

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCHING AUTHORITY

To:

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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/US2018/046756

International filing date (day/month/year)
14.08.2018

Priority date (day/month/year)
21.08.2017

International Patent Classification (IPC) or both national classification and IPC
INV. A23L29/30 A23L27/30 A23L33/125 ADD. C12P19/22 C13K7/00 C12P19/14

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

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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>2-8, 11-13, 15-19, 21, 22</u>
	No: Claims	<u>1, 9, 10, 14, 20</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 and inventive step; citations and explanations supporting such statement

1 Reference is made to the following documents (**see in particularly the passages referred to in the International search report**):

D1 US 2015/322470 A1 (FURLAN TIZIANO [IT] ET AL) 12 November 2015

D2 US 2016/122442 A1 (ANDERSEN CARSTEN [DK] ET AL) 5 May 2016

D3 US 2015/111259 A1 (KLEINHOUT T [NL] ET AL) 23 April 2015

2 It is to be remarked that claim 1 is very broad in scope. It has not been rendered credible that the process is inventive and solves the technical problem to be solved over the entire scope of the claim (c.f. § [3] of the description).

It has for example not been made credible that *any* imaginable concentrations, ratios process parameters and process conditions solve the technical problem posed.

Looking at § [23] and table 1 of the description, it is not revealed what kind of prior art maltose is used to compare the invention with or by which process it has been made. Nor has it been revealed which process produced the maltose syrup in the right hand side column. The skilled person has no guidance about how to re-produce and compare the results provided by the table.

An objection as to lack of inventive step must be made already at this stage Article 33(3) PCT.

3 Novelty

The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 does not appear to be new:

3.1 The process steps defined by claim 1 should logically produce the maltose syrup defined on I 1-2 of claim 1. These process steps are however known (see below), so either essential features are lacking in the claim or earlier known processes also produce the product intended.

It is to be remarked at this stage that claim 1 reads "a plurality of amylase enzymes" which is seen as "at least two", since a clear definition of "plurality" is not available.

- 3.2 As also taught by the description at hand, c.f. § [4], it is well known to apply a two-step process (liquefaction and saccharification) to produce maltose syrup.

Single-step processes are however also known (see below).

Given the broadness of the two steps defined by claim 1, D1 (see for example § [6] and the enzyme mixture disclosed there) is novelty destroying.

Paragraph [6] of D2 also teaches the same steps and enzymes.

Admittedly, D1 and D2 do not refer to "between 42-50 % of maltose" in claim 1 or a "more fluid" product as allegedly shown by the examples in table 1 of the description at hand. As pointed out above, however, the actual steps claimed are known so the result should be the same.

Both D1 and D2 teach comestible products incorporating the maltose syrup produced. Therefore claims 9-10, 14 and 20 do not appear to be new either.

- 3.3 Concerning the single-step processes briefly mentioned above, D3 teaches such processes.

D3 (c.f. § [22]) teaches using an appropriate ratio of alpha-amylase and beta-amylase. Pullulanase can also be added - c.f. § [24].

Yet, The subject matter claimed by claim 1 is new due to the two-step process claimed.

- 3.4 Remaining with D3, § [50] refers to maltose syrup at less than 50% syrup so the subject matter as defined by claim 9 must be deemed lacking novelty over D3 although D3 teaches a one-step process. The process does not necessarily produce a new product as the process may merely be an alternative.

Moreover, table 14 and § [138] of D3 shows a less viscous product at certain temperatures. Concerning claim 10 at hand, it is possible to produce products with overlapping parameter ranges by alternative methods. The product is not rendered new thereby.

It also needs to be remarked that the viscosity range is open downwards and goes down as far as to zero (c.f. Item VIII below).

- 4 Inventive step

Further to § 2 above, the present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step:

- 4.1 Paragraph [3] of the description explains that thinning the syrup at higher temperatures is energy consuming.

D2 and D3 also discuss this technical problem.

D2 (c.f. §§ [71]-[72]) teaches a one- or two step process rendering low maltose or higher maltose syrups. It appears from § [72] that the number of enzymes employed is decisive for the amount of maltose obtained.

D3 (c.f. § [22]) appears to recommend a one-step process but points out that the DP3 content during the saccharification is kept low by using the appropriate ratio of alpha-amylase and beta-amylase.

- 4.2 With the broad claims at hand, either D2 (processes and products) or D3 (products and process for making comestibles) can be regarded as being the closest prior art. As explained above, the technical problem underlying the invention at hand is deemed solved by D2 and D3.

Any differences defined by the dependent claims may be seen as alternative details which may optimize the invention but any unexpected technical effect has not been shown to date, in particular as the results of the table are not unambiguously reproducible (c.f. § [2] above).

- 5 Independent claims

The same reasoning as to inventive step applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claims.

- 6 Dependent claims

As pointed out above, the dependent claims define optimization features such as temperature, pH and preferred enzymes. Process optimization forms part of the routine work of the skilled person. Any unexpected findings due to the preferred parameters have not been made credible at this stage.

Dependent claims 2-8 do therefore not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see D1-D3.

Dependent claims 11-13 also rely on parameters (whereby there is no measurement method for the viscosity). Whilst it is generally allowable to characterize products by parameters, it is still required that the products is new. This also goes for dependent claims 15-19 and the method of making the comestible as defined by claims 20-22 (whereby claim 20 is an

independent claim referring back to earlier claims). The method according to claims 20-22 is also broad in scope and relies on the parametric definitions of the syrup in earlier claims.

Currently no convincing evidence or arguments have been provided in favour of the claims (may they be directly or indirectly dependent).

Re Item VIII

Certain observations on the international application

The application does not meet the requirements of Article 6 PCT, because claims are not clear and concise, as explained in the following:

- 1 Claim 9 at hand is a so called product-by-process claim.

Where a claim defines a product in terms of the process by which the product is made, the claim should be construed as a claim to the product *per se* that possesses the characteristics derived from the manufacturing process stated in the claim. A product is not rendered novel merely by the fact that it is produced by means of a (possibly) new process.
By drafting claim 10, the applicant has proven that it is indeed possible to define the product *per se*.
- 2 Further to claims 9 and 10; although claims 9 and 10 have been drafted as separate independent claims, they relate effectively to the same subject-matter and differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter.
- 3 It follows from the above that claims referring to claim 9 also lack clarity and are not acceptable.
- 4 Claims 10-11 define ranges reaching down to zero. This means that the parameter is optional (c.f. Item 5, § 3.4 above).