WHAT IS CLAIMED:

1. A method of preparing a lyophilized formulation, the method comprising:

(a) cooling a lyophilization chamber containing a liquid formulation comprising a protein, a saccharide, and a surfactant to a temperature ranging from -35 °C to -50 °C to produce a frozen formulation, and holding the chamber at a temperature ranging from -40 °C to -50 °C for a time period of 2 hours to 24 hours;

(b) heating the chamber to a temperature ranging from -30 °C to -20 °C and a pressure ranging from 25 mTorr to 100 mTorr to produce a primary dried formulation, and holding the chamber at a temperature ranging from -30 °C to -20 °C and a pressure ranging from 25 mTorr to 100 mTorr for a time period of 45 hours to 60 hours;

(c) heating the chamber to a temperature ranging from 20 °C to 35 °C to produce a secondary dried formulation, and holding the chamber at a temperature ranging from 20 °C to 30 °C and a pressure ranging from 25 mTorr to 100 mTorr for a time period of 5 hours to 10 hours to produce the lyophilized formulation;

wherein the liquid formulation has a pH of 3-7 and does not contain mannitol; and the method lacks an annealing step.

2. The method of claim 1, wherein, the cooling of step (a) occurs to a temperature of about -45 °C, the holding of step (a) occurs, at a temperature of about -45°C, or both.

3. The method of claim 1 or 2, wherein the cooling of step (a) occurs at a rate ranging from 0.5 °C/min to 1 °C/min, preferably 0.5 °C/min.

4. The method of any one of claims 1-3, wherein the heating of step (b) occurs to a temperature of about -25 °C, the holding of step (b) occurs at a temperature of about -25 °C, or both.

5. The method of any one of claims 1-4, wherein the heating of step (b) occurs at a rate ranging from 0.1 °C/min to 1 °C/min, 0.1 °C/min to 0.5 °C/min, or about 0.3 °C/min.

6. The method of any one of claims 1-5, wherein the heating of step (b), the holding of step (b), or both occurs at a pressure ranging from 70 mTorr to 100 mTorr, preferably about 70 mTorr.

7. The method of any one of claims 1-6, wherein the heating of step (c) occurs to a temperature of about 30 °C, the holding of step (c) occurs at a temperature of about 30°C, or both.

8. The method of any one of claims 1-7, wherein the heating of step (c) occurs at a rate ranging up to about 0.5 °C/min, for example at a rate ranging from 0.05 °C/min to 0.5 °C/min, preferably at a rate of about 0.1 °C/min.

9. The method of any one of claims 1-8, wherein the holding of step (c) occurs at a pressure ranging from 70 mTorr to 100 mTorr, preferably at about 70 mTorr.

10. The method of any one of claims 1-9, wherein the protein is an antibody or a bispecific antibody construct.

11. The method of claim 10, wherein the bispecific antibody construct is a half-life extended (HLE) bispecific antibody construct, optionally comprising an amino acid sequence set forth in SEQ ID NO: 20, SEQ ID NO: 21, SEQ ID NO: 22, SEQ ID NO: 23, SEQ ID NO: 33, SEQ ID NO: 43, SEQ ID NO: 44, SEQ ID NO: 45, SEQ ID NO: 55, SEQ ID NO: 65, SEQ ID NO: 66, SEQ ID NO: 55, SEQ ID NO: 76, SEQ ID NO: 77, SEQ ID NO: 87, SEQ ID NO: 97, SEQ ID NO: 98, SEQ ID NO: 99, SEQ ID NO: 109, SEQ ID NO: 110, SEQ ID NO: 111, SEQ ID NO: 121, SEQ ID NO: 122, SEQ ID NO: 131, SEQ ID NO: 141, SEQ ID NO: 142, SEQ ID NO: 146, SEQ ID NO: 147, SEQ ID NO: 156, SEQ ID NO: 165, SEQ ID NO: 174, SEQ ID NO: 183, SEQ ID NO: 184, SEQ ID NO: 185, SEQ ID NO: 186, SEQ ID NO: 187, or SEQ ID NO: 188.

12. The method of any one of claims 1-11, wherein the protein is present in the liquid formulation at a concentration ranging from 0.1 mg/mL to 100 mg/mL, or from 0.1 mg/mL to 70 mg/mL, or from 0.5 mg/mL to 30 mg/mL, or from 1 mg/ml to 20 mg/mL, or about 1 mg/mL.

13. The method of any one of claims 1-12, wherein the liquid formulation of step (a) has a pH of 4-6, or 4-5, and optionally further comprises a buffer wherein the buffer is an acetate buffer, a glutamate buffer, a citrate buffer, a lactate buffer, a succinate buffer, a tartrate buffer, a fumarate buffer, a maleate buffer, a histidine buffer, a phosphate buffer, a 2-(N-morpholino) ethanesulfonate buffer, or any combination thereof.

14. The method of claim 13, wherein the buffer is present at a concentration ranging from 5 mM to 200 mM, from 10 mM to 50 mM, or about 10 mM.

15. The method of any one of claims 1-14, wherein the saccharide is a monosaccharide or a disaccharide.

16. The method of any one of claims 1-15, wherein the saccharide is present in the liquid formulation at a concentration ranging from 1 to 5% (w/v), from 6% to 12% (w/v), or about 9% (w/v).

17. The method of any one of claims 1-16, wherein the surfactant is polysorbate 20, polysorbate 40, polysorbate 60, polysorbate 80, poloxamer 188, poloxamer 407, triton X-100, polyoxyethylene, PEG 3350, PEG 4000, or a combination thereof and the surfactant is present in the liquid formulation at a concentration ranging from 0.001% to 0.5% (w/v), from 0.001% to 0.01% (w/v), or about 0.01% (w/v).

18. The method of any one of claims 1-17, wherein the liquid formulation of step (a) has a pH of about 4.2 and comprises about 10 mM L-glutamic acid, about 9.0% (w/v) sucrose, and about 0.010% (w/v) polysorbate 80.

19. The method of any one of claims 1-18, wherein the lyophilized formulation, upon reconstitution, exhibits a 0.5% or less increase in the percentage of high molecular weight species after storage for one month at 40 °C, or exhibits a 0.3% or less increase in the percentage of high molecular weight species after storage for one month at 40 °C.

20. A lyophilized protein formulation prepared by the method according to any one of claims 1-19.