WHAT IS CLAIMED IS:

1. A method of determining the reduction susceptibility of a protein, comprising:

(a) providing a first cell culture fluid and a second cell culture fluid, wherein the first cell culture fluid and the second cell culture fluid are identical, except the first cell culture fluid comprises a cell lysate and the second cell culture fluid is essentially free of the cell lysate;

(b) mixing the first cell culture fluid and the second cell culture fluid at a series of ratios, thereby preparing a set of samples;

(c) adding the protein to each sample of the set of samples and incubating each sample of the set of samples in an air-sealed container (i) having an interior volume of about 1 mL to about 3 mL, and (ii) having less than 100 microliters of headspace;

(d) determining the level of protein reduction and/or the redox potential in each sample of the set of samples; and

(e) determining the reduction susceptibility of the protein based on the level of protein reduction and/or the redox potential determined for each sample of the set of samples in step (d), thereby determining the reduction susceptibility of the protein.

2. A method of determining the reduction susceptibility of a protein, comprising:

(a) adding the protein to each sample of a set of samples prepared by mixing a first cell culture fluid and a second cell culture fluid at a series of ratios, wherein the first cell culture fluid and the second cell culture fluid are identical, except the first cell culture fluid comprises a cell lysate and the second cell culture fluid is essentially free of the cell lysates;

(b) incubating each sample of the set of samples in an air-sealed container (i) having an interior volume of about 1 mL to about 3 mL, and (ii) having less than 100 microliters of headspace; and

(c) determining the level of protein reduction and/or the redox potential in each sample of the set of samples to determine the reduction susceptibility of the protein based on the level of protein reduction and/or the redox potential,

thereby determining the reduction susceptibility of the protein.

3. A method of modifying a culturing condition or cell culture fluid bioprocessing condition of a cell culture medium used for the production of a protein, comprising:

(a) providing a first cell culture fluid and a second cell culture fluid, wherein the first cell culture fluid and the second cell culture fluid are identical, except the first cell culture fluid comprises a cell lysate and the second cell culture fluid is essentially free of the cell lysate;

(b) mixing the first cell culture fluid and the second cell culture fluid at a series of ratios, thereby preparing a set of samples;

(c) adding the protein to each sample of the set of samples and incubating each sample of the set of samples in an air-sealed container (i) having an interior volume of about 1 mL to about 3 mL, and (ii) having less than 100 microliters of headspace;

(d) determining the level of protein reduction and/or the redox potential in each sample of the set of samples;

(e) determining the reduction susceptibility of the protein based on the level of protein reduction and/or the redox potential determined for each sample of the set of samples in step (d); and

(f) modifying one or more culturing conditions or cell culture fluid bioprocessing conditions of the cell culture medium based on the reduction susceptibility of the protein,

thereby modifying the culturing condition or the cell culture fluid bioprocessing condition used for the production of the protein.

4. A method of generating a standard curve of reduction susceptibility of a protein, comprising:

(a) providing a first cell culture fluid and a second cell culture fluid, wherein the first cell culture fluid and the second cell culture fluid are identical, except the first cell culture fluid comprises a cell lysate and the second cell culture fluid is essentially free of the cell lysate;

(b) mixing the first cell culture fluid and the second cell culture fluid at a series of ratios, thereby preparing a set of samples;

(c) adding the protein to each sample of the set of samples and incubating each sample of the set of samples in an air-sealed container (i) having an interior volume of about 1 mL to about 3 mL, and (ii) having less than 100 microliters of headspace;

(d) determining the level of protein reduction and the redox potential in each sample of the set of samples; and

(e) generating a standard curve of reduction susceptibility of the protein based on the determined level of redox potential and the determined level of protein reduction for each sample of the set of samples,

thereby generating the standard curve of reduction susceptibility of the protein.

5. The method of any one of claims 1-4, wherein the cell lysate was obtained through homogenization of cells and/or wherein the cell lysate was centrifuged to remove cellular debris before step (b).

6. The method of any one of claims 1-5, wherein the second cell culture fluid is obtained by removing essentially all of the cells from a cell culture medium.

7. The method of any one of claims 1-6, wherein the protein is a recombinant protein.

8. The method of claim 7, wherein the recombinant protein is an antibody, or antigen-binding fragment thereof.

9. The method of claim 8, wherein the antibody is a monoclonal antibody.

10. The method of any one of claims 1-9, wherein the level of protein reduction is determined by assessing the oxidation state of the disulfide bonds in the protein.

11. The method of any one of claims 1-10, wherein the redox potential is determined by measuring one or more of lactate dehydrogenase (LDH), the nicotinamide adenine dinucleotide (NAD+)/reduced NAD+ (NADH) redox couple, the NADP+/reduced

NADP+ (NADPH) redox couple, NADPH, thioredoxin (Trx), and/or glutathione (Grx) or using a redox potential probe.

12. The method of any one of claims 1-11, wherein the level of protein reduction is determined by the amount of intact and/or reduced protein after the incubating with each sample of the set of samples.

13. The method of claim 12, wherein the amount of intact and/or reduced protein is determined using a native SDS-PAGE gel or a microfluidic device.

14. The method of any one of claims 1-13, comprising determining the level of protein reduction and the redox potential in each sample of the set of samples and further comprising generating a graph of the protein reduction susceptibility based on the determined redox potential and the determined level of intact or reduced protein for each sample in the set of samples.

15. The method of any one of claims 1-14, wherein the air-sealed container is an air-sealed glass vial and/or wherein the air-sealed container has an interior volume of about 2 mL to about 2.5 mL.

16. The method of any one of claims 1-15, wherein the air-sealed container has less than 50 microliters, less than 10 microliters, or 0 microliter of headspace.

17. The method of any one of claims 1-16, wherein the protein is incubated with each sample of the set of samples for about 0.5 to about 4 hours prior to step (c).

18. The method of any one of claims 1, 2, and 5-17, further comprising comparing the reduction susceptibility of the protein with a reference standard and/or further comprising selecting the protein for further development based on the reduction susceptibility of the protein.

19. The method of claim 18, wherein the reference standard is a standard curve of reduction susceptibility of a reference protein.

20. The method of any one of claims 3 and 5-17, wherein the modifying of the one or more culturing conditions or the cell culture fluid bioprocessing conditions of the cell culture medium comprises adjusting one or more: a component of a liquid culture medium composition, pH, temperature, and dissolved oxygen during the production of the protein.