

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 3483SWT-PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2018/046701	International filing date (<i>day/month/year</i>) 14 August 2018 (14.08.2018)	Priority date (<i>day/month/year</i>) 15 August 2017 (15.08.2017)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant CORN PRODUCTS DEVELOPMENT, INC.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	This REPORT consists of a total of 8 sheets, including this cover sheet.																								
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																									
3.	This report contains indications relating to the following items: <table style="width: 100%;"> <tr> <td style="width: 5%; text-align: center;">☒</td> <td style="width: 25%;">Box No. I</td> <td style="width: 70%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	☒	Box No. I	Basis of the report	☐	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 Article 35(2) with regard to novelty, inventive step or 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
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4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 18 February 2020 (18.02.2020) Authorized officer Sun Hwa Lee e-mail: pct.team1@wipo.int
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2018/046701

International filing date (day/month/year)
14.08.2018

Priority date (day/month/year)
15.08.2017

International Patent Classification (IPC) or both national classification and IPC
INV. C08B30/18 C08L3/02 C12P19/14 C12P19/20

Applicant
CORN PRODUCTS DEVELOPMENT, 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 43*bis*.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 usually 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 66.1*bis*(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.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

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Box No. I Basis of the 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 43bis.1(a))
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 13ter.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 13ter.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13ter.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:

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

1. Statement

Novelty (N)	Yes: Claims	<u>1-7</u>
	No: Claims	<u>8-22</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-22</u>
Industrial applicability (IA)	Yes: Claims	<u>1-22</u>
	No: Claims	

2. Citations and explanations

see separate sheet

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:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 US 3 974 034 A (HORN HAROLD E ET AL) 10 August 1976
(1976-08-10)
- D2 US 5 853 487 A (TANG DAN [US] ET AL) 29 December 1998
(1998-12-29)
- D3 CASTRO NATALIA ET AL: "Influence of DE-value on the
physicochemical properties of maltodextrin for melt extrusion processes",
CARBOHYDRATE POLYMERS, APPLIED SCIENCE PUBLISHERS,
LTD. BARKING, GB,
vol. 144, 5 March 2016 (2016-03-05), pages 464-473, XP029504817,
ISSN: 0144-8617, DOI: 10.1016/J.CARBPOL.2016.03.004
- D4 WO 03/018766 A2 (SYNGENTA PARTICIPATIONS AG [CH]; LANAHAN
MICHAEL B [US]; BASU SHIB SAN) 6 March 2003 (2003-03-06)
- D5 SREENATH H K ET AL: "EFFECT OF PULLULANASE AND ALPHA-
AMYLASE ON HYDROLYSIS OF WAXY CORN STARCH",
STARCH: INTERNATIONAL JOURNAL FOR THE INVESTIGATION,
PROCESSING AND USE OF CARBOHYDRATES AND THEIR
DERIVATIVES, WILEY-VCH VERLAG, WEINHEIM, DE,
vol. 42, no. 12, 1 January 1990 (1990-01-01), pages 482-486,
XP001106612,
ISSN: 0038-9056
- D6 US 3 974 033 A (HARJES CLARENCE F ET AL) 10 August 1976
(1976-08-10)

Preliminary remarks: unclear features cannot distinguish the subject-matter of claims over the prior art. As a consequence, the viscosity ranges and water activity values cited in present claims 8-9, 14-16 and 19 cannot be taken into consideration in assessing novelty and inventive of the present claims (see Re Item VIII below).

1) D1 relates to maltodextrin syrups which remain clear over a relatively long period of time at high solids concentrations and to a method of preparing said syrups, wherein the first step includes simultaneous oxidation and liquefaction of the starch at elevated temperatures and the second step includes conversion with alpha-amylase into maltodextrin (see D1, column 1, lines 8-15). The maltodextrins of D1 are capable of being dissolved in water to a solids content as high as 80% by weight to obtain syrups which exhibit remarkable solution stability (see D1, column 4, lines 9-58).

The Example 1 of D1 discloses a process of preparation of a maltodextrin from starch, said maltodextrin presenting (see Table 1, the fourth column from the left, "White Milo"):

- a dextrose equivalent (DE) of 18,4, which falls within the DE range cited in present claims 8, 13 and 20;
- a DP1 of 1,1%, i.e. less than 5% by weight as in claims 8 and 20;
- a DP2 of 8,9%, which falls within the range of 4 to 10% by weight cited in claims 8 and 20;
- a DP3 of 9,6%, which falls within the range of 9 to 14% by weight cited in claims 8 and 20;
- a DP4+ of 80,4%, which falls within the range of 75 to 82% by weight cited in claims 8 and 20.

The example 1 of D1 also discloses a solution of said maltodextrine comprising 72,8 % dry substance, i.e. greater than 65%, as in present claims 8, 14, 15 and 16, said solution remaining haze free for longer than 75 days, which means that said solution has a shelf life of greater than one month as in present claim 18 (see D1, column 10, lines 42-46).

The subject-matter of present claims 8-9 and 16-22 is therefore not novel over D1 (Article 33(2) PCT).

The subject-matter of present independent claim 12 is a product defined in terms of a process of manufacture.

Where a claim defines a product in terms of the process by which the product is made, the claim as a whole is directed to a product.

Such a claim lacks novelty if a prior art product (in the present case the maltodextrin with a DE of 18,4 disclosed in D1, Example 1, Table 1), even if made by an undisclosed or different process, appears to be inherently the same as, or indistinguishable from, the claimed product (see the PCT International search and preliminary examination Guidelines, Part II, Chapter 5, paragraph 5.26).

The subject-matter of present claims 12 to 15 lacks therefore novelty over D1 (Article 33(2) PCT).

2) D2 relates to the provision of maltodextrin in liquid form which exhibits extreme clarity, low viscosity, and will not develop retrogradation upon storage at room temperature (see column 1, lines 41-52).

The method of D2 allows the preparation of maltodextrins that can be concentrated or evaporated up to about 80% dry solids content, or higher, without any handling difficulty. Moreover, water activity of maltodextrins, produced in accordance with D2, of about 75% dry solids is lower than 0.86 at room temperature (see D2, column 6, lines 21-32).

The Example 2 of D2 describes the preparation of solutions comprising 70,2% and 75,5% dry solids content of a maltodextrin having a DE of 17,2. Said solutions are stored at room temperature for 2 months and both are clear and retrogradation free (see D2, column 12 lines 1-26).

The subject-matter of present claims 12-18 is therefore not novel over D2 (Article 33(2) PCT).

3) D3 is a study on the properties of five different types of maltodextrin, among which two present a DE of 17 and 19 respectively (see the abstract).

D3 discloses that the molecular weight distribution of maltodextrins is crucial because it allows to get a better understanding of their behaviors in terms of structural and functional properties (see D3, page 466, paragraph 3.1.1 and 3.2.1).

According to D3, enzymatic cocktails such as amylase and pullulanase enzymes, combined with acid hydrolysis are employed nowadays in order to obtain maltodextrin with a more accurate molecular weight profile (see D3, pages 472-473, paragraph 4. Conclusion).

The process according to present claim 1 differs from this disclosure of D3, in that it specifies that the amylase is an alpha-amylase.

This specification cannot establish an inventive step since alpha-amylase is the most common enzyme used in the preparation of maltodextrin from starch (see for instance, D1, Example 1; D2, column 2, lines 1-30, D4, example 21 and figures 11-12 or D6, column 4, lines 44-53).

Moreover D4 discloses that alpha-amylase alone or alpha-amylase in combination with pullulanase can be used to produce maltodextrin (see D4, page 74, lines 1-11), and D5 even discloses that a combination of alpha-amylase and pullulanase is more efficient to produce maltodextrin having a low content of glucose (DP1) than alpha-amylase alone (see D5, the abstract and pages 483-485, 3. Results and discussion).

Consequently, an inventive step cannot be acknowledged for the subject-matter of present claim 1 (Article 33(3) PCT).

Dependent claims 2-7 do not contain any features which, in combination with the features of claim 1 to which they refer, meet the requirements of the PCT in respect of inventive step, because the additional features contained in these claims appear to be within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can be readily contemplated in advance (see D5, page 484, last 2 lines of the first paragraph of the left column or D6, from column 6, line 4 to column 7, line 8).

Re Item VIII

Certain observations on the international application

The viscosity ranges cited in present claims 8, 14, 16 and 19 with no indication whatsoever pertaining to the method of measurement, renders the subject-matter of said claims unclear (Art. 6 PCT).

The same applies to the "water activity" cited in present claims 9, 15 and 17.

Consequently, the subject-matter of present claims 8-9, 14-16 and 19 does not fulfill the requirements of Art. 6 PCT.