

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

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FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 19/60981

International filing date (day month/year)

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Priority date (day/month/year)

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IPC - A01N 25/28; A01N 35/06 (2020.01)

CPC - A01N 25/28; A01N 35/06; Y10T 428/2989

Applicant

ARYSTA LIFESCIENCE INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed:
 - ☐ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	2, 4, 9, 11, 13-20, 22-23	YES
	Claims	1, 3, 5-8, 10, 12, 21	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-23	NO
Industrial applicability (IA)	Claims	1-23	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1, 3, 5-6, 8, and 10 lack novelty under PCT Article 33(2) as being anticipated by CN 101990890 B to Beijing Nutrichem International Co. Ltd. (hereinafter Nutrichem).

Regarding claim 1, Nutrichem discloses of a composition particularly adapted for herbicidal use (para [0007]: "The present invention provides a method for the preparation of the cyclohexenone type herbicidal microcapsules..."), comprising one or more biopolymer containing micro-capsules containing one or more cyclohexanediones encapsulated therein (para [0007]: "The present invention provides a method for the preparation of the cyclohexenone type herbicidal microcapsules... as microcapsule wall materials... chitosan..."; para [0028]: "...the cyclohexenone-type herbicides selected [from]... tepraloxym..."; example 4: "The resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan... spray dried to obtain... tepraloxym microcapsules"; i.e. in example 4, microcapsules comprise 10% tepraloxym encapsulated in chitosan), resulting in enhanced chemical stability and dispersibility of the encapsulated cyclohexanediones for such use (para [0009]: "...[microcapsules] obtained by the production method of the present invention cyclohexenone herbicide microcapsules... to improve the storage stability of cyclohexenone herbicides, and can better control the size of the cyclohexenone herbicide microcapsules"; by encapsulating cyclohexanediones in the biopolymer as specified, will result in enhanced stability and dispersibility).

Regarding claim 3, Nutrichem further discloses the composition of claim 1, wherein the biopolymer comprises polysaccharide and/or cellulose (para [0007]: "The present invention provides a method for the preparation of the cyclohexenone type herbicidal microcapsules... as microcapsule wall materials... chitosan..."; example 4: "The resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan..."; chitosan is a polysaccharide).

Regarding claim 5, Nutrichem further discloses the composition of claim 3, including one or more surfactants (example 4: "...1g polyoxyethylene fatty alcohol ethers... dissolved in 20g of water... [t]he resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan... spray dried to obtain... tepraloxym microcapsules"; para [0032]: "The emulsifier used in the present invention may be a variety of conventional emulsifiers, for example... polyoxyethylene fatty alcohol ethers...").

Regarding claim 6, Nutrichem further discloses the composition of claim 1, wherein the cyclohexanediones are present in the micro-capsules in an amount of 1% to 70% by weight (example 4: "The resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan... spray dried to obtain... tepraloxym microcapsules").

Regarding claim 8, Nutrichem further discloses the composition of claim 1, wherein the composition optionally contains one or more natural gum, starch, protein, alcohol, water soluble polymer, and/or an oil (example 4: "...added 10g 10 wt.% gum arabic... [t]he resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan... spray dried to obtain... tepraloxym microcapsules").

Regarding claim 10, Nutrichem further discloses the composition of claim 8, wherein the natural gum comprises Gum Arabic (example 4: "...added 10g 10 wt.% gum arabic... [t]he resulting emulsion 100g parcels containing particles tepraloxym 10 wt% chitosan... spray dried to obtain... tepraloxym microcapsules").

Claims 1, 3, 7, 12, and 21 lack novelty under PCT Article 33(2) as being anticipated by CN 101427672 A to Hebei University of Science and Technology (hereinafter Hebei).

Regarding claim 1, Hebei discloses of a composition particularly adapted for herbicidal use (para [0005]: "The present invention solves the technical problem is to provide a herbicide sethoxydim aqueous suspension of microcapsules..."), comprising one or more biopolymer containing micro-capsules containing one or more cyclohexanediones encapsulated therein (para [0005]: "The present invention solves the technical problem is to provide a herbicide sethoxydim aqueous suspension of microcapsules..."; para [0025]: "As a further refinement of the invention, which is based on gelatin, acacia and sodium carboxymethyl cellulose as the wall material..."), resulting in enhanced chemical stability and dispersibility of the encapsulated cyclohexanediones for such use (para [0033]: "...compared with the conventional emulsifiable oil concentrates, the present invention is microencapsulated sethoxydim... reduce drug decomposition... to improve the stability of the herbicide; having a sustained release function..."; by encapsulating cyclohexanediones in the biopolymer as specified, will result in enhanced stability and dispersibility).

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The term "biopolymer" used in claims 1 and 3 has been interpreted to mean polymers that are produced by living organisms, and includes polynucleotides, polypeptides, and polysaccharides.

There is a period "." missing after claim 2.

Claims 10-12 and 14-21 are all missing a space after the claim number.

Claim 17 contains a typo, it ends with a comma "," not a period ".".

Claims 14-20 improperly depend on claim 13. Claims 14-20 further disclose of the composition of claim 13, or further disclose of a composition which depends on claim 13. However, claim 13 does not disclose of a composition, but of an oil dispersion. Therefore, it claims 14-20 have been assumed to further disclose of an oil dispersion.

Claim 20 is unclear and confusing. Claim 20 depends on claim 19 which discloses of "a polyoxyethylene sorbitan monolaurate", however, claim 20 discloses that "the polyoxyethylene sorbitan [of claim 19] is a monolaurate, monostearate, tristearate, and/or trioleate". In the interest of completing the international search, claim 19 has been assumed to be: "The oil dispersion of claim 13, wherein the oil comprises a polyoxyethylene sorbitan with a carbon chain length varying from C10 to C20", where claim 20 further specifies that the polyoxyethylene sorbitan is a monolaurate, monostearate, tristearate, and/or trioleate.

Claims 22 and 23 improperly depend on claim 17. Claims 22 and 23 further disclose of "[t]he method of claim 17", however, claim 17 discloses of a composition not a method. Therefore, claims 22 and 23 have been interpreted to be dependent on claim 21, which does disclose of a method.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 Citations and Explanations

Regarding claim 3, Hebei further discloses the composition of claim 1, wherein the biopolymer comprises polysaccharide and/or cellulose (para [0025]: "As a further refinement of the invention, which is based on gelatin, acacia and sodium carboxymethyl cellulose as the wall material...").

Regarding claim 7, Hebei further discloses the composition of claim 1, made by complex coacervation (para [0005]: "The present invention further provides a method for preparing the above-described herbicides sethoxydim aqueous suspension of microcapsules, which utilizes the principle of complex coacervation process...").

Regarding claim 12, Hebei discloses of a water dispersion containing the composition of claim 1 (para [0005]: "The present invention solves the technical problem is to provide a herbicide sethoxydim aqueous suspension of microcapsules...").

Regarding claim 21, Hebei discloses of a method of controlling insects and/or weeds comprising applying the composition of claim 1 to a crop (para [0005]: "The present invention solves the technical problem is to provide a herbicide sethoxydim aqueous suspension of microcapsules... a type of preparation can be used for controlling monocotyledonous weeds in dicotyledonous crops...").

Claims 2 and 11 lack inventive step under PCT Article 33(3) as being obvious over Nutrichem.

Regarding claim 2, Nutrichem further discloses of composition of claim 1, wherein the cyclohexanedione comprises Clethodim (para [0028]: "...the cyclohexenone-type herbicides selected clethodim..."). However, Nutrichem does not disclose of a specific example or embodiment comprising clethodim encapsulated by one or more biopolymer containing micro-capsules. However, it would have been obvious to one of ordinary skill in the art to form the composition of claim 1, where chitosan, a biopolymer encapsulates clethodim as the cyclohexanedione, based on the teachings of Nutrichem, since Nutrichem discloses that the microcapsules can be made from biopolymers and can encapsulate clethodim.

Regarding claim 11, Nutrichem further discloses of composition of claim 5, wherein the surfactant comprises one or more polyalkylene oxide block copolymers (para [0032]: "The emulsifier used in the present invention may be a variety of conventional emulsifiers, for example... polyoxyethylene - polyoxypropylene propylene block polymer ethers..."). However, Nutrichem does not disclose of a specific example or embodiment comprising the composition of claim 1 wherein the specific surfactant used is one or more polyalkylene oxide block copolymers. However, it would have been obvious to one of ordinary skill in the art to form the composition of claim 1, where one or more polyalkylene oxide block copolymers is used as the surfactant, one or more polyalkylene oxide block copolymers polyalkylene oxide block copolymers can be used as a surfactant.

Claims 22-23 lack inventive step under PCT Article 33(3) as being obvious over Hebei.

Regarding claim 22, Hebei discloses of the method of claim 21 as discussed above, however, Hebei does not specifically disclose whether the applying step is applied post-emergently. However, it would have been obvious to one of ordinary skill in the art through routine experimentation to apply the herbicide of claim 1 post-emergently after the crop breaks ground, in order to destroy weeds which have already began to grow on or near crops.

Regarding claim 23, Hebei discloses of the method of claim 21 as discussed above, however, Hebei does not specifically disclose whether the applying step is applied pre-emergently. However, it would have been obvious to one of ordinary skill in the art through routine experimentation to apply the herbicide of claim 1 pre-emergently before the crop breaks ground, in order to prevent the growth of weeds on or near crops.

Claim 4 lacks inventive step under PCT Article 33(3) as being obvious over Nutrichem in view of US 5,922,357 A to Coombes et al. (hereinafter Coombes).

Regarding claim 4, Nutrichem discloses of the composition of claim 3, wherein the biopolymer comprises a polysaccharide, as discussed above, however, Nutrichem does not disclose that the polysaccharide comprises inulin. However, in a similar invention, Coombes discloses of a microcapsule (col 2 lines 34-37: "...there is provided a microsphere... which comprises a substantially spherical core particle of a non-water-soluble polymer..."; col 3 lines 44-45: "...where the microsphere is required to carry an active agent...") wherein the microcapsules contains one or more biopolymers, selected from the polysaccharide inulin (col 2 lines 34-39: "...there is provided a microsphere... which comprises... an outer surface layer consisting substantially of a water-soluble polymer..."; col 4 lines 8-11: "Water-soluble polymers which are useful in the preparation of microspheres in accordance with the invention are polysaccharides such as... inulin..."). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Nutrichem and Coombes and form the composition of claim 3 wherein the biopolymer comprises a polysaccharide, as disclosed by Nutrichem, wherein the polysaccharide is inulin, as disclosed by Coombes, in order to form an herbicide-containing microcapsule which has specific physical properties, e.g. release rate, shelf-life, etc.

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Continuation of:

Box V.2 Citations and Explanations

Claim 9 lacks inventive step under PCT Article 33(3) as being obvious over Nutrichem in view of US 2010/0248963 A1 to Becher et al. (hereinafter Becher).

Regarding claim 9, Nutrichem discloses of the composition of claim 8, however, Nutrichem does not disclose that the composition comprises a sorbitol as an alcohol. However, in a similar invention, Becher discloses of a composition particularly adapted for herbicidal use, comprising one or more micro-capsules containing one or more cyclohexanediones encapsulated therein (para [0012]: "...a particulate microencapsulated acetamide herbicide comprising a water-immiscible core material comprising the acetamide herbicide and a microcapsule having a shell wall..."; para [0215]: "...the herbicidal microcapsules of the present invention can be dispersed in combination with one or more co-herbicides... selected from acetyl CoA carboxylase inhibitors..."; para [0218]: "Acetyl CoA carboxylase inhibitors include, for example, alloxymid, butoxydim, clethodim, cycloxydim, pinoxaden, sethoxydim, tepraloxymid and tralkoxydim, salts and esters thereof, and mixtures thereof"). Becher further discloses that the composition further comprises sorbitol for use as an antifreeze agent (para [0202]: "Other useful additives include, for example... antifreeze agents... such as... sorbitol..."). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Nutrichem and Becher and form the composition of claim 8, as disclosed by Nutrichem, wherein the composition further comprises sorbitol, as disclosed by Becher, in order to form a composition that will not freeze when it is applied to crops.

Claims 13-18 lack inventive step under PCT Article 33(3) as being obvious over Nutrichem in view of WO 2012/080208 A1 to Lamberti SPA. (hereinafter Lamberti).

Regarding claim 13, Nutrichem discloses of the composition of claim 1, however, Nutrichem does not disclose of an oil dispersion containing the composition of claim 1. However, in a similar invention, Lamberti discloses of an herbicidal oil dispersion comprising microparticles of cyclohexanediones (page 4 lines 12-15: "...an agrochemical oil dispersion comprising... a mixture of at least [sic] one solid agrochemical active ingredient having average particle size below 20 micron and an oil..."; page 10 lines 18-25 to page 11 lines 1-8: "Examples of herbicides... alloxymid, clethodim, cycloxydim, sethoxydim and tralkoxydim..."). Therefore, it would have been obvious to combine the teachings of Nutrichem and Lamberti and form the composition of claim 1, comprising microcapsules encapsulating one or more cyclohexanediones for enhanced stability, as disclosed by Nutrichem, wherein said microcapsules are dispersed in an oil, as disclosed by Lamberti, in order to form a stable oil-based herbicidal composition which comprises cyclohexanediones as the active herbicide.

Regarding claim 14, Nutrichem and Lamberti disclose of the oil dispersion of claim 13, and Lamberti further discloses wherein the oil comprises a vegetable oil (page 14 lines 3-16: "The oil is a water-insoluble liquid organic medium and may be... vegetable oils...").

Regarding claim 15, Nutrichem and Lamberti disclose of the oil dispersion of claim 13, and Lamberti further discloses wherein the oil comprises soybean oil, pine oil, and/or sunflower oil, rapeseed oil, and/or methylated rapeseed oil (page 14 lines 3-19: "The oil is a water-insoluble liquid organic medium and may be... vegetable oils such as... soybean oil, rapeseed oil, sunflower oil...").

Regarding claim 16, Nutrichem and Lamberti disclose of the oil dispersion of claim 13, and Lamberti further discloses wherein the oil comprises paraffinic oil (page 15 line 16: "According to a particular embodiment, the oil is a paraffin oil...").

Regarding claim 17, Nutrichem and Lamberti disclose of the oil dispersion of claim 13, and Lamberti further discloses wherein the oil comprises an aromatic solvent (page 14 lines 3-15: "The oil is a water-insoluble liquid organic medium and may be... aromatic or cycloaliphatic, which may be unsubstituted or substituted, C7- to C18-hydrocarbon compounds such as mono- or polyalkyl-substituted benzenes...").

Regarding claim 18, Nutrichem and Lamberti disclose of the oil dispersion of claim 17, wherein the solvent comprises C9 to C10 dialkyl and trialkyl benzenes (page 14 lines 3-15: "The oil is a water-insoluble liquid organic medium and may be... aromatic or cycloaliphatic, which may be unsubstituted or substituted, C7- to C18-hydrocarbon compounds such as mono- or polyalkyl-substituted benzenes...").

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In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 Citations and Explanations

Claims 19-20 lack inventive step under PCT Article 33(3) as being obvious over Nutrichem in view of Lamberti and in further view of US 4,952,722 A to Serban et al. (hereinafter Serban).

Regarding claim 19, Nutrichem and Lamberti disclose of the oil dispersion of claim 13, and Lamberti further discloses that the oil dispersion further comprises a polyoxyethylene sorbitan (page 15 lines 18-24 to page 16 lines 1-20: "In a preferred embodiment the agrochemical oil dispersion of the invention further comprises... surfactants... [s]uitable surfactants are... sorbitan or sorbitol esters with fatty acids or polyalkoxylated, preferably polyethoxylated, sorbitan or sorbitol esters"). However, Lamberti does not disclose that the polyoxyethylene sorbitan comprises a carbon chain length varying from C10 to C20. However, in a similar invention, Serban discloses of an oil dispersion comprising an herbicidal component (col 1 lines 4-10: "This invention relates to organic compound having... herbicidal properties and plant growth regulating properties... and to herbicidal compositions and processes utilizing such compounds..."; col 22 lines 28-33: "The liquid compositions may comprise a solution or dispersion of the active ingredient in a liquid carrier... [e]xamples of liquid carriers include... mineral oil..."), wherein the oil dispersion further comprises a polyoxyethylene sorbitan having a carbon chain length varying from C10 to C20 (col 22 lines 28-33: "The liquid compositions may comprise a solution or dispersion of the active ingredient in a liquid carrier optionally containing one or more surface active agents..."; col 22 lines 16-25: "Nonionic surface active agents include... sorbitan monolaurate, and their condensation products with ethylene oxide..."; monolaurate is C10). Therefore, it would have been obvious to combine the teachings of Nutrichem and Lamberti in view of Serban and form the oil dispersion of claim 13 further comprising a nonionic surfactant, as disclosed by Nutrichem and Lamberti, wherein the nonionic surfactant comprises a polyoxyethylene sorbitan having a carbon chain length varying from C10 to C20, in order to form an herbicidal oil dispersion where the microcapsules are uniformly dispersed throughout the oil phase.

Regarding claim 20, Nutrichem, Lamberti, and Serban disclose of the oil dispersion of claim 19, and Serban further discloses wherein the polyoxyethylene sorbitan is a monolaurate, monostearate, tristearate, and/or trioleate (col 22 lines 16-25: "Nonionic surface active agents include... sorbitan monolaurate, and their condensation products with ethylene oxide...").

Claims 1-23 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.