What is Claimed is:

1. A process for preparing an alkylated cyclodextrin composition comprising an alkylated cyclodextrin, the process comprising:

(a) mixing a cyclodextrin with an alkylating agent to form a reaction milieu comprising an alkylated cyclodextrin, one or more unwanted components, and one or more drug-degrading impurities;

(b) conducting one or more separations to remove the one or more unwanted components from the reaction milieu to form a partially purified solution comprising the alkylated cyclodextrin and the one or more drug-degrading impurities, wherein the one or more separations are ultrafiltration, diafiltration, centrifugation, extraction, solvent precipitation, or dialysis;

(c) preparing a phosphate-free activated carbon having a residual conductivity of 10 μS or less by a process comprising subjecting activated carbon to a first carbon washing process comprising adding water, soaking the carbon in the water, and draining the water; and

(d) treating the partially purified solution with the phosphate-free activated carbon having a residual conductivity of 10 μS or less and producing the alkylated cyclodextrin,

wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U. due to a drug-degrading agent, as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the SAE-CD composition per mL of solution in a cell having a 1 cm path length.

2. The process of Claim 1, wherein the first carbon washing process comprises soaking the carbon in water for at least 20 minutes.

3. The process of Claim 2, wherein the first carbon washing process comprises soaking the carbon in water for about 30 minutes.

4. The process of any of Claims 1-3, wherein the first carbon washing process comprises adding the water in a countercurrent direction.

5. The process of any of Claims 1-4, further comprising repeating the first carbon washing process at least two times.

6. The process of any of Claims 1-5, further comprising, after the first carbon washing process, a second carbon washing process comprising flowing water over the carbon in a co-current direction.

7. The process of Claim 6, wherein the second carbon washing process comprises flowing water over the carbon in a co-current direction for at least 1 hour.

8. The process of Claim 6, wherein the second carbon washing process comprises flowing water over the carbon in a co-current direction for about 3 hours.

9. The process of any of Claims 6-8, further comprising testing the residual conductivity of the water after the second carbon washing process and, if the residual conductivity of the water is greater than 10 μS, repeating at least one of the first carbon washing process and the second carbon washing process until the residual conductivity of the water is 10 μS or less.

10. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.5% (w/w) of a chloride.

11. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.1% (w/w) of a chloride.

12. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.05% (w/w) of a chloride.

13. A process for preparing at least 9 consecutive lots of an alkylated cyclodextrin composition comprising an alkylated cyclodextrin and less than about 0.05% (w/w) of a chloride, the process for preparing each of the lots comprising:

(a) mixing a cyclodextrin with an alkylating agent to form a reaction milieu comprising an alkylated cyclodextrin, one or more unwanted components, and one or more drug-degrading impurities;

(b) conducting one or more separations to remove the one or more unwanted components from the reaction milieu to form a partially purified solution comprising the alkylated cyclodextrin and the one or more drug-degrading impurities, wherein the one or more separations are ultrafiltration, diafiltration, centrifugation, extraction, solvent precipitation, or dialysis; and

(c) treating the partially purified solution with a phosphate-free activated carbon having a residual conductivity of 10 μS or less and producing the alkylated cyclodextrin,

wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U. due to a drug-degrading agent, as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the SAE-CD composition per mL of solution in a cell having a 1 cm path length.

14. The process of Claim 13, wherein the at least 15 consecutive lots are prepared.

15. The process of Claim 13, wherein the at least 20 consecutive lots are prepared.

16. The process of Claim 13, wherein the at least 30 consecutive lots are prepared.

17. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 10 years.

18. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 5 years.

19. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 3 years.

20. The process of any of Claims 1-19, wherein the alkylated cyclodextrin composition further comprises less than 500 ppm of a phosphate.

21. The process of any of Claims 1-19, wherein the alkylated cyclodextrin composition further comprises less than 125 ppm of a phosphate.

22. The process of any one of Claims 1-21, wherein the residual conductivity is 9 μS or less.

23. The process of any one of Claims 1-21, wherein the residual conductivity is 8 μS or less.

24. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition comprises less than 0.01% (w/w) of a chloride.

25. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition comprises less than 0.005% (w/w) of a chloride.

26. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition comprises less than 0.0001% (w/w) of a chloride.

27. The process of any one of Claims 1-26, wherein the alkylated cyclodextrin composition has an average degree of substitution of 2 to 9.

28. The process of any one of Claims 1-26, wherein the alkylated cyclodextrin composition has an average degree of substitution of 4.5 to 7.5.

29. The process of any one of Claims 1-26, wherein the alkylated cyclodextrin composition has an average degree of substitution of 6 to 7.5.

30. The process of any one of Claims 1-29, wherein the alkylated cyclodextrin composition has an absorption of less than 0.2 A.U., as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

31. The process of Claims 30, wherein the absorption is due to a drug degrading agent.

32. The process of any one of Claims 30-31, wherein the absorption is determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 500 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

33. The process of any one of Claims 1-32, wherein the alkylated cyclodextrin composition has an absorption of less than 1 A.U., as determined by UV/vis spectrophotometry at a wavelength of 320 nm to 350 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

34. The process of any one of Claims 1-32, wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U., as determined by UV/vis spectrophotometry at a

wavelength of 320 nm to 350 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

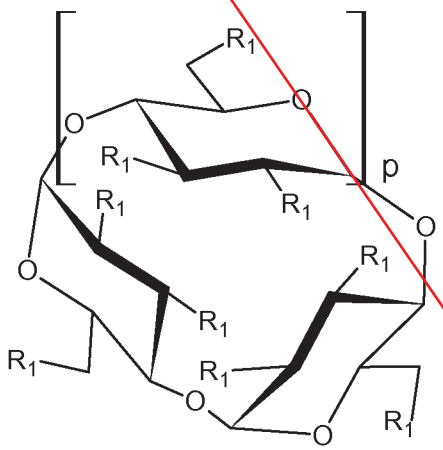
35. The process of any one of Claims 33-34, wherein the absorption is due to a color forming agent.

36. The process of any one of Claims 33-35, wherein the absorption is determined by UV/vis spectrophotometry at a wavelength of 320 nm to 350 nm for an aqueous solution containing 500 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

37. The process of any one of Claims 1-36, wherein the phosphate-free activated carbon is washed with a solvent until the eluted solvent has reached the residual conductivity.

38. The process of claim any one of Claims 1-36, wherein the phosphate-free activated carbon is washed with water until the eluted water has reached the residual conductivity.

39. The process of any one of Claims 1-38, wherein the alkylated cyclodextrin is a sulfoalkyl ether cyclodextrin of Formula (II):



Formula (II)

wherein p is 4, 5, or 6, and R_1 is independently selected at each occurrence from -OH or -O-(C_2-C_6 alkylene)-SO_3^--T, wherein T is independently selected at each occurrence from pharmaceutically acceptable cations, provided that at least one R_1 is -OH and at least one R_1 is O-(C_2-C_6 alkylene)-SO_3^--T.

40. The process of Claim 39, wherein R_1 is independently selected at each occurrence from -OH or -O-(C_4 alkylene)-SO_3^--T, and -T is Na^+ at each occurrence.

41. The process of any one of Claims 39-40, wherein the SAE-CD is a sulfobutyl ether cyclodextrin (SBE-CD).

42. The process of any one of Claims 1-38, wherein the alkylated cyclodextrin is a hydroxyalkyl ether cyclodextrin (HAE-CD).

43. The process of Claim 42, wherein the HAE-CD is a hydroxypropyl ether cyclodextrin (HPE-CD).

44. The process of any one of Claims 1-43, further comprising combining the alkylated cyclodextrin composition with one or more excipients.

45. The process of any one of Claims 1-44, further comprising combining the alkylated cyclodextrin composition with an active agent.

46. A product prepared by the process of any one of Claims 1-45.

47. A process for preparing a pharmaceutical composition, comprising:

preparing an alkylated cyclodextrin according to the process of any one of Claims 1-45; and

combining the alkylated cyclodextrin with carfilzomib.

48. A pharmaceutical composition prepared by the process of Claim 47.

What is claimed is:

1. A process for preparing an alkylated cyclodextrin composition comprising an alkylated cyclodextrin, the process comprising:

(a) mixing a cyclodextrin with an alkylating agent to form a reaction milieu comprising an alkylated cyclodextrin, one or more unwanted components, and one or more drug- degrading impurities;

(b) conducting one or more separations to remove the one or more unwanted components from the reaction milieu to form a partially purified solution comprising the alkylated cyclodextrin and the one or more drug-degrading impurities, wherein the one or more separations are ultrafiltration, diafiltration, centrifugation, extraction, solvent precipitation, or dialysis;

(c) preparing a phosphate-free activated carbon having a residual conductivity of 10 µS or less by a process comprising subjecting activated carbon to a first carbon washing process comprising adding water, soaking the carbon in the water, and draining the water; and

(d) treating the partially purified solution with the phosphate-free activated carbon having a residual conductivity of 10 µS or less and producing the alkylated cyclodextrin,

wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U. due to a drug-degrading agent, as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the SAE-CD composition per mL of solution in a cell having a 1 cm path length.

2. The process of Claim 1, wherein the first carbon washing process comprises soaking the carbon in water for at least 20 minutes.

3. The process of Claim 2, wherein the first carbon washing process comprises soaking the carbon in water for about 30 minutes.

4. The process of any of Claims 1-3, wherein the first carbon washing process comprises adding the water in a countercurrent direction.

5. The process of any of Claims 1-4, further comprising repeating the first carbon washing process at least two times.

6. The process of any of Claims 1-5, further comprising, after the first carbon washing process, a second carbon washing process comprising flowing water over the carbon in a co-current direction.

7. The process of Claim 6, wherein the second carbon washing process comprises flowing water over the carbon in a co-current direction for at least 1 hour.

8. The process of Claim 6, wherein the second carbon washing process comprises flowing water over the carbon in a co-current direction for about 3 hours.

9. The process of any of Claims 6-8, further comprising testing the residual conductivity of the water after the second carbon washing process and, if the residual conductivity of the water is greater than 10 μS, repeating at least one of the first carbon washing process and the second carbon washing process until the residual conductivity of the water is 10 μS or less.

10. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.5% (w/w) of a chloride.

11. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.1% (w/w) of a chloride.

12. The process of any one of Claims 6-9, wherein the alkylated cyclodextrin composition comprises less than 0.05% (w/w) of a chloride.

13. A process for preparing at least 9 consecutive lots of an alkylated cyclodextrin composition comprising an alkylated cyclodextrin and less than about 0.05% (w/w) of a chloride, the process for preparing each of the lots comprising:

(a) mixing a cyclodextrin with an alkylating agent to form a reaction milieu comprising an alkylated cyclodextrin, one or more unwanted components, and one or more drug- degrading impurities;

(b) conducting one or more separations to remove the one or more unwanted components from the reaction milieu to form a partially purified solution comprising the

alkylated cyclodextrin and the one or more drug-degrading impurities, wherein the one or more separations are ultrafiltration, diafiltration, centrifugation, extraction, solvent precipitation, or dialysis; and

(c) treating the partially purified solution with a phosphate-free activated carbon having a residual conductivity of 10 µS or less and producing the alkylated cyclodextrin,

wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U. due to a drug-degrading agent, as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the SAE- CD composition per mL of solution in a cell having a 1 cm path length.

14. The process of Claim 13, wherein the at least 15 consecutive lots are prepared.

15. The process of Claim 13, wherein the at least 20 consecutive lots are prepared.

16. The process of Claim 13, wherein the at least 30 consecutive lots are prepared.

17. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 10 years.

18. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 5 years.

19. The process of any one of claims 13-16, wherein the consecutive lots are prepared within a period of 3 years.

20. The process of any of Claims 1-19, wherein the alkylated cyclodextrin composition further comprises less than 500 ppm of a phosphate.

21. The process of any of Claims 1-19, wherein the alkylated cyclodextrin composition further comprises less than 125 ppm of a phosphate.

22. The process of any one of Claims 1-21, wherein the residual conductivity is 9 µS or less.

23. The process of any one of Claims 1-21, wherein the residual conductivity is 8 µS or less.

24. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition has an average degree of substitution of 2 to 9.

25. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition has an average degree of substitution of 4.5 to 7.5.

26. The process of any one of Claims 1-23, wherein the alkylated cyclodextrin composition has an average degree of substitution of 6 to 7.5.

27. The process of any one of Claims 1-26, wherein the alkylated cyclodextrin composition has an absorption of less than 0.2 A.U., as determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

28. The process of Claim 27, wherein the absorption is due to a drug degrading agent.

29. The process of any one of Claims 27-28, wherein the absorption is determined by UV/vis spectrophotometry at a wavelength of 245 nm to 270 nm for an aqueous solution containing 500 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

30. The process of any one of Claims 1-29, wherein the alkylated cyclodextrin composition has an absorption of less than 1 A.U., as determined by UV/vis spectrophotometry at a wavelength of 320 nm to 350 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

31. The process of any one of Claims 1-29, wherein the alkylated cyclodextrin composition has an absorption of less than 0.5 A.U., as determined by UV/vis spectrophotometry at a wavelength of 320 nm to 350 nm for an aqueous solution containing 300 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

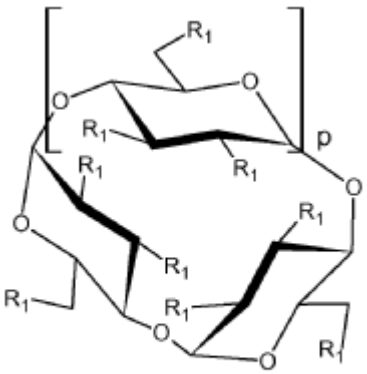
32. The process of any one of Claims 30-31, wherein the absorption is due to a color forming agent.

33. The process of any one of Claims 30-32, wherein the absorption is determined by UV/vis spectrophotometry at a wavelength of 320 nm to 350 nm for an aqueous solution containing 500 mg of the alkylated cyclodextrin composition per mL of solution in a cell having a 1 cm path length.

34. The process of any one of Claims 1-33, wherein the phosphate-free activated carbon is washed with a solvent until the eluted solvent has reached the residual conductivity.

35. The process of claim any one of Claims 1-33, wherein the phosphate-free activated carbon is washed with water until the eluted water has reached the residual conductivity.

36. The process of any one of Claims 1-35, wherein the alkylated cyclodextrin is a sulfoalkyl ether cyclodextrin of Formula (II):



Formula (II)

wherein p is 4, 5, or 6, and R_1 is independently selected at each occurrence from -OH or - O-(C_2-C_6 alkylene)-SO_3^--T, wherein T is independently selected at each occurrence from pharmaceutically acceptable cations, provided that at least one R_1 is -OH and at least one R_1 is O-(C_2-C_6 alkylene)-SO_3^--T.

37. The process of Claim 36, wherein R_1 is independently selected at each occurrence from - OH or -O-(C_4 alkylene)-SO_3^--T, and -T is Na^+ at each occurrence.

38. The process of any one of Claims 36-37, wherein the SAE-CD is a sulfobutyl ether cyclodextrin (SBE-CD).

39. The process of any one of Claims 1-35, wherein the alkylated cyclodextrin is a hydroxyalkyl ether cyclodextrin (HAE-CD).

40. The process of Claim 39, wherein the HAE-CD is a hydroxypropyl ether cyclodextrin (HPE-CD).

41. The process of any one of Claims 1-40, further comprising combining the alkylated cyclodextrin composition with one or more excipients.

42. The process of any one of Claims 1-41, further comprising combining the alkylated cyclodextrin composition with an active agent.

43. A process for preparing a pharmaceutical composition, comprising:

preparing an alkylated cyclodextrin according to the process of any one of Claims 1-42; and

combining the alkylated cyclodextrin with carfilzomib.