CLAIMS

1. A method of reducing bioburden of a chromatography resin comprising:

exposing a container comprising a composition comprising (i) a chromatography resin and (ii) a liquid comprising benzyl alcohol and at least-two antioxidant agents, to a dose of gamma-irradiation sufficient to reduce the bioburden of the container and the chromatography resin, wherein the concentration of benzyl alcohol in the liquid is 0.01% v/v to 10% v/v, and wherein benzyl alcohol and the at least two antioxidant agents are present in amounts sufficient to ameliorate the loss of binding capacity of the chromatography resin after exposure to the dose of gamma-irradiation.

2. The method of claim 1, wherein the container is a storage vessel.

3. The method of claim 1, wherein the container is a chromatography column.

4. The method of claim 1, wherein the container is a packed chromatography column.

5. The method of claim 1, wherein the composition is a slurry of sedimented chromatography resin.

6. The method of claim 1, wherein the at least two antioxidant agents are selected from the group consisting of: reduced glutathione, reduced thioredoxin, reduced cysteine, a carotenoid, melatonin, lycopene, tocopherol, reduced ubiquinone, ascorbate, bilirubin, uric acid, lipoic acid, a flavonoid, a phenolpropanoid acid, lidocaine, naringenin, fullerene, glucose, mannitol, 4-hydroxy-2,2,6,6-tetramethylpiperidin-1-oxyl, and dimethylmethoxy chromanol.

7. The method of claim 1, wherein the at least two antioxidant agents are selected from the group consisting of: mannitol, sodium ascorbate, histidine, and methionine.

8. The method of claim 7, wherein the liquid comprises mannitol, sodium ascorbate, histidine, and methionine.

9. The method of claim 1, wherein the liquid comprises:

(i) between 30 mM and 70 mM methionine and between 30 mM and 70 mM histidine; or

(ii) between 10 mM and 50 mM methionine, between 10 mM and 50 mM histidine, and between 10 mM and 50 mM sodium ascorbate; or

(iii) between 5 mM to 45 mM sodium ascorbate, between 5 mM and 45 mM methionine, between 5 mM and 45 mM mannitol, and between 5 mM to 45 mM histidine.

10. The method of claim 1, wherein the chromatography resin is selected from the group consisting of: anionic exchange chromatography resin, cationic exchange chromatography resin, affinity chromatography resin, hydrophobic interaction chromatography resin, and size exclusion chromatography resin.

11. The method of claim 10, wherein the composition comprises affinity chromatography resin comprising a protein ligand.

12. The method of claim 11, wherein the protein ligand is protein A.

13. The method of claim 10, wherein the composition comprises an anionic exchange chromatography resin.

14. The method of claim 13, wherein the anionic exchange chromatography resin comprises N-benzyl-N-methyl-ethanolamine groups.

15. The method of claim 1, wherein the dose of gamma-irradiation is between 15 kGy and 45 kGy.

16. The method of claim 1, further comprising:

packing the chromatography resin into a reduced bioburden column in an aseptic environment.

17. A composition comprising (i) a chromatography resin and (ii) a liquid comprising benzyl alcohol and at least two antioxidant agents, wherein the concentration of benzyl alcohol in the liquid is 0.01% v/v to 10% v/v, and wherein benzyl alcohol and the at least two antioxidant agents are present in amounts sufficient to ameliorate the loss of binding capacity of the chromatography resin upon treatment with a dose of gamma-irradiation sufficient to reduce bioburden of the composition.