

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALBAUGH, LLC,

Petitioner,

v.

BASF SE,

Patent Owner

Case: PGR2026-00026

U.S. Patent No. 12,305,206

DECLARATION OF SURI S. IYER, PH.D.

PGR2026-00026
PETITIONER EX1003

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I, Suri S. Iyer, Ph.D., declare as follows:

I. OVERVIEW

1. I have been retained by counsel for Albaugh, LLC (Petitioner” or “Albaugh”) as a technical expert in connection with the above identified proceeding.

2. I have been asked to provide my opinions concerning the validity of claims 1-6 of U.S. Patent No. 12,305,206 (“the ’206 patent”).

3. The ’206 patent is titled “Methods for Making L-Glufosinate.”
Ex.1001. I understand that the ’206 patent is owned by BASF SE (“Patent Owner or “BASF”).

4. I understand that this declaration is being submitted in support of Albaugh’s Petition for Post Grant Review of the ’206 patent.

5. My opinions in this declaration are based on my review of the ’206 patent; the prosecution history of the ’206 patent, including the applications to which it claims priority; the relevant prior art, the other documents cited or otherwise referred to in this Declaration; and my own training and experience.

6. I am being compensated for my time at my consulting rate of \$350.00/hr. I am also being reimbursed for reasonable travel expenses related to my consultation. I have no personal or financial interest in the outcome of this proceeding, and my compensation is in no way affected by its outcome.

II. BACKGROUND AND QUALIFICATIONS

7. My education and experience are described more fully in my curriculum vitae, which is attached as Ex.1004. I highlight certain experiences here.

8. I received my Bachelor of Science degree in Chemistry (with Honors) from Fergusson College, Pune, India, in 1990. I received an M.S. in Organic Chemistry (with Honors) from Indian Institute of Technology, Bombay, India, in 1992. I received a Ph.D. in Chemistry from Indiana University, Bloomington, Indiana, USA, in 2000.

9. I am currently Professor and Chair in the Department of Chemistry, University of Massachusetts, Lowell, MA, a position I have held since 2023. I have been an academic since completing my post-doctoral training at Los Alamos National Laboratories in 2004 and have held faculty positions at Georgia State University and University of Cincinnati. My research has been wide ranging covering almost all aspects of chemistry with a focus on organic chemistry, and a specialty in carbohydrates and oligosaccharides.

10. I have over 30 years of academic research experience in organic and bioorganic chemistry. My work has included the design, synthesis, purification, and stereochemical characterization of complex organic compounds, including the preparation and resolution of stereoisomers. I have extensive experience in multi-step synthetic route development, reaction optimization, chromatographic and crystallographic purification (including analytical and preparative HPLC), and structural characterization using modern analytical techniques such as NMR spectroscopy, mass spectrometry, infrared spectroscopy, and UV–Vis spectroscopy. My research has involved structure–activity relationships (SAR), chemical stability, reactivity, and functional performance of organic compounds in biologically relevant systems. In addition to laboratory-scale synthesis, I have experience evaluating formulation considerations, compound stability, reproducibility, and analytical validation. Technologies developed in my laboratory have been licensed to commercial entities developing diagnostic products. As part of those translational efforts, I worked directly with industry scientists to refine formulations, improve reproducibility, and adapt laboratory-developed methods to scalable and commercially viable production processes. This included addressing formulation optimization, analytical validation, and consistency of chemical performance under applied conditions.

11. Since 2017, I have served on multiple (~3 per annum) Federal review panels for the National Institutes of Health (NIH), the National Science Foundation (NSF), and other state and institutional funding agencies. These panels evaluate research proposals spanning organic chemistry, medicinal chemistry, chemical biology, materials chemistry, and translational chemical applications. Each Federal review panel typically consists of approximately 20 scientists from academia, industry, and government. Panel members review and score assigned proposals for scientific merit, technical rigor, innovation, feasibility, and potential impact. Individual reviewers commonly evaluate ~9 proposals per panel, and panels collectively assess and rank a large number (100) of submissions. In my administrative roles as Chair of Chemistry and previously as Director of a multidisciplinary biomedical research program, I have also evaluated internal research proposals, interdisciplinary initiatives, and graduate fellowship applications. These responsibilities require assessment of experimental design, stereochemical considerations, formulation strategies, analytical methodology, scalability, and technical validity. Through these combined experiences; academic research, translational collaboration with industry, and national-level scientific review, I have developed expertise in organic chemistry, stereoisomer synthesis and characterization, formulation considerations, analytical validation, and evaluation of chemical technologies in both research and applied contexts.

12. I have authored and co-authored the publications listed on my curriculum vitae (Ex.1004) in leading peer-reviewed journals including the *Journal of the American Chemical Society*. My curriculum vitae also includes information concerning my published book chapters and a list of patents on which I am named as an inventor.

III. SUMMARY OF OPINIONS

13. My opinions are limited to L-glufosinate ammonium formulations as claimed in the '206 patent. I provide my opinions from the perspective of a person of ordinary skill in the art, which I refer to herein as a "POSITA" or a "skilled person" as defined *infra* §VI. I summarize my opinions as follows:

- Ground 1: Claim 1 of the '206 patent is invalid because it is anticipated by U.S. Patent No. 8,445,406 ("Long"), which describes each and every limitation as arranged in claim 1.
- Grounds 2 and 3: Claims 1-6 of the '206 patent are invalid because they are obvious in view of Long, either alone (Ground 2) or in combination with one or more of the "L-Glufosinate Synthesis References"¹ (Ground 3).

¹ Schulz (Ex.1006), Zeiss (Ex.1007), Grabley (Ex.1008), Nakanishi (Ex.1009), Minowa (Ex.1010), and Knorr (Ex.1011).

IV. MATERIALS CONSIDERED

14. In forming my opinions in this Declaration, I have relied on my knowledge and professional experience as described above. I have also considered in whole or in part the materials listed below.

Exhibit	Description
1001	U.S. Patent No. 12,305,206 (the '206 patent.)
1002	Excerpts from the File History for U.S. Patent No. 12,305,206
1005	U.S. Patent No. 8,445,406 (“Long”)
1006	Schulz et al., “Stereospecific Production of the Herbicide Phosphinothricin (Glufosinate) by Transamination: Isolation and Characterization of a Phosphinothricin-Specific Transaminase from <i>Escherichia coli</i> ,” <i>Applied and Environmental Microbiology</i> , 56: 1-6 (1990)(“Schulz”)
1007	Zeiss, H-J., “Enantioselective Synthesis of Both Enantiomers of Phosphinothricin via Asymmetric Hydrogenation of α -Acylamido Acrylates,” <i>J. Org. Chem.</i> , 56:1783-1788 (1991)(“Zeiss”)
1008	U.S. Patent No. 4,389,488 (“Grabley”)
1009	U.S. Patent Appln. Publication No. 2014/0309453 A1 (“Nakanishi”), “Method for Producing Glufosinate P Free Acid”
1010	U.S. Patent No. 7,772,426 (“Minowa”)
1011	U.S. Patent No. 5,767,309 (“Knorr”)
1012	September 14, 2020, “BASF acquires Glu-L technology from AgriMetis,” https://www.basf.com/us/en/media/news-releases/2020/09/basf-acquires-glu-l-technology-from-agrimetis.html .
1013	Excerpts from the File History for U.S. Appln. No. 62/302,421
1014	Excerpts from the File History for U.S. Appln. No. 62/336,989
1015	Excerpts from the File History for U.S. Appln. No. 62/413,240
1016	Excerpts from the File History for U.S. Application No. 15/445,254
1017	U.S. Patent No. 9,834,802
1018	Excerpts from the File History for U.S. Application No. 15/787,448
1019	U.S. Patent No. 10,260,078
1020	Excerpts from the File History for U.S. Application No. 16/287,290
1021	U.S. Patent No. 10,781,465
1022	Excerpts from the File History for U.S. Application No. 16/997,133

1023	U.S. Patent No. 11,560,577
1024	Excerpts from the File History for U.S. Application No. 17/530,018
1025	U.S. Patent No. 11,905,538
1026	U.S. Patent No. 8,383,137 (“Modaressi”)
1027	Excerpts from the File History for U.S. Application No. 18/179,136
1028	U.S. Patent No. 11,913,048
1029	U.S. Patent No. 10,888,095 (“Bhoge et al.”)
1030	Ruhland et al., <i>Environ. Biosafety Res.</i> 1:29–37 (2002)
1031	Federal Register, 63(88):25195-6 (1998)
1032	Zeiss, H-J., “Enantioselective Synthesis of Both Enantiomers of Phosphinothricin via Asymmetric Hydrogenation of α -Acylamido Acrylates,” <i>J. Org. Chem.</i> , 56:1783-1788 (1991)

V. LEGAL STANDARDS

15. In expressing opinions on what I understand may be considered legal issues, I have applied the following legal standards conveyed to me by counsel.

16. I understand that the analysis of the validity of patent claims is done from the perspective of a POSITA at the time of the alleged invention in view of the patent’s disclosure and prosecution history. I understand that although the front page of the ’206 patent indicates an earliest priority date of March 2, 2016, the claims of the ’206 patent are only entitled to a filing date of February 28, 2017. My opinions would be the same regardless of whether the claims of the ’206 patent are entitled to their earlier filing date of March 2, 2016, or the later date of February 28, 2017.

A. Anticipation

17. I have been informed that a claim is invalid as anticipated (lacks novelty) if a single prior art reference discloses every limitation of the claim, either expressly or inherently, as arranged in the claim. I also understand that for a prior art reference to anticipate a claim, the reference must provide disclosure sufficient for the POSITA to practice the relevant disclosure without undue experimentation. I understand, however, that a reference does not need to disclose what is already well-known to the POSITA. Moreover, I understand that a prior art reference should be considered for all that it teaches and not just limited to a particular or preferred embodiment or example.

18. I have also been informed that anticipation can be applied using multiple references when the extra references are used to show that the primary reference includes an enabling disclosure of the preparation of a claimed chemical compound. I understand that anticipation can exist where the primary reference discloses a claimed compound while the additional references teach methods of making that compound and are submitted as evidence of what was in the public's possession before the invention.

B. Obviousness

19. I understand that a patent claim is invalid as obvious if the differences between the claimed subject matter and what is taught by the prior art are such that

the subject matter as a whole would have been obvious to a POSITA at the time that the invention was made, rather than in hindsight. I also understand that anticipation is the epitome of obviousness and a disclosure that anticipates a claim also renders the claim invalid for obviousness.

20. I understand that four factual inquiries guide a determination of obviousness: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) objective evidence of nonobviousness.

21. I understand that the hypothetical POSITA is presumed to have knowledge of the relevant prior art at the time of the claimed invention, and that the scope of the prior art encompasses any prior art that was reasonably pertinent to the particular problem(s) the inventor faced.

22. I understand that a claimed invention may be found obvious based on a single prior art reference or on a combination of prior art references. I understand that there need not be an explicit teaching, suggestion, or motivation to combine prior art references to determine that an invention is obvious. Nonetheless, I understand it is important that a POSITA have a reason to combine the elements found in the prior art in the way the claimed invention does.

23. I understand that a reasonable expectation of success need only be reasonable and does not require a certainty of success and that obviousness may be found even where there is some degree of unpredictability in the art.

24. I understand that discovering and claiming a new benefit of an old process cannot make that old process non-obvious, and that recognition of latent properties in the prior art does not render non-obvious an otherwise known invention.

25. I understand that obviousness can be based on the routine desire of a POSITA to make improvements and the motivation to optimize percentages within a disclosed set of percentage ranges in the prior art. I further understand that generally differences in concentration or temperature will not support the nonobviousness of claimed subject matter that is encompassed by the prior art, unless there is evidence indicating such concentration or temperature is critical.

26. I understand that evidence of nonobviousness includes evidence of unexpected results, commercial success, long-felt but unsolved needs, failure of others, skepticism of experts, and copying by competitors. I further understand that for evidence of nonobviousness to be accorded substantial weight, there must be a nexus between the evidence and the merits of the claimed invention. I have been informed by counsel that obviousness cannot be rebutted by the mere recognition of a latent property in the prior art and that evidence of nonobviousness

lacks a nexus to the claimed invention if it exclusively relates to a feature that was known in the prior art.

VI. PERSON OF ORDINARY SKILL IN THE ART

27. I have been informed that the claims of a patent are judged from the perspective of a hypothetical “person of ordinary skill in the art,” which I will refer to herein as a “POSITA.” I also understand that “the art” is the field of technology to which the patent is related. The purpose of a POSITA is to provide an objective viewpoint, and it is my understanding that the question of patent validity is viewed from the perspective of a POSITA, and not from the perspective of a lay person, an inventor, or a person of extraordinary skill in the art.

28. I have been informed that the claims of the '206 patent are to be interpreted as a POSITA would have understood them at the relevant time, which I have been asked to assume is February 28, 2017, although my opinions would be the same if this date was March 2, 2016.

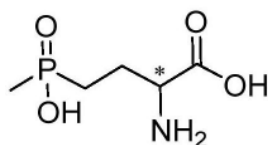
29. For the subject matter of the claims of the '206 patent, a POSITA would be a multidisciplinary team that included a person with an advanced degree in a discipline such as chemistry, organic chemistry, formulation science, pharmaceuticals including molecular pharmaceuticals, pesticides and formulation technology, and the like, and five years of practical experience, or the equivalent.

30. The POSITA would be familiar with prior art methods for synthesizing, purifying, and formulating organic molecules having biological activity, including organic compounds having an asymmetric center and the enantiomers and racemic mixtures of those compounds. The POSITA would be familiar with formulations of organic bioactive compounds, such as herbicides, in racemic form and in individual enantiomer form, as well as their properties and applications. The POSITA would be part of a research team working to develop biologically active organic molecules, including herbicides, and would attend meetings with team members typical of a team developing herbicides for commercial applications. The POSITA would have also had access to other individuals typically involved in developing herbicidal formulation products, including those involved in upstream and downstream manufacturing, analytical chemistry, packaging, and regulatory affairs. The POSITA would have regularly attended lectures, symposia, and conferences on formulations and applications of herbicides, and would have been familiar with the literature in the field and the research and development of other groups working in the field.

31. I consider myself to have at least the qualifications of a POSITA at the time of the alleged invention.

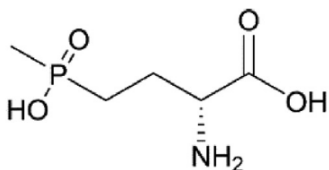
VII. BACKGROUND OF THE TECHNOLOGY

32. Glufosinate is a naturally occurring broad-spectrum herbicide and considered one of the safest herbicides from a toxicological and environmental standpoint. Ex.1001, 1:44-45. The glufosinate chemical structure includes an asymmetric carbon atom denoted * in the following diagram.

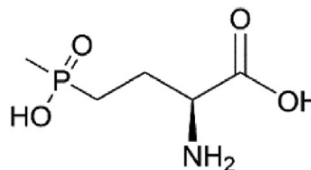


Glufosinate

33. Accordingly, glufosinate exists as both the D- and L-enantiomers.



D-Glufosinate



L-Glufosinate

34. As stated in the Background of the challenged patent, it was known in the prior art that L-glufosinate is the active enantiomer and is much more potent than D-glufosinate. *Id.*, 6 at 1:48-52.

35. Interest in the active L-enantiomer is reflected in the patenting and publication of chemical methods for the stereospecific preparation of L-glufosinate since at least as early as 1990 and some of those prior patents and publications

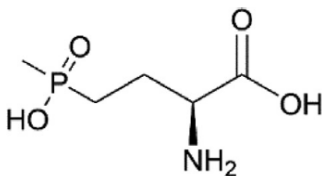
form part of the prior art relied upon in this Declaration. Ex.1006-Ex.1011 (“the L-Glufosinate Synthesis References”), discussed *infra* §IX.

VIII. THE '206 PATENT

36. I understand that U.S. Patent No. 12,305,206 (“the '206 patent”)(Ex.1001) was issued on May 20, 2025 and that it is owned by BASF SE (“BASF” or “Patent Owner”), as indicated on the front page of the '206 patent.

A. The '206 Patent Disclosure

37. The '206 patent is entitled “Methods for Making L-Glufosinate” and describes the preparation and use of the herbicide L-glufosinate.



L-Glufosinate

38. The '206 patent describes a two-step synthetic process for preparing L-glufosinate, in which “the proportion of L-glufosinate . . . can be substantially increased.” Ex.1001, 1 at Abstract. This two-step process is summarized as follows in the '206 patent:

The first step of the process involves the oxidative deamination of D-glufosinate to PPO (2-oxo-4-(hydroxy

(methyl)phosphinoyl)butyric acid). The second step involves the specific amination of PPO to L-glufosinate, using an amine group from one or more amine donors.

Id., 6 at 1:63-67.

39. The '206 patent describes that methods of obtaining L-glufosinate with high enantiomeric purity were known prior to its filing and can be used to prepare L-glufosinate salts for use in the invention.

Other salts of L-glufosinate are known in the art. U.S. Pat. Nos. 5,767,309 and 5,869,668 teach the use of chiral alkaloid bases to form diastereomeric salts with racemic glufosinate. Purification is achieved because the salt of L-glufosinate precipitates from solution in much larger quantity than the corresponding salt of D-glufosinate. Therefore this method could be used with the present invention to obtain L-glufosinate with high enantiomeric excess, if desired.

Id., 12 at 13:11-18.

40. The '206 patent states that the patents and publications identified in its disclosure are “incorporated by reference” (*Id.*, 20 at 30:56-63), which I

understand means that the relevant disclosures of those patents and publications are made part of the '206 patent disclosure.

41. The '206 patent describes aqueous formulations of L-glufosinate ammonium and “one or more additional components” selected from a list of four “components:” sodium alkyl ether sulfate, 1-methoxy-2-propanol, dipropylene glycol, and alkyl polysaccharide.

Also described herein are formulations. The formulations comprise L-glufosinate ammonium in an amount from 10-30% by weight of the formulation; *one or more additional components* selected from the group consisting of sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation; 1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation; dipropylene glycol in an amount from 4-18% by weight of the formulation; and alkyl polysaccharide in an amount from 4-20% by weight of the formulation; and water as the balance of the formulation.

Id., 7 at 4:14-24 (emphasis added).

42. The '206 patent also describes aqueous formulations of L-glufosinate ammonium having specific weight percentages of L-glufosinate ammonium, the “other components,” and water.

Optionally, the formulation comprises L-glufosinate ammonium in an amount of 12.25% by weight of the formulation; sodium alkyl ether sulfate in an amount of 15.8% by weight of the formulation; 1-methoxy-2-propanol in an amount of 0.5% by weight of the formulation; dipropylene glycol in an amount of 4.3% by weight of the formulation; alkyl polysaccharide in an amount of 4.9% by weight of the formulation; and water in an amount of 62.25% by weight of the formulation.

Id., 7 at 4:41-49.

43. In addition to L-glufosinate ammonium, the '206 patent describes that the compositions can include residual amounts of D-glufosinate and “PPO” (2-oxo-4-(hydroxy (methyl)phosphinoyl)butyric acid), an intermediate in the synthesis. *Id.*, 13 at 15:3-8.

44. The '206 patent describes that the formulations can include “carriers (e.g., diluents and/or solvents), and other components.”

Optionally, one or more additional components can be added to the composition to produce a formulated herbicidal composition. Such formulated compositions can include L-glufosinate, *carriers (e.g., diluents and/or solvents), and other components.*

Id., 13 at 15:23-27.

45. The aqueous L-glufosinate ammonium formulations described in the '206 patent can include:

- surfactants from 10-40% by weight, notably sodium alkyl ether sulfate surfactants (*Id.*, 13 at 15:37-41);
- solvent combinations, including the combination of 1-methoxy-2-propanol and dipropylene glycol, in amounts of 0.5-2% and 4-18% by weight, respectively (*Id.*, 13 at 15:56–16:2);
- humectants, specifically alkyl polysaccharides, in amounts from 4-20% by weight (*Id.*, 13 at 16:7-14);
- diluents, including water and “other aqueous components” (*Id.*, 13 at 16:24-28; and
- other “components” as described in U.S. Pat. Nos. 4,692,181 and 5,258,358, both of which are incorporated by reference (*Id.*, 14 at 17:13-16).

46. The '206 patent states that the compositions can also contain other “additaments,” including other “phytotoxics,” “plant growth regulators,” and “pesticides.”

Compositions described herein can also contain other additaments, for example, fertilizers, phytotoxics and plant growth regulators, pesticides, and the like used as adjuvants or in combination with any of the above-described adjuvants. The compositions described herein can also be admixed with the other materials, e.g., fertilizers, other phytotoxics, etc., and applied in a single application.

Id., 14 at 18:7-13.

47. The '206 patent includes Examples of the two-step synthetic process for preparing the L-glufosinate enantiomer, including enzyme purification and assay techniques (*Id.*, Examples at 17-20), but it does not include any examples of L-glufosinate ammonium aqueous formulations comprising any of the “other additives” recited in claim 1.

B. Selected Portions of the '206 Patent Prosecution History

48. Based on the information on the front page of the '206 patent, it is my understanding that the '206 patent was granted on May 20, 2025, from Application

Petition for Post-Grant Review No. PGR2026-00026 || U.S. Patent No. 12,305,206 No. 18/435,340 (“the ’340 application”) filed on February 7, 2024, which is the seventh application in a chain of applications beginning with three U.S. applications filed in 2016.

49. The following Table shows the chain of applications leading to the ’206 patent. I have been informed by counsel that there was a break in the chain of applications when BASF’s predecessor, AgriMetis LLC (“AgriMetis”),² abandoned each of its 2016 applications in January 2017, prior to filing its Application No. 15/445,254 on February 28, 2017. I have further been informed that this break in the chain of applications means that the claims of the ’206 patent are not entitled to the benefit of any of the 2016 filing dates for BASF’s three 2016 applications and must rely on the February 28, 2017 filing date of the ’254 application.

² I have reviewed a press release from September 14, 2020, in which BASF announced that it was acquiring AgriMetis LLC’s “Glu-L” technology directed to purified L-glufosinate. Ex.1012.

Application No.	Filing Date
62/302,421 Express Abandonment January 26, 2017	March 2, 2016
62/336,989 Express Abandonment January 26, 2017	May 16, 2016
62/413,240 Express Abandonment January 30, 2017	October 26, 2016
Break in Continuity	
15/445,254 (Pat. No. 9,834,802)	February 28, 2017
15/787,448 (Pat. No. 10,260,078)	October 18, 2017
16/287,290 (Pat. No. 10,781,465)	February 27, 2019
16/997,133 (Pat. No. 11,560,577)	August 19, 2020
17/530,018 (Pat. No. 11,905,538)	November 18, 2021
18/179,135 (Pat. No. 11,913,048)	March 6, 2023
18/435,340 (Pat. No. 12,305,206)	February 7, 2024

1. Method of Making Patents

50. I have reviewed the patents BASF has obtained in this chain of applications, including the claims. Other U.S. patents in this family issued with claims specific to the two-step enzymatic process for preparing L-glufosinate ammonium described in the specification (U.S. Patent Nos. 9,834,802 (Ex.1017); 10,781,465 (Ex.1021); 11,560,577 (Ex.1023); 11,905,538 (Ex.1025); and

Petition for Post-Grant Review No. PGR2026-00026 || U.S. Patent No. 12,305,206 11,913,048 (Ex.1028)) or compositions comprising the intermediate (“PPO”) in that process (U.S. Patent No. 10,26,078; Ex.1019).

2. Application No. 17/530,018 (“the ’018 application”)

51. I understand that BASF filed U.S. Application No. 17/530,018 (“the ’018 application”) on November 18, 2021 (Ex.1024) and it eventually issued as U.S. Patent No. 11,905,538 (“the ’538 patent”) having claims to formulations comprising L-glufosinate prepared by a two-step enzymatic process. Ex.1025.

52. Claim 8 of the ’538 patent recites a formulation comprising the same **“one or more additional components,”** in the same weight percentages, as recited in claim 1 of the ’206 patent.

8. The formulation of claim 1, wherein said L-glufosinate composition comprises L-glufosinate ammonium in an amount from 10-30% by weight of the formulation; and wherein said adjuvant comprises one or more additional components selected from the group consisting of sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation; 1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation; dipropylene glycol in an amount from 4-18% by weight of the formulation; and alkyl polysaccharide in an amount from 4-20% by weight of the formulation; and water as the balance of the formulation.

Id., 25.

53. I have also reviewed claims 9-14 of the ’583 patent, which mirror the specific compositions recited in dependent claims 2-6 of the ’206 patent. *Id.*

a. Office Action of March 16, 2023

54. I have reviewed what I understand to be an Office Action from the U.S. PTO Examiner dated March 16, 2023, in which the Examiner cited the same prior art reference relied on by Albaugh in this Petition, (U.S. Patent No. 8,445,406)(“Long”)(Ex.1005). Ex.1024, 19.

55. I have been informed that based on the claim term “comprising,” the Examiner interpreted claim 8 to be “open-ended,” which I understand means that the claim encompasses formulations having the recited components and allows for additional unrecited formulation ingredients. *Id.*, 19.

56. Using this “open-ended” claim interpretation, I understand that the Examiner found that the following disclosure in Long described formulations containing “L-enantiomer glufosinate.”

Long DA., (US 8,445, 406 B2) disclose stable concentrated herbicidal composition comprising surfactant alkyl ether sulfate (Abstract; and entire document); L-enantiomer glufosinate and its salt (col. 2, lines, 39-67; col. 3, lines 10-23) in an amount 20%-35% (col. 3, lines 24-34); surfactant alkyl ether sulfate (col. 3, lines 35-54); said composition further comprising organic solvent such as methanol, ethanol, propanol, ... ethylene glycol (col. 3, lines 55-67 to col. 5, lines 1-35; Examples 1 to 9, Table, col. 6; Examples 10 to 12, col. 7-8; Table Examples 13-14, col. 9-10).

Id., 19-20.

57. I understand that the Examiner rejected formulation claims 8-15 under as obvious over Long in view of Modaressi (U.S. Patent No. 8,383,137)(Ex.1026). Ex.1024, 20-21. The Examiner stated that Long discloses “L-enantiomer glufosinate” and relied on Modaressi for the teaching of a specific L-glufosinate formulation used for field trials having an L-glufosinate concentration of 37.4% by weight of the formulation,

Regarding claims 8-15, the following references teach the structural and functional elements of the instant invention: Long DA., (US 8,445, 406 B2) disclose L-enantiomer glufosinate and its salt (col. 2, lines, 39-67; col. 3, lines 10-23) in an amount 20%-35% (col. 3, lines 24-34) and Modaressi et al., (US 8,383, 137) also teach herbicidal compositions wherein the active herbicide concentration at ~37.4% and application of said herbicide in field trials (see col. 7, lines 30-67).

Id., 21.

b. Amendment and Response of September 18, 2023

58. I have reviewed the September 18, 2023 Amendment and Response filed by BASF (“Patent Owner”), in which it argued that “Long discloses that the glufosinate used in the aqueous herbicidal formulation is racemic glufosinate.” *Id.*, 10 (emphasis in original).

59. BASF also provided the Examiner with an Appendix, and argued that its field test data shows unexpected results for the claimed formulation.

As shown in Appendix A, tests were carried out using racemic glufosinate and L-glufosinate to determine the phytotoxicity to glufosinate-tolerant soybean at various concentrations (i.e., 300 g/ha, 600 g/ha, and 1200 g/ha). As shown, the L-glufosinate surprisingly resulted in less phytotoxicity to the soybeans than the same amount of racemic glufosinate (i.e., LGA 300 vs. GA 300, etc.) and when comparing the same amounts of L-glufosinate (i.e., LGA 300 vs. GA 600 or LGA 600 vs. GA 1200).

Id., 12.

60. BASF reported that its field tests compared the toxicity of L-glufosinate (LGA) and racemic glufosinate (GA) in a formulation containing SLES at “adjuvant ratios typically used in commercial Glufosinate formulations.” *Id.*, 13. According to BASF, the results show the unexpected result that L-glufosinate is less phytotoxic than racemic glufosinate on two varieties of glufosinate-tolerant soybeans. *Id.*, 12.

c. Notice of Allowance

61. I have reviewed the Examiner’s October 16, 2023 Notice of Allowance in which the Examiner stated that the claims were allowable in view of BASF’s claim amendments and “persuasive arguments.” *Id.*, 1, 4.

3. Application No. 18/435,340 (“the ’340 application”)

62. I understand that BASF filed U.S. Application No. 18/435,340 (“the ’340 application”) on February 7, 2024 (Ex.1002), and that the ’340 application issued as the ’206 patent (Ex.1001), the subject of Albaugh’s Petition.

63. I understand that BASF filed 6 claims with the '340 application.

Independent claim 1 as originally filed is reproduced below.

1. A formulation comprising:

L-glufosinate ammonium in an amount from 10-30% by weight of the formulation;

one or more additional components selected from the group consisting of:

sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation;

1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation;

dipropylene glycol in an amount from 4-18% by weight of the formulation;

alkyl polysaccharide in an amount from 4-20% by weight of the formulation; and

water as the balance of the formulation.

Ex.1002, 25.

a. Office Action of October 10, 2024

64. I have reviewed an Examiner's Office Action dated October 10, 2024, in which the Examiner rejected formulation claims 1-6 as anticipated by Long, again interpreting the claims as "open-ended," which I understand allows for the presence of additional unrecited formulation ingredients, based on the claim term "comprising." *Id.*, 17-18. The Examiner again stated that Long discloses formulations with "L-enantiomer glufosinate."

Long DA., (US 8,445, 406 B2, in IDS) disclose stable concentrated herbicidal composition comprising surfactant alkyl ether sulfate (Abstract; and entire document); L-enantiomer glufosinate and its salt in an amount 20%-35% (Abstract; col. 1, Summary of the invention; col. 2, lines, 39-67; col. 3, lines 10-34); surfactant alkyl ether sulfate in an amount 3-35% by weight (col. 3, lines 35-54); said composition further comprising organic solvent such dipropylene glycol in an amount 1-20% by weight (col. 3, lines 55-67 to col. 4, lines 1-20); alkyl polysaccharide/alkyl polyglucoside in an amount 1-15% by weight (Abstract; col. 4, lines 21-67 to col. 5, lines 1-19). Also see Examples 1 to 9, Table, col. 6; Examples 10 to 12, col. 7-8; Table Examples 13-14, col. 9-10; claims and entire document.

Id., 18.

65. From the Office Action, I understand that the Examiner also rejected each of claims 1-6 as obvious over Long in view of Bhoge et al. (U.S. Patent No. 10,888,095)(Ex.1029). According to the Examiner, Long “is silent regarding wherein one or more additional components selected from the group consisting of ... 1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation,” and that it would have been obvious to modify the teachings of Long and employ 1-methoxy-2-propanol as taught by Boghe et al. Ex.1002, 19-20.

b. Amendment and Response of March 10, 2025

66. I have reviewed BASF’s March 10, 2025 Amendment and Response in which it amended claim 1 to recite that the L-glufosinate must be “greater than

about 90%” L-isomer compared to the sum of D- and L-isomer in the formulation, the same limitation which appears in claim 1 of the ’206 patent.

1. (Currently amended) A formulation comprising:
 - L-glufosinate ammonium in an amount from 10-30% by weight of the formulation and D-glufosinate, wherein the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation;
 - one or more additional components selected from the group consisting of:
 - sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation;
 - 1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation;
 - dipropylene glycol in an amount from 4-18% by weight of the formulation;
 - alkyl polysaccharide in an amount from 4-20% by weight of the formulation;
 - and
 - water as the balance of the formulation.

Id., 7.

67. In response to the Examiner’s rejection, BASF again argued that “Long discloses that the glufosinate used in the aqueous herbicidal formulation is **racemic** glufosinate,” and therefore did not anticipate the “greater than about 90%” limitation recited in the amended claims. *Id.*, 9-10 (emphasis in original).

As indicated above, claim 1 has been amended to recite that “the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation.”

Thus, the recited L-glufosinate composition in amended claim 1 is **not** racemic glufosinate.

Id.

68. Regarding the Examiner’s obviousness rejection, BASF/AgriMetis again submitted its data from its field tests and argued (as it had done in the ’018 application discussed above) that its formulations demonstrate the unexpected result that L-glufosinate is less phytotoxic than racemic glufosinate when applied on two varieties of glufosinate-resistant soybeans. *Id.*, 10.

c. Notice of Allowance

69. I have reviewed the Examiner’s April 3, 2025 Notice of Allowance, indicating his allowance of claims 1-6 in view of BASF/AgriMetis’s claim amendments, “persuasive arguments” and “Appendix A showing unexpected results.”

Claim Rejections: 35 USC § 102 (AIA)

Claims 1-6 rejected under 35 U.S.C. 102(a)(1) and 35 U.S.C. 102(a)(2) as being anticipated by Long DA., (US 8,445,406 B2, in IDS), is being withdrawn due to claim amendments, persuasive arguments and an Appendix A showing unexpected results (for details, see applicants’ arguments/remarks dated 03/10/2025; pages 4-5).

Id., 3-4.

IX. THE PRIOR ART

A. Long (Ex.1005)

70. U.S. Patent No. 8,445,406 (“Long”)(Ex.1005) is entitled “Stable Concentrated Herbicidal Compositions.” The front page of Long indicates a date of patent of May 21, 2013. Ex.1005, 1.

71. As I discussed above, I understand that Long was considered by the USPTO Examiner during prosecution of the '206 patent and that the Examiner initially cited Long in rejecting the claims for anticipation and obviousness and later withdrew his rejections.

72. Long describes liquid compositions that include (a) 20-35 percent by weight of a water-soluble herbicide, (b) an C₁₂-C₁₆ alkyl ether surfactant, (c) an organic solvent, and (d) an alkyl polyglucoside, as indicated in the Abstract.

(57) **ABSTRACT**

A liquid herbicidal composition is provided, comprising:

- a. 20 to 35 percent by weight, based on the total weight of the composition, of a water-soluble herbicidal ingredient;
- b. a C₁₂-C₁₆ alkyl ether sulfate;
- c. an organic solvent; and
- d. an alkyl polyglucoside.

The composition is stable; i.e., it occurs in a substantially continuous, single phase at temperatures as low as -20° C. It also has a viscosity of no more than 2000 cps at temperatures as low as 0° C.

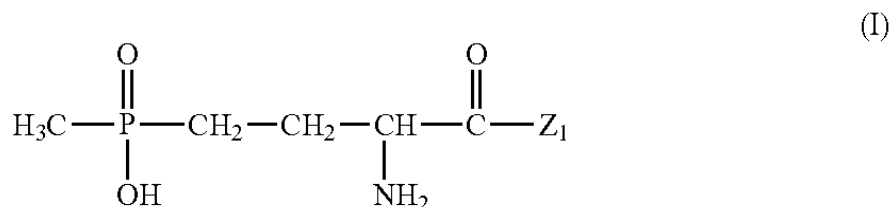
Ex.1005, 1.

73. Long describes that the herbicidal formulations comprise (a) “a water-soluble herbicidal ingredient,” and salts thereof, and specifically identifies glufosinate ammonium.

The liquid herbicidal composition of the present invention comprises a water-soluble herbicidal ingredient (a). Non-limiting, suitable examples include glufosinate and salts thereof such as glufosinate-ammonium, glyphosate and salts thereof, paraquat, diquat, and the like. Mixtures may also be used.

Id., 2 at 2:33-38.

74. Long states that the herbicidal compounds for use in the formulations are a compound of formula (I):



and contain an asymmetric carbon atom. Long describes that the herbicidal ingredient of formula (I) is intended to encompass “*all stereoisomers and mixtures thereof*,” and specifically the biologically active enantiomers, exemplified by “*the L enantiomer of glufosinate and its ammonium salt*.”

Note that the compounds of formula (I) contain an asymmetric carbon atom. *The L enantiomer has been observed to be the biologically active isomer.* The formula (I) therefore is intended to encompass *all stereoisomers and mixtures thereof*, particularly the racemate, and the biologically active enantiomer in each case. Examples of active ingredients of the formula (I) include glufosinate

and/or its ammonium salt such as in a racemic mixture;
i.e., 2-amino-4-hydroxy(methyl)-phosphinoyl-butanoic
acid and its ammonium salt, *the L enantiomer of
glufosinate and its ammonium salt* or other salts

Id., 3 at 3:10-23 (emphasis added).

75. Long teaches that the water-soluble herbicidal compounds may be present in the composition “in an amount of 20 to 35 percent by weight, often 20 to 30 percent by weight, and more often 22 to 28 percent by weight.” *Id.*, 3 at 3:24-28.

76. Long describes that the herbicidal formulations may comprise (b) an alkyl ether sulfate, exemplified by sodium lauryl ether sulfate (commonly known as “SLES”) and other salts of lauryl ether sulfate. *Id.*, 3 at 3:35-54. The preferred alkyl ether sulfate described in Long is sodium lauryl ether sulfate (SLES). *Id.*, 3 at 3:46-49. Long describes that the alkyl ether sulfate is present in the composition in an amount between 3-35% by weight, preferably between 10-30%, and more preferably between 20-30%, by weight of the composition. *Id.*, 3 at 3:50-54. Each of Examples 1-12 in Long is a formulation comprising 38% SLES. *Id.*, 4-6 at 6:31-9:54.

77. Long describes that the herbicidal formulations may comprise (c) an organic solvent and identifies several solvents including dipropylene glycol and

propylene glycol monomethyl ether (which is also known as 1-methoxy-2-propanol). *Id.*, 3 at 3:55-4:20. Long describes that individual solvents or solvent mixtures that are substantially miscible with water may be used in order to maintain the phase stability of the composition, and that the organic solvent may be present in the composition in an amount between 1-20% by weight, and preferably 3-10% by weight, based on the total weight of the composition. *Id.*

78. Long describes that the herbicidal formulations may comprise (d) an alkyl polyglucoside surfactant, which may be present in the composition in an amount between 1-15% by weight, and preferably 6-12% by weight, based on the total weight of the composition. *Id.*, 3-4 at 4:21-5:4.

79. Long describes that the herbicidal formulations may also optionally include auxiliary agents commonly used in herbicide formulations and known to those skilled in the art, including “wetting agents, dispersants, emulsifiers, penetrants, preservatives, antifreezes and evaporation inhibitors such as glycerol and ethylene or propylene glycol, sorbitol, sodium lactate, fillers, carriers, colorants including pigments and/or dyes, pH modifiers (buffers, acids, and bases), salts such as calcium, magnesium, ammonium, potassium, sodium, and/or iron chlorides, fertilizers such as ammonium sulfate and ammonium nitrate, urea, and defoamers.” *Id.*, 4 at 5:36-6:3.

80. Long includes Examples illustrating the preparation of formulations of racemic glufosinate ammonium “demonstrating combinations of co-solvents and alkyl polyglucosides and their combined effects on stability” and “illustrating the effects of dipropylene glycol with various co-solvents.” *Id.*, 4-6.

B. Ruhland (Ex.1030)

81. Ruhland et al., “A comparative investigation of the metabolism of the herbicide glufosinate in cell cultures of transgenic glufosinate-resistant and non-transgenic oilseed rape (*Brassica napus*) and corn (*Zea mays*),” *Environ. Biosafety Res.* 1:29–37 (2002)(“Ruhland”)(Ex.1030) published in 2002.

82. Ruhland is cited in the Background section of BASF’s ’206 patent for the teaching that it was known that L-glufosinate is much more potent than D-glufosinate. Ex.1001, 3 at 6:48-52.

83. Ruhland studied the metabolism of glufosinate and its L- and D-enantiomers in cell cultures of glufosinate-sensitive and glufosinate-resistant oilseed rape and corn, finding that L-glufosinate was metabolized and D-glufosinate was not metabolized. Ex.1030, 1 at Abstract.

Degradation of glufosinate was influenced not only by the cell type but also by the enantiomeric form of glufosinate applied. All metabolites were formed from LGA but not from the D-enantiomer. As already concluded by Dröge

et al. (1992) from the metabolism of glufosinate in sterile transgenic plants, DGA seems to be stable in plant metabolism under sterile conditions. The separate use of LGA and DGA confirms the metabolic stability of DGA in both sensitive and transgenic oilseed rape and corn cells.

Id., 7.

A. The L-Glufosinate Synthesis References

1. Schulz (Ex.1006)

84. Schulz et al., “Stereospecific Production of the Herbicide Phosphinothricin (Glufosinate)³ by Transamination: Isolation and Characterization of a Phosphinothricin-Specific Transaminase from *Escherichia coli*,” *Applied and Environmental Microbiology*, 56: 1-6 (1990)(“Schulz”)(Ex.1006) published in 1990. It is my understanding that during prosecution of a related application, the Examiner cited Shulz for the teaching of a method of using a transaminase enzyme to convert PPO to L-glufosinate free acid. Ex.1016, 13-14. I also understand that BASF agreed that Shulz taught the enzymatic production of L-glufosinate free acid

³ L-phosphinothricin is another name for L-glufosinate free acid.

from PPO and that the transaminase enzyme used in Shulz could be used to produce L-glufosinate in the second step of Patent Owner's process. *Id.*, 6.

85. Schulz describes the stereospecific synthesis of L-glufosinate free acid and the isolation of pure solid L-glufosinate from a mixture containing glutamate.

The aim of our investigations was to develop a method for the stereospecific synthesis of the L-enantiomer.

Ex.1006, 1.

We have isolated a transaminase from E. coli K-12 that is capable of catalyzing the synthesis of the herbicidal compound L-phosphinothricin from the corresponding keto acid (PPO) with L-glutamic acid, GABA, or 3-aminopropyl (methyl) phosphinic acid as an efficient amino-group donor.

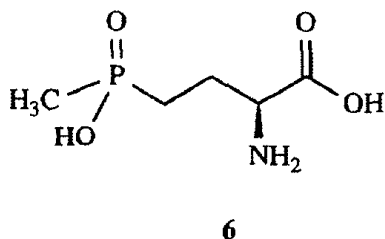
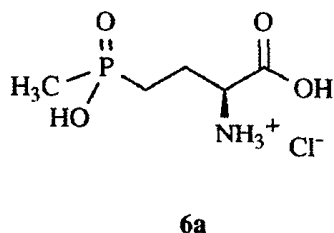
Id., 5.

86. Shulz describes that analysis of the L-phosphinothricin produced by its enzymatic method "revealed an optical purity of >99.9%." *Id.*, 5.

2. **Zeiss** (Ex.1007)

87. Zeiss, H-J., “Enantioselective Synthesis of L-Phosphinothricin⁴ from L-Methionine and L-Glutamic Acid via L-Vinylglycine,” *Tetrahedron*, 48(38):8263-70 (1992)(“Zeiss”)(Ex.1007) published in 1992. I understand that Patent Owner cited Zeiss to the Office, but the Examiner did not apply Zeiss in a rejection during prosecution.

88. Zeiss describes the synthesis and crystallization of L-glufosinate hydrochloride (**6a**) and L-glufosinate free acid (**6**).

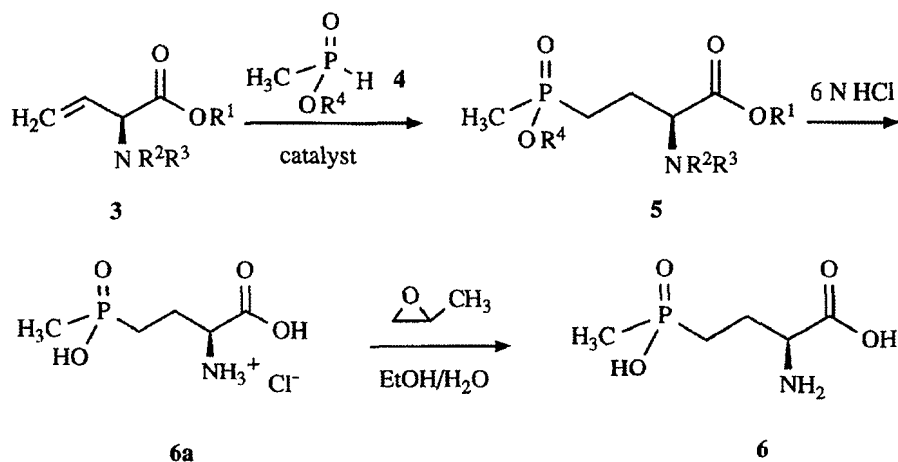


L-Phosphinothricin (**6**), a natural occurring amino acid which possesses herbicidal and antibacterial properties by inhibiting the enzyme glutamine synthetase (B.C. 6.3.1.2) in plants and bacteria, can be obtained with 99.4% enantiomeric excess via regioselective addition of alkyl

⁴ L-Phosphinothricin is another name for L-glufosinate free acid.

methylphosphinates **4** to protected L-vinylglycine derivatives **3** followed by hydrolysis of the intermediates **5**.

Ex.1007, 1 at Abstract.



Id., 2.

89. Zeiss describes obtaining L-glufosinate hydrochloride **6a** having an enantiomeric excess (ee) of 92.6% and 97.4% and obtaining⁵ L-glufosinate free acid **6** having an ee of 99.4%. *Id.*, 2-3, 6.

⁵ Zeiss cites to an earlier publication of his work for the details of the procedure for converting **6a** into **6**. Zeiss, H-J., "Enantioselective Synthesis of Both Enantiomers of Phosphinothricin via Asymmetric Hydrogenation of α -Acylamido Acrylates," *J. Org. Chem.*, 56:1783-1788 (1991)(Ex.1032)

3. Grabley (Ex.1008)

90. U.S. Patent No. 4,389,488 (“Grabley”)(Ex.1008), entitled “Process for the Enzymatic Preparation of L-2-amino-4-methylphosphinobutyric Acid.”⁶ The front page of Grabley indicates that it was granted in 1983. I understand that the USPTO Examiner did not consider Grabley during prosecution.

91. Grabley describes an enzymatic separation of a racemic mixture of D,L-glufosinate for the purification of L-glufosinate and provides an example of the use of the separation process to prepare pure crystalline L-glufosinate free acid. Ex.1008, 2 at 1:67-2:12 and throughout.

92. Grabley reports preparing L-glufosinate “with an optical purity greater of at least 90% (corresponding to 95% of L form).” *Id.*, 3 at 3:20-23.

⁶ L-2-Amino-4-methylphosphinobutyric acid, L-phosphinothricin, and L-PTC are alternative names for L-glufosinate.

4. Nakanishi (Ex.1009)

93. U.S. Patent Application Publication No. 2014/0309453 A1 (“Nakanishi”)(Ex.1009) is entitled “Method for Producing Glufosinate P Free Acid”.⁷ Nakanishi published on October 16, 2014.

94. Nakanishi describes “a method for producing crystalline glufosinate P free acid [L-glufosinate] with high purity.” EX1009, 1 at Abstract.

The present inventors found a method for producing glufosinate P free acid which is synthesized by neutralizing glufosinate P hydrochloride salt with caustic soda, as a crystal with high purity and good yield.

Id., 8 at ¶ [0017].

95. Nakanishi describes that the effect of the invention is the production of high purity crystalline glufosinate P free acid (L-glufosinate) simply and inexpensively.

The production method according to the present invention is advantageous in that crystalline glufosinate P free acid

⁷ “Glufosinate P free acid” and “L-phosphinothrycin” are also synonyms for L-glufosinate as its free acid.

which is industrially effective and having low hygroscopicity, can be produced with high purity and high yield. In addition, the production method according to the present invention is also advantageous in that glufosinate P free acid can be produced as a crystal, extremely simply and inexpensively without the need for special devices.

Id., 9 at ¶ [0025].

96. Nakanishi describes crystals of glufosinate P free acid (L-glufosinate) and its various salt forms, including the ammonium salt.

Glufosinate P free acid and its crystal can be in a salt form such as sodium salt, potassium salt, ammonium salt etc., as desired. Further, it can also be in an acid addition salt form such as hydrochloric acid, sulfuric acid, acetic acid, nitric acid etc. Glufosinate P monosodium salt (chemical name: sodium L-homoalanin-4-yl(methyl)phosphinate) is preferably exemplified as a salt of glufosinate P obtained from crystalline glufosinate P free acid of the present invention.

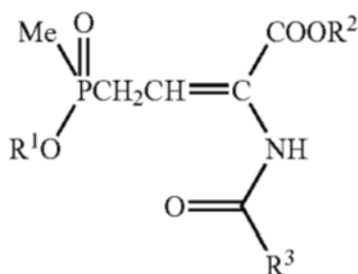
Id., 9 at ¶ [0037].

5. Minowa (Ex.1010)

97. U.S. Patent No. 7,772,426 (“Minowa”)(Ex.1010) is entitled “Method For Producing L-2-Amino-4-(Hydroxymethylphosphinyl)-Butanoic Acid”.⁸

According to the front page of Minowa, it issued on August 10, 2010. It is my understanding that the Examiner did not consider Minowa during prosecution.

98. Minowa describes a process for preparing L-glufosinate free acid by subjecting the following compound to hydrogenation in the presence of asymmetric catalyst, followed by hydrolysis of the resulting product. Ex.1010, 3-4 at 2:34-3:17.



99. Minowa describes that, with its method, L-glufosinate free acid “can be efficiently produced in high enantiomeric excess, 92% ee or more.” *Id.*, 5 at 5:6-9. Minowa include seven Examples of the preparation of L-glufosinate (as the

⁸ “L-2-amino-4-(hydroxymethylphosphinyl)-butanoic acid” is a synonym for L-glufosinate.

free acid) having an enantiomeric excess (ee) of greater than 92%. *Id.*, 6-7 at 8:40-10:26.

6. Knorr (Ex.1011)

100. U.S. Patent No. 5,767,309 (“Knorr”)(Ex.1011) is entitled “Process for Preparing [L]- or [D]-Homoalanin-4-yl-(methyl)phosphinic Acid⁹ and Salts Thereof by Racemic Resolution,” and on the front page indicates that it was issued June 16, 1998. I understand that Knorr was disclosed to the USPTO Examiner, but the Examiner did not apply Knorr in a rejection during prosecution.

101. Knorr describes various prior art methods for preparing L-glufosinate and describes the various shortcomings of those prior art methods. Ex.1011, 2 at 1:6-46.

102. Knorr describes a crystallization method for resolving racemic mixtures of L- and D-glufosinate and their salts, which takes advantage of the difference in their relative solubilities in solvent mixtures of water and solvents such as alcohols. *Id.*, 2 at 2:36-57.

⁹ “Homoalanin-4-yl-(methyl)phosphinic acid” is another synonym for L-glufosinate free acid.

103. The '206 patent specification refers to Knorr and states that Knorr's purification method "could be used with the present invention to obtain L-glufosinate with high enantiomeric excess, if desired." Ex.1001, 12 at 13:11-18.

X. CLAIM CONSTRUCTION

104. It is my understanding that in this proceeding the claims are to be given their ordinary and customary meaning, which is the meaning that the terms would have to a POSITA at the time of the invention.

105. For reference, claim 1 of the '206 patent is reproduced below.

1. A formulation comprising:
L-glufosinate ammonium in an amount from 10-30% by weight of the formulation and D-glufosinate, wherein the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation;
one or more additional components selected from the group consisting of:
sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation;
1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation;
dipropylene glycol in an amount from 4-18% by weight of the formulation;
alkyl polysaccharide in an amount from 4-20% by weight of the formulation; and
water as the balance of the formulation.

A. "comprising"

106. Claim 1 uses the term "comprising," which I understand is known as a "transitional phrase" with an established meaning that should be adopted here, and which signals that the claim is "open-ended," and "inclusive of additional

unrecited elements.” I understand that this means claim 1 does not exclude additional, unrecited, formulation ingredients (including additional active herbicidal agents).

107. A POSITA would understand that claim 1 recites “[a] formulation ‘comprising’” the following three recited elements which are set off in claim 1 as three separate clauses:

3 Recited Elements of Claim 1 A formulation, <i>comprising</i>
(1) L-glufosinate ammonium in an amount from 10-30% by weight and D-glufosinate, wherein the L-glufosinate ammonium is greater than 90% L-isomer compared to the sum of L- and D-glufosinate present in the formulation;
(2) one or more additional components selected from a group of four at recited weight percentages; and
(3) water

108. As I discussed above, this construction of claim 1 is the same construction applied by the Examiner during prosecution of the '206 patent.

109. This “open-ended” construction of claim 1 is also consistent with the teachings of the ’206 patent specification, which describes that the formulations may also include diluents, solvents, and other aqueous components.

Optionally, one or more additional components can be added to the composition to produce a formulated herbicidal composition. Such formulated compositions can include L-glufosinate, carriers (e.g., diluents and/or solvents), and other components.

Ex.1001, 13 at 15:23-27.

110. As I discussed above, the ’206 patent specification describes that the formulations can include,

- diluents, including water and “other aqueous components” (*Id.*, 13 at 16:24-28); and
- other “components” as described in U.S. Pat. Nos. 4,692,181 and 5,258,358, both of which are incorporated by reference (*Id.*, 14 at 17:13-16).

111. The ’206 patent also states that the formulations can contain other “additaments,” including other “phytotoxicants,” “plant growth regulants,” and “pesticides,” and is consistent with this “open-ended” construction of “comprising.”

Compositions described herein can also contain other additaments, for example, fertilizers, phytotoxicants and plant growth regulants, pesticides, and the like used as adjuvants or in combination with any of the above-described adjuvants. The compositions described herein can also be admixed with the other materials, e.g., fertilizers, other phytotoxicants, etc., and applied in a single application.

Id., 14 at 18:7-13.

- B. “L-glufosinate ammonium in an amount from 10-30% by weight of the formulation and D-glufosinate, wherein the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation”**

112. Claim 1 recites “L-glufosinate in an amount of 10-30% by weight and D-glufosinate.” By its plain language, a POSITA would understand that claim 1 requires the presence of some amount of both L-glufosinate ammonium and D-glufosinate.

113. Claim 1 also recites that the formulation has “greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate

present in the formulation,” which is clear on its face and would be understood by a POSITA to mean that the percentage of L-glufosinate is calculated as:¹⁰

$$\frac{(\text{mass of L-glufosinate})}{(\text{mass of L-glufosinate} + \text{mass of D-glufosinate})} \times 100$$

C. “one or more additional components selected from the group consisting of . . .”

114. Claim 1 recites that the formulation comprises “*one or more* additional components” (emphasis added) selected from a group of four listed in the claim. I understand that this language represents a closed group limited to just “*one or more*” of the four recited “additional components.”

115. A POSITA would understand from the claim language that the “*one or more* additional components” limitation in claim 1 only requires the presence of any *one* of the members at the recited weight percentages:

- sodium alkyl ether sulfate (10-40% by weight);
- 1-methoxy-2-propanol (0.5-2% by weight)

¹⁰ A POSITA would understand that the purity recited in claim 1 is not the same as “enantiomeric excess” (ee) which is a term used by organic chemists and calculated as

$$ee = \frac{(\text{mass of L-isomer} - \text{mass of D-isomer})}{(\text{mass of L-isomer} + \text{mass of D-isomer})} \times 100$$

- dipropylene glycol (4-18% by weight); or
- alkyl polysaccharide (4-20% by weight).

116. For example, based on this interpretation, any formulation containing the following three ingredients is an example of a formulation within the scope of claim 1, regardless of the presence of any other ingredients:

Claim 1		Example Formulation of Claim 1
10-30% L-glufosinate ammonium (>90% L-enantiomer)		10-30% by weight of 90% L-glufosinate
<i>one</i> or more additional components selected from	10-40% w/w sodium alkyl ether sulfate	4-18% by weight of dipropylene glycol
	0.5-2% w/w 1-methoxy-2-propanol	
	4-18% w/w dipropylene glycol	
	4-20% w/w alkyl polysaccharide	
water as the balance of the formulation		water

117. Likewise, for example, any formulation comprising the following three ingredients is another example of a formulation within the scope of claim 1, regardless of the presence of any other ingredients:

Claim 1		Example Formulation of Claim 1
10-30% L-glufosinate ammonium (>90% L-enantiomer)		10-30% by weight of 90% L-glufosinate
<i>one</i> or more additional components selected from	10-40% w/w sodium alkyl ether sulfate	4-20% by weight of an alkyl polysaccharide
	0.5-2% w/w 1-methoxy-2-propanol	
	4-18% w/w dipropylene glycol	
	4-20% w/w alkyl polysaccharide	
water as the balance of the formulation		water

D. “water as the balance of the formulation”

118. Water is also recited as a formulation ingredient in claim 1 and is recited to be present “as the balance of the formulation.”

119. The ’206 patent does not provide a definition for the meaning of the phrase “as the balance of the formulation,” and the ’206 patent disclosure describes embodiments of formulations having a range of water concentration from as low as 36.75 % by weight to as high as 73.1 % by weight. Ex1001, 13-14 at 16:29-17:12.

120. The only disclosure in the ’206 patent related to the amount of diluent (including water) present in the compositions states that the amount is “an amount necessary to produce compositions ready for packaging and/or use” (*Id.*, 13 at 16:24-29), which does not provide any meaning to the phrase “as the balance of the formulation.”

121. A POSITA would understand that the amount of water present “as the balance of the formulation” in the formulations of claim 1 is that amount necessary to achieve (or balance) the weight percentages recited in the claims.

XI. Ground 1: Claim 1 is Anticipated by Long

122. Claim 1 of the '206 patent is reproduced below.

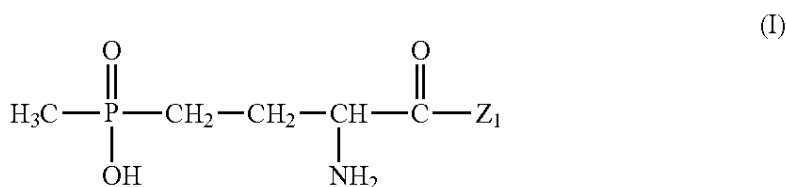
1. A formulation comprising:
L-glufosinate ammonium in an amount from 10-30% by weight of the formulation and D-glufosinate, wherein the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation;
one or more additional components selected from the group consisting of:
sodium alkyl ether sulfate in an amount from 10-40% by weight of the formulation;
1-methoxy-2-propanol in an amount from 0.5-2% by weight of the formulation;
dipropylene glycol in an amount from 4-18% by weight of the formulation;
alkyl polysaccharide in an amount from 4-20% by weight of the formulation; and
water as the balance of the formulation.

123. Long teaches each and every limitation as arranged in claim 1.

- A. **“L-glufosinate ammonium in an amount from 10-30% by weight of the formulation and D-glufosinate, wherein the formulation has greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation”**

1. L-Glufosinate Ammonium

124. As I explained above, Long identifies typical herbicides employed in its formulations as those of formula (I),



and states that the herbicidal compounds of formula (I) encompass “*all stereoisomers and mixtures thereof*,” and include “*the biologically active enantiomer*,” exemplified by “*the L enantiomer of glufosinate and its ammonium salt*.”

Note that the compounds of formula (I) contain an asymmetric carbon atom. The L enantiomer has been observed to be the biologically active isomer. The formula (I) therefore is intended to encompass *all stereoisomers and mixtures thereof*, particularly the racemate, and *the biologically active enantiomer* in each case. Examples of active ingredients of the formula (I) include glufosinate

and/or its ammonium salt such as in a racemic mixture;
i.e., 2-amino-4-hydroxy(methyl)phosphinoylbutanoic
acid and its ammonium salt, *the L enantiomer of
glufosinate and its ammonium salt* or other salts

Ex.1005, 3 at 3:10-23 (emphasis added).

125. I understand, and a POSITA would understand, from this disclosure that the formulations in Long are not limited to those comprising **racemic** glufosinate, but rather Long's formulations can be employed with "all *stereoisomers* and mixtures thereof," including the biologically active *L-enantiomer of glufosinate ammonium*, which is expressly called out, either as the purified *stereoisomer* or in a mixture (such as a racemic mixture) with the D-isomer.

126. As I discussed above, I understand that during prosecution of the '206 patent, in response to an Examiner rejection, BASF argued that Long "discloses that the glufosinate used in the aqueous herbicidal formulations is **racemic** glufosinate." Ex1002, 9-10 (emphasis in original). I also understand that the Examiner found BASF's argument to be "persuasive." *Id.*, 3-4. I disagree with BASF's argument based on the plain language in Long and for the reasons discussed above, and believe that the Examiner erred in accepting BASF's argument.

2. L-Glufosinate Ammonium of “greater than about 90% L-glufosinate compared to the sum of the D-glufosinate and the L-glufosinate present in the formulation”

127. A POSITA would have been aware of the L-Glufosinate Synthesis References (Ex.1006-1011, summarized above) describing the preparation and purification of L-glufosinate and its salts (including its ammonium salt) having greater than 90% L-enantiomer purity (when compared to the sum of the D- and L-isomers) as recited in claim 1 of the '206 patent.

128. This is consistent with the following passage from the '206 patent, which describes that methods of obtaining L-glufosinate salts with high enantiomeric purity were known in the prior art, including in the Knorr prior art reference (Ex.1011).¹¹

Other salts of L-glufosinate are known in the art. U.S. Pat. Nos. 5,767,309 [Knorr; Ex. 1011] and 5,869,668 teach the use of chiral alkaloid bases to form diastereomeric salts with racemic glufosinate. Purification is achieved because the salt of L-glufosinate precipitates from solution in much

¹¹ I have been informed by counsel that the teachings in Knorr (Ex.1011) can be considered part of the '206 patent disclosure, since the '206 patent specification states that it was to be “incorporated by reference” into the '206 patent.

larger quantity than the corresponding salt of D-glufosinate. Therefore this method could be used with the present invention to obtain L-glufosinate with high enantiomeric excess, if desired.

Ex.1001, 12 at 13:11-18.

129. As mentioned above, I have been informed by counsel that multiple references can be used in an anticipation when the extra references (the L-Glufosinate Synthesis References) show that the primary reference (Long) contains a disclosure that would enable a POSITA to prepare a claimed compound (L-glufosinate ammonium of 90% L-isomer purity compared to the sum of L- and D-isomers). Here, I am using the L-Glufosinate Synthesis References to show that methods for preparing L-glufosinate ammonium having at least 90% L-isomer (compared to the sum of L- and D-isomers) was in the public's possession before 2017 (and 2016).

130. The L-Glufosinate Synthesis References show that by 2017 (and 2016) the public was in possession of methods of preparing L-glufosinate either as its free acid (Schulz (Ex.1006), Zeiss (Ex. 1007), Grabley (Ex.1008), Nakanishi (Ex.1009), Minowa (Ex.1010)) or in salt forms (Zeiss (Ex.1007), Nakanishi (Ex.1009), Knorr (Ex.1011)), including the ammonium salt (Nakanishi (Ex.1009)). These methods included enzymatic preparation starting from materials such as

PPO (Schulz (Ex.1006), Grabley (Ex.1008), Minowa (Ex.1010)) and chemical synthesis (Zeiss (Ex.1007), Nakanishi (Ex.1009)) or purification from racemic mixtures (Knorr (Ex.1011)). A POSITA would have been able to follow the teachings of the L-Glufosinate Synthesis References to prepare either the free acid or a salt of L-glufosinate, including its ammonium salt. As discussed in Nakanishi (Ex.1010), the preparation of various salt forms of L-glufosinate from its free acid was known, and would have been a matter of routine acid-base chemistry for a POSITA.

3. “in an amount from 10-30% by weight of the formulation”

131. As I explain above at §IX.A., Long describes that herbicides, L-glufosinate and its salts, including L-glufosinate ammonium, may be present in its formulations in an amount from “10-30% by weight.” Long describes formulations wherein the herbicidal ingredient is present in the composition “in an amount of 20 to 35 percent by weight, often 20 to 30 percent by weight, and more often 22 to 28 percent by weight.” Ex.1005, 3 at 3:24-28.

132. The Examples in Long also teach formulations having L-glufosinate salts between 10-30% by weight, since a POSITA would understand that Long’s Example formulations can be used with purified L-glufosinate ammonium substituted for racemic glufosinate. Each of the Examples in Long employs a 50% solution of racemic glufosinate at 44% by weight. *Id.*, 4-5 at 6:30-7:68. A

POSITA would understand that 44% by weight of a 50% solution of racemic glufosinate translates to 22% by weight racemic glufosinate ($0.44 \times 0.50 = 0.22$), half of which (0.11 or 11% by weight) is L-glufosinate. Using the same active ingredient weight percentages employed in Long's Examples, a POSITA would use half as much active enantiomer – or 11% by weight L-glufosinate ammonium – within the 10-30% by weight recited in claim 1. My calculations above assume a solution of 100% “*pure*” L-isomer. A POSITA would also account for the enantiomeric purity of the starting L-isomer, adjusting the weight percentage accordingly. For example if the starting L-glufosinate ammonium is 90% L-isomer, a POSITA would increase the weight percentage from 11% as follows:

$$11\%/0.9 = 12.2\%.^{12}$$

¹² A POSITA would make the following calculation in determining the amount of L-glufosinate to include in Long's Example formulations using 90% pure L-isomer: 22% by weight of 50% solution of glufosinate is 11% L-glufosinate; in order to arrive at 11% L-glufosinate, and accounting for L-glufosinate of 90% purity, the calculation is $11\%/0.90 = 12.2\%$ of a 90% pure L-isomer, which is also within the 10-30% by weight range recited in claim 1.

B. “one or more additional components selected from . . .”

133. Claim 1 recites a formulation comprising “one or more” of the following “additional components” at the recited weight percentages:

- sodium alkyl ether sulfate (10-40% by weight);
- 1-methoxy-2-propanol (0.5-2% by weight);
- dipropylene glycol (4-18% by weight); or
- alkyl polysaccharide (4-20% by weight).

134. As I discuss above, a POSITA would understand from the claim language that the “*one or more* additional components” limitation in claim 1 only requires the presence of any *one* of the members at the recited weight percentages.

135. Long describes formulations suitable for purified L-glufosinate ammonium that meet the limitation requiring “*one* or more additional components” at the weight percentages recited in claim 1.

1. “sodium alkyl ether sulfate in an amount from 10-40% by weight”

136. Long teaches that the herbicidal formulations may comprise an alkyl ether sulfate, exemplified by sodium lauryl ether sulfate (SLES) and other salts of lauryl ether sulfate. Ex.1005, 3 at 3:35-54. The preferred alkyl ether sulfate described in Long is SLES. *Id.*, 3 at 3:46-49.

137. Long describes that the alkyl ether sulfate is present in the composition within the 10-40% by weight range recited in claim 1. Long teaches that SLES may be present in an amount between 3-35% by weight, preferably between 10-30%, and more preferably between 20-30%, by weight of the composition. *Id.*, 3 at 3:50-54.

138. Further, each of Examples 1-12 in Long is a formulation comprising 38% SLES, within the 10-40% by weight range of SLES recited in claim 1. *Id.*, 4-6 at 6:31-9:54.

139. I understand, and a POSITA would understand, that Long describes aqueous formulations containing purified L-glufosinate ammonium in an amount from 10-30% by weight (as discussed above) formulated with SLES in an amount from 10-40% by weight. Based on this understanding, Long's aqueous formulations of L-glufosinate ammonium having 90% L-isomer in an amount between 10-30% by weight and SLES in an amount between 10-40% by weight anticipate claim 1 of the '206 patent because they include each of the recited formulation components:

A formulation, comprising		
Claim 1		Long (Ex.1005)
10-30% L-glufosinate ammonium (>90% L-enantiomer compared to the sum of L- and D-isomers)		see discussion above at §XI.A.
one or more additional components selected from	10-40% w/w sodium alkyl ether sulfate	10-40% w/w sodium alkyl ether sulfate (SLES)
	0.5-2% w/w 1-methoxy-2-propanol	
	4-18% w/w dipropylene glycol	
	4-20% w/w alkyl polysaccharide	
water as the balance of the formulation		water

140. My conclusion is based on my understanding that such formulations described in Long anticipate claim 1 regardless of whether Long's formulations include additional carriers (solvent, diluents) or other components, because claim 1 includes the phrase “comprising” and is therefore open-ended and allows for the presence of other non-recited ingredients.

2. “1-methoxy-2-propanol in an amount from 0.5-2% by weight” OR “dipropylene glycol in an amount from 4-18% by weight”

141. Long describes that the herbicidal formulations can comprise an organic solvent, and identifies the specific solvents recited in claim 1: dipropylene glycol and 1-methoxy-2-propanol (also known as propylene glycol monomethyl ether). Ex.1005, 3 at 3:55-4:20.

142. Long teaches that individual solvents or solvent mixtures that are substantially miscible with water may be used in order to maintain the phase stability of the formulation, and that the organic solvent may be present in the composition in an amount between 1-20% by weight, and preferably 3-10% by weight, based on the total weight of the composition. *Id.*

143. Long includes Example formulations of racemic glufosinate “demonstrating combinations of co-solvents and alkyl polyglucosides and their combined effects on stability.” *Id.*, 4-5 at 6:30-7:68.

144. Long’s Example formulations 4-6 include 1-methoxy-2-propanol (another name for propylene glycol monomethyl ether) at 7% by weight and Long’s Example formulations 7-12 include dipropylene glycol at 7% by weight. *Id.*

145. I understand, and a POSITA would understand, from the teachings in Long that its Example formulations can be used with purified L-glufosinate

ammonium (greater than 90% L-isomer compared to the sum of L- and D-isomers) substituted for racemic glufosinate.

146. It is my understanding that Long's aqueous formulations having purified L-glufosinate ammonium in an amount between 10-30% by weight (as discussed above) and 1-methoxy-2-propanol (at Long's disclosed range of 1-20% by weight) and/or dipropylene glycol (at Long's disclosed ranges of 1-20% by weight or 3-10% by weight, or as used in Long's Examples at 7% by weight) anticipate claim 1 because they include the recited formulation components at their recited weight percentages:

A formulation, comprising		
Claim 1		Long (Ex.1005)
10-30% L-glufosinate ammonium (>90% L-enantiomer compared to the sum of L- and D-isomers)		see discussion above at §XI.A.
<i>one</i> or more additional components selected from	10-40% w/w sodium alkyl ether sulfate	0.5-2% w/w 1-methoxy-2-propanol OR 4-18% w/w dipropylene glycol
	0.5-2% w/w 1-methoxy-2-propanol	
	4-18% w/w dipropylene glycol	
	4-20% w/w alkyl polysaccharide	
water as the balance of the formulation		water

147. My conclusion is based on my understanding that such formulations described in Long anticipate claim 1 regardless of whether Long's formulations include additional carriers (solvent, diluents) or other components, because claim 1

includes the phrase “comprising” and is therefore open-ended and allow for the presence of other non-recited ingredients.

3. 4-20% w/w alkyl polysaccharide

148. Long describes that the herbicidal formulations can comprise an alkyl polyglucoside surfactant, which may be present in the composition in an amount between 1-15% by weight, and preferably 6-12% by weight, based on the total weight of the composition. Ex.1005, 3-4 at 4:21-5:4.

149. Each of the Example formulations in Long employs an alkyl polyglycoside (either hexyl polyglycoside, ethylhexyl polyglycoside, or C₈₋₁₁ alkyl polyglycoside) at 5% by weight, within the 4-20% by weight range recited in claim 1. *Id.*, 4-5.

150. Aqueous formulations of purified L-glufosinate ammonium (90% L-isomer compared to the sum of L- and D-isomers) in an amount between 10-30% by weight (as discussed above) and an alkyl polysaccharide at Long's disclosed ranges of 1-15% by weight or 6-12% by weight, or as used in Long's Examples at 5% by weight anticipate claim 1 because they include the recited formulation components:

A formulation, comprising		
Claim 1		Long (Ex.1005)
10-30% L-glufosinate ammonium (>90% L-enantiomer compared to the sum of L- and D-isomers)		see discussion above at §XI.A.
one or more additional components selected from	10-40% w/w sodium alkyl ether sulfate	4-20% w/w alkyl polysaccharide
	0.5-2% w/w 1-methoxy-2-propanol	
	4-18% w/w dipropylene glycol	
	4-20% w/w alkyl polysaccharide	
water as the balance of the formulation		water

151. My conclusion is based on my understanding that such formulations described in Long anticipate claim 1 regardless of whether Long's formulations include additional carriers (solvent, diluents) or other components, because claim 1 includes the phrase “comprising” and is therefore open-ended and allows for the presence of other non-recited ingredients.

4. “water as the balance of the formulation”

152. Claim 1 recites the presence of “water as the balance of the formulation.” I understand, and a POSITA would understand, that the formulations of claim 1 must include water and that there is no upper or lower limitation on the amount of water, except that it is present in the formulations of claim 1 in an amount necessary to achieve (or balance) the recited weight percentages of the other recited components.

153. For the reasons discussed above at ¶¶118-121, and based on my understanding that claim 1 is open-ended and allows for the presence of other unrecited ingredients, Long anticipates claim 1.

XII. Grounds 2 and 3: Claims 1-6 are Obvious Over Long, Either Alone (Ground 2) or in View of the “L-Glufosinate Synthesis References” (Ground 3)

154. In my opinion, each of the claims of the '206 patent are invalid because they are obvious in view of Long, either alone or in combination with one or more of the L-Glufosinate Synthesis References.

A. Claim 1

1. Long Alone

155. Claim 1 is obvious in view of Long alone for the same reasons it anticipates claim 1, discussed above §XI. This is based on my understanding that a single prior art reference which anticipates also renders a claim obvious.

156. Based on Long alone, and for the reasons discussed above for anticipation, a POSITA such as myself would be motivated to make and use purified (greater than about 90% L-isomer compared to the sum of L- and D-isomers) L-glufosinate ammonium formulations having one or more of the additional components at the weight percentages described in Long and recited in claim 1, and would have had a reasonable expectation of success in arriving at the claimed invention

2. Long in View of the L-Glufosinate Synthesis References

157. In my opinion, claim 1 is obvious over Long in view of the L-Glufosinate Synthesis References.

158. It is my understanding that the underlying factual inquiry for an obviousness analysis requires consideration of the following:

- the scope and content of the prior art;
- the differences between the prior art and the claims at issue;
- the level of ordinary skill in the pertinent art; and
- relevant secondary considerations of nonobviousness.

I address each of these factors below.

a. Level of Skill in the Art

159. For the subject matter of the challenged claims of the '206 patent, I describe the attributes of a POSITA above at §VI.

b. Scope and Content of the Prior the Art

160. I summarized the scope and content of the prior art, as viewed from the perspective of a POSITA above at §IX.

c. Differences Between the Prior Art and the Claims at Issue

i. Motivation

161. As I discuss above at ¶¶74 and 124-126, Long describes aqueous formulations of L-glufosinate ammonium having greater than 90% L-isomer (compared to the sum of L- and D-isomers) and “one or more additional components” within the weight percentages recited in claim 1.

162. Long would have motivated a POSITA to pursue methods of preparing purified L-glufosinate and its salts, including its ammonium salt, since Long expressly describes the L-isomer as the “biologically active isomer,” and specifically identifies “the L enantiomer of glufosinate and its ammonium salt” as a biologically active herbicide for use in its formulations. Based on the teachings of Long, a POSITA would have been motivated to prepare and purify the biologically active L-isomer of glufosinate ammonium for use in Long’s formulations and would be motivated to look to prior art methods of doing so.

ii. Expectation of Success

163. I have been informed that obviousness requires a “reasonable expectation of success” and does not require a certainty of success and that obviousness may be found even where there is some degree of unpredictability in the art.

164. A POSITA following the teachings of Long would have had a reasonable expectation of success in preparing stable, active herbicidal formulations of purified L-glufosinate ammonium for application to crops, for instance by substituting the active L-isomer of glufosinate ammonium for racemic glufosinate used in the Examples provided in Long. Long expressly states that the formulations can be employed for racemates or biologically active isomers, and a POSITA would have a reasonable expectation of success that the formulations described in Long can be used specifically for L-glufosinate ammonium at the greater than 90% isomeric purity (compared to the sum of L- and D-isomers) recited in claim 1.

165. A POSITA would have been able to follow all the teachings in Long and the L-Glufosinate Synthesis References (see ¶130 above) and would have had a reasonable expectation of success of preparing L-glufosinate ammonium with greater than 90% L-isomer purity (compared to the sum of L- and D-isomers) and using it in aqueous formulations such as those described in Long.

166. Further, a POSITA would have had a reasonable expectation that the synthesis and purification of L-glufosinate ammonium as described in Knorr (Ex.1011) would be suitable for preparing the formulations claimed in the '206 patent, since the '206 patent states that the methods of Knorr “could be used with

the present invention to obtain L-glufosinate with high enantiomeric excess, if desired.” Ex.1001, 12 at 13:11-18.

d. Secondary Considerations of Nonobviousness

167. I have been informed by counsel that for evidence of nonobviousness, such as unexpected results, to be accorded substantial weight, BASF must establish a nexus between the evidence and the merits of claim 1. I further understand that a nexus exists when the data is commensurate in scope with the claim.

168. I have reviewed data from field tests submitted by BASF during prosecution of the '206 patent, which BASF alleged represents that the formulations of claim 1 have unexpected results. Ex1002, 12. I disagree with BASF’s allegation that its data (1) has a nexus to claim 1, or that it (2) represents an unexpected result.

169. BASF presented the following visual crop injury assessment (i.e., % crop injury compared to an untreated control) made 7 days after treatment.

Table 2e: Ratings of herbicidal activity (phytotoxicity) in an greenhouse experiment against the above mentioned glufosinate tolerant soybeans (GLXMA) after a single post-emergence treatments with racemate glufosinate-ammonium (GA) and L-glufosinate-ammonium (LGA) rated 7 DAA.

Field crop	LGA 300 g/ha	GA 300 g/ha	LGA 600 g/ha	GA 600 g/ha	LGA 1200 g/ha	GA 1200 g/ha
GLXMA (CZ1660)	0	5	10	15	10	40
GLXMA (CZ3519)	5	10	10	35	15	70
average	2.5	7.5	10	25	12.5	55

Id.

170. BASF stated that its field tests were “carried out using racemic glufosinate and L-glufosinate to determine the phytotoxicity to glufosinate-tolerant soybean at various concentrations (i.e., 300 g/ha, 600 g/ha, and 1200 g/ha)” *Id.*, 10. Along with its data, BASF stated that the test formulations for each experiment included “sodium lauryl ester sulfate (SLES) with adjuvant ratios typically used in commercial glufosinate formulations,” but did not provide any quantitative information on the adjuvant ratios used in its experiments. *Id.*, 12 at Appendix A. According to BASF, “the L-glufosinate surprisingly resulted in less phytotoxicity to the soybeans than the same amount of racemic glufosinate (i.e., LGA 300 vs. GA 300, etc.) and when comparing the same amounts of L-glufosinate i.e., LGA 300 vs. GA 600 or LGA 600 vs. GA 1200).” *Id.*

171. In my opinion, (a) any differences in phytotoxicity in BASF’s field tests would have been due to the inherent properties of L-glufosinate ammonium and racemic glufosinate ammonium and not the formulations recited in claim 1, and (b) BASF’s data is for a single (undefined) formulation and a glufosinate-resistant soybeans and is not commensurate in scope with the genus of formulations recited in claim 1.

i. Any Differences in Phytotoxicity in BASF's Tests are Due to the Inherent Properties of Glufosinate and its Enantiomers and Not the Formulations of Claim 1

172. In BASF's field tests, L-glufosinate (LGA) and racemic glufosinate (GA) were compared in the same formulation containing SLES at the same unspecified adjuvant weight ratio, and therefore, any observed differences in phytotoxicity between the LGA and GA on glufosinate-tolerant soybeans could not have been due to the particulars of the formulation (since they were the same) and would have to be due to the inherent differences in phytotoxicity between LGA and GA on the two varieties of glufosinate-resistant soybeans tested, inherent properties of LGA and GA which existed in the prior art.

173. Racemic glufosinate ammonium (GA) has been used as an herbicide on glufosinate-tolerant soybeans in the U.S. since at least 1998. Ex.1031. And as detailed above at §VIII.A., the '206 patent acknowledges that L-glufosinate was known in the prior art to be the biologically active enantiomer. Ex.1001, 6 at 1:48-52 (citing to Ruhland (Ex.1030)); *Id.*, 13 at 3:3-11 (citing to U.S. Pat. No. 9,255,115 in the same family as Nakanishi (Ex.1009)); *see also, e.g.* Long (Ex.1005), Zeiss (Ex.1007), Schulz (Ex.1006), Knorr (Ex.1011), discussed *supra*.

174. BASF used the same formulation for both LGA and GA in its field tests and did not compare its claimed formulation to any other formulation. If

BASF's field test data comparing identical formulations of LGA and GA shows anything, it is the relative lower phytotoxicity of LGA than GA in glufosinate-tolerant soybeans—an inherent property of LGA and GA. The data showing alleged unexpected lower phytotoxicity for LGA has no nexus to the presence of the “one or more additional components” in the weight percentage recited in challenged claim 1—since the tested LGA and GA formulations were both formulated with the same SLES adjuvant in the same ratio. Without a comparison to other formulations, nothing can be said about unexpected results of the formulation tested.

ii. BASF's Data is Not Commensurate with the Full Scope of the Genus of Formulations Recited in Claim 1

175. As discussed above, BASF used the same formulation for each of the LGA and GA applications on glufosinate-tolerant soybeans, but did not provide any details of that formulation, except that “[a]ll treatments were applied with an adjuvant Sodium-lauryl-ester sulfate (SLES) with adjuvant ratios typically used in commercial with [sic] Glufosinate formulations.” Ex.1002, 12. Based on this information, I am not able to determine if BASF's test formulations were within the scope of claim 1, other than to accept BASF's statement that “the data shows that the claimed formulation recited in claim 1 has unexpected results.” Ex.1002, 10, 12.

176. While each of BASF's test formulations included a single adjuvant, SLES, there is no indication that BASF tested any formulations having any of the other "additional components" recited in claim 1, namely 1-methoxy-2-propanol, dipropylene glycol, or an alkyl polysaccharide, at any of the weight percentages recited in claim 1. BASF's data provides no information about formulations having any of the other "additional components" recited in claim 1.

177. BASF's field test data is not commensurate in scope with claim 1 for the additional reason that the data does not cover the entire range of weight percentage of SLES (or any other "additional components") recited in claim 1. BASF's test formulations included SLES at a single (and unspecified) weight percentage "typically used in commercial glufosinate," but the data says nothing about formulations having the full range of "10-40% by weight" SLES recited in claim 1. BASF's data has no nexus to formulations having 0.5-2% by weight 1-methoxy-2-propanol, 4-18% by weight dipropylene glycol, or 4-20% by weight alkyl polysaccharide—the other "additional components" recited in claim 1.

178. Lastly, BASF's tests are limited to two varieties of transgenic soybeans and are not commensurate in scope with claim 1, which recites "a formulation." As I understand, a claim to "a formulation" is not limited to any use or to uses on any crops such as soybeans or transgenic soybeans. As discussed above, whether LGA and GA have different phytotoxicity in the tested glufosinate-

tolerant soybeans is an inherent property of LGA and GA and BASF's field test data says nothing about the relative phytotoxicities of LGA and GA in any other plants for which formulation claim 1 can be used.

B. Claims 2-6

179. In my opinion, claims 2-6 recite nothing more than specific weight percentages that would be arrived at by a POSITA through routine optimization of the same formulation components described in Long, and for the same reasons discussed above for claim 1, are obvious over Long, either alone or in combination with one or more of the L-Glufosinate Synthesis References.

180. Dependent claims 2-6 recite formulations having L-glufosinate ammonium, "additional components," and water, present at specific weight percentages. Claim 2 is representative and reproduced below.

2. The formulation of claim 1, wherein the L-glufosinate composition comprises L-glufosinate ammonium in an amount of 12.25% by weight of the formulation; and wherein the one or more additional components comprise sodium alkyl ether sulfate in an amount of 31.6% by weight of the formulation; 1-methoxy-2-propanol in an amount of 1% by weight of the formulation; dipropylene glycol in an amount of 8.6% by weight of the formulation; alkyl polysaccharide in an amount of 9.8% by weight of the formulation; and water in an amount of 36.75% by weight of the formulation.

Ex.1001, 22.

181. Dependent claims 3-6 recite the same formulation components as dependent claim 2, but recite different specific weight percentages, as presented in the following Table.

Recited “% by weight”					
	Claim 2	Claim 3	Claim 4	Claim 5	Claim 6
L-glufosinate ammonium	12.25	24.5	12.25	12.25	24.5
sodium alkyl ether sulfate	31.6	31.6	15.8	22.1	22.1
1-methoxy-2-propanol	1	1	0.5	1	1
dipropylene glycol	8.6	8.6	4.3		
alkyl polysaccharide	9.8	9.8	4.9	6.2	6.2
Water	36.75	24.5	62.25	58.45	46.2

182. Long provides Examples of aqueous formulations of racemic glufosinate comprising the same additional components—sodium alkyl ether sulfate, 1-methoxy-2-propanol, dipropylene glycol, alkyl polysaccharide, and water. Ex.1005, 4-5.

183. As discussed above for claim 1, Long expressly describes that L-glufosinate is the active enantiomer and that L-glufosinate ammonium can be used in Long’s aqueous formulations. *Supra*, §X.A.1.

184. Following the teachings of Long, it would have been only a matter of routine optimization for a POSITA to adjust the ratios of active herbicide and

formulation components to arrive at the specific weight percentages recited in dependent claims 2-6. It would have been routine for a POSITA to determine the optimum percentages within the disclosed percentage ranges in Long.

185. First, the weight percentages recited in dependent claims 2-6 are all within the ranges disclosed in Long. *Supra*, ¶¶76-78, 135-151.

186. Second, a POSITA would be motivated to adjust the ratios of formulation components in Long's Examples to account for the fact that racemic glufosinate contains only 50% of the active L-glufosinate isomer. Long's Examples use racemic glufosinate at 44% by weight of a 50% (w/w) glufosinate solution, which corresponds to 22% total racemic glufosinate active in the final formulation ($0.44 \times 0.50 = 0.22$). Ex.1005, 4-5. Because only half of the racemate is the L-isomer, this provides 11% L-glufosinate equivalent active in the final formulation. A POSITA would understand that to deliver the same L-glufosinate equivalent using **100% pure** L-glufosinate, one would routinely reduce the loading of the 50% glufosinate solution by half—i.e., use 22% by weight of a 50% (w/w) L-glufosinate solution, which likewise provides 11% L-glufosinate active.

187. My calculations above assume a solution of 100% “**pure**” L-isomer. It would also be routine for a POSITA to account for the enantiomeric purity of the starting L-isomer, adjusting the weight percentage accordingly. For example if the starting L-glufosinate ammonium is 90% L-isomer, a POSITA would increase the

weight percentage from 11% as follows: $11\%/0.9 = 12.2\%$.¹³ That routine adjustment to 12.2% by weight is what is recited (“12.25%”) in dependent claims 2, 4, and 5.

188. Similarly, it would have been routine for a POSITA to prepare more concentrated formulations for later dilution and double the concentration L-glufosinate ammonium—to 24.5% by weight—as recited in dependent claims 3 and 6.

189. Lastly, BASF’s ’206 patent specification does not describe that there is any criticality to the specific weight percentages recited in dependent claims 2-6, and BASF did not allege that its field test data it submitted alleging “unexpected

¹³ Claims 2, 4, and 5 recite “12.25 % by weight” of 90% pure L-glufosinate ammonium. A POSITA would make the following calculation in the routine determination of the amount of L-glufosinate to include in a formulation using 90% pure L-isomer: 22% by weight of 50% solution of glufosinate is 11% L-glufosinate; in order to arrive at 11% L-glufosinate, and accounting for L-glufosinate of 90% purity, the calculation is $11\%/0.90 = 12.2\%$ of a 90% pure L-isomer.

results” for claim 1 (see *supra* §IX.A.2.d) was of the same scope as any of claims 2-6.

* * *

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so-made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

DECLARATION OF SURI S. IYER, PH.D.

Dated: February 18, 2026

Suri S. Iyer

Suri S. Iyer, Ph.D.