resin, such that the anti-α4β7 antibody binds to the resin;

washing the mixed mode chromatography resin with a wash solution; and

eluting the anti-α4β7 antibody from the mixed mode chromatography resin by contacting the resin with an elution solution having a pH at or below pH 4.2 and a conductivity at or below 28 mS/cm, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the anti-α4β7 antibody comprises a heavy chain variable region set forth in SEQ ID NO:1, and a light chain variable region set forth in SEQ ID NO:2.

20. The method of claim 19, wherein the composition comprises an increased yield of an anti-α4β7 antibody relative to a control composition comprising the anti-α4β7 antibody obtained in like manner using a control elution solution having a pH above pH 4.2 and/or a control conductivity above 28 mS/cm.

21. The method of claim 19 or 20, wherein the elution solution has a pH at or below 4.0 or wherein the elution solution has a pH of about pH 4.2 to about pH 3.8.

22. The method of any one of claims 19 to 21, wherein the elution solution has a conductivity of about 18 mS/cm to about 28 mS/cm and/or the elution solution comprises NaCl at a concentration of about 160 mM to about 240 mM.

23. The method of any one of claims 19 to 22, wherein the mixed mode chromatography resin is contacted with at least 55 g or with about 55 g to about 80 g of the anti-α4β7 antibody per liter of resin.

24. The method of any one of claims 19 to 23, wherein the mixed mode chromatography resin has strong anion exchange, hydrogen bonding, and hydrophobic interaction functionality on a smaller bead size, optionally wherein the mixed mode chromatography resin is Capto Adhere ImpRes.

25. The method of any one of claims 19 to 24, wherein the method further comprises purifying the anti-α4β7 antibody using a cation exchange (CEX) resin.

26. The method of claim 25, wherein the CEX resin is operated in bind/elute mode.

27. A method for producing a composition comprising an anti-α4β7 antibody from a liquid solution comprising an anti-α4β7 antibody and one or more impurities, said method comprising

contacting the liquid solution comprising the anti-α4β7 antibody and one or more impurities with a cation exchange (CEX) resin, such that the anti-α4β7 antibody binds to the resin;

washing the CEX resin with a wash solution; and

eluting the anti-α4β7 antibody from the CEX resin by contacting the resin with an elution solution having a conductivity at or below 16 mS/cm, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the anti-α4β7 antibody comprises a heavy chain variable region set forth in SEQ ID NO:1, and a light chain variable region set forth in SEQ ID NO:2.

28. The method of claim 27, wherein the composition comprising the anti-α4β7 antibody, comprises about 1% or less HMW aggregate.

29. The method of claim 27 or 28, wherein the elution solution has a conductivity at or below 14 mS/cm, about 11-16 mS/cm or about 12-14 mS/cm.

30. The method of any one of claims 27 to 29, wherein the elution solution comprises NaCl at a concentration of about 70 mM to about 110 mM.

31. The method of any one of claims 27 to 30, wherein the elution solution has a pH from about pH 5 to about pH 6 or about pH 5.1 to about pH 5.8.

32. The method of any one of claims 27 to 31, wherein the anti-α4β7 antibody is loaded on the CEX resin at a concentration of about 25-70 g antibody per liter of resin; or the anti-α4β7 antibody is loaded on the CEX resin at a concentration of about 30-60 g antibody per liter of resin.

33. The method of any one of claims 27 to 32, wherein the CEX resin is a strong CEX resin, optionally wherein the CEX resin is Nuvia HR-S.

34. The method of any one of claims 27 to 33, wherein the method further comprises purifying the anti-α4β7 antibody using a mixed mode chromatography resin.

35. The method of claim 34, wherein the mixed mode chromatography resin is operated in bind/elute mode.

36. A method for producing a composition comprising an anti-α4β7 antibody from a liquid solution comprising a major isoform of an anti-α4β7 antibody and one or more basic isoform species, the method comprising

contacting the liquid solution comprising the anti-α4β7 antibody and one or more basic isoform species with a cation exchange (CEX) resin, such that the anti-α4β7 antibody binds to the resin;

washing the CEX resin with a wash solution; and

eluting the anti-α4β7 antibody from the CEX resin by contacting the resin with an elution solution having a conductivity at or above 11 mS/cm, such that a composition comprising the anti-α4β7 antibody is obtained,

wherein the anti-α4β7 antibody comprises a heavy chain variable region set forth in SEQ ID NO:1, and a light chain variable region set forth in SEQ ID NO:2.

37. The method of claim 36, wherein the composition comprising the anti-α4β7 antibody, comprises about 4% to about 20% basic isoform.

38. The method of claim 36 or 37, wherein the elution solution has a conductivity at or above 12 mS/cm, about 11-16 mS/cm or about 12-14 mS/cm.

39. The method of any one claims 36 to 38, wherein the elution solution has a pH from about pH 5 to about pH 6 or from about pH 5.1 to about pH 5.8.

40. The method of any one of claims 36 to 39, wherein the anti-α4β7 antibody is loaded on the CEX resin at a concentration of about 25-70 g or about 30-60 g antibody per liter of resin.

41. The method of any one of claims 36 to 40, wherein the CEX resin is Nuvia HR-S.

42. The method of any one of claims 36 to 41, wherein the method further comprises purifying the anti-α4β7 antibody using a mixed mode chromatography resin.

43. The method of claim 42, wherein the mixed mode chromatography resin is operated in bind/elute mode.

44. The method of any one of claims 1 to 43, wherein the antibody was produced in a Chinese Hamster Ovary (CHO) cell.

45. The method of any one of claims 1 to 44, wherein the composition obtained comprises purified anti-α4β7 antibody, and wherein the method further comprises a subsequent step of formulating the anti-α4β7 antibody into a formulation suitable for human use.

46. The method of any one of claims 1 to 45, wherein the method comprises formulating the purified anti-α4β7 antibody into a dry, lyophilized formulation.

47. The method of any one of claims 1 to 45, wherein the method comprises formulating purified anti-α4β7 antibody into a liquid formulation so that the anti-α4β7 antibody is suitable for administration by subcutaneous injection.

48. The method of any one of claims 1 to 47, wherein the anti-α4β7 antibody comprises a heavy chain variable region sequence as set forth in SEQ ID NO: 1, and a light chain variable region sequence as set forth in SEQ ID NO: 5.

49. The method of any one of claims 1 to 47, wherein the anti-α4β7 antibody is vedolizumab.

50. A composition comprising an anti-α4β7 antibody, wherein said composition is obtainable by the method of any one of claims 1-49.