

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.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/US2022/032533

International filing date (day/month/year)
07.06.2022

Priority date (day/month/year)
08.06.2021

International Patent Classification (IPC) or both national classification and IPC
INV. C08B37/00 A23L29/231 C08L1/02 C08L5/06 C08J3/075

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 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 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 66.1bis(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.

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. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☒ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claims Nos.

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>6, 7, 12, 16-36</u>
	No: Claims	<u>1-5, 8-11, 13-15, 37-39</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-39</u>
Industrial applicability (IA)	Yes: Claims	<u>1-39</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 IV

Lack of unity of invention

1. The application consists of two inventions:

Invention 1: claims 1-24, 34-39. A gelling fiber material comprising: a) a cellulosic component and b) an associated pectin component in an amount of from 40% to 50% (% galacturonic acid (%GA)); the pectin component having a degree of esterification (% DE) of from about 10% to about 80%; and the gelling fiber material having a molecular weight from about 50 kDa to about 275 kDa.

Invention 2: claims 25-33. A method of monitoring a chemical reaction involving a material comprising a pectin component and a cellulosic component, comprising: a. recording a spectrum of the material; and b. evaluating the spectrum against a model that correlates the spectrum against a second parameter of one or more of the pectin component or cellulosic component containing cellulosic material wherein the spectrum is evaluated at least within a wavenumber range selected from the group consisting of: i. a wavenumber range from about 1400 to about 845 cm^{-1} , ii. one or more wavenumber ranges selected of the group consisting of (A) about 1400 to about 1050 cm^{-1} , (B) about 1050 to about 975 cm^{-1} , (C) about 975 to about 875 cm^{-1} , and (D) about 875 and about 845 cm^{-1} , and iii. one or more wave number ranges selected from the group consisting of (A) about 1095 to about 1070 cm^{-1} , (B) about 1050 to about 1020 cm^{-1} , (C) about 975 to about 895 cm^{-1} , and (D) about 875 to about 845 cm^{-1} .

2. The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The common matter linking the inventions is a material comprising a pectin component and a cellulosic component. This common matter is already known from Zhang Chen et al., Food Hydrocolloids 98 (2020) 105246 (D1) and WO 91/15517 A1 (D2).

D1 (abstract; paragraph 2.2; tables 1, 3) discloses a gelling composition obtained by alkaline extraction (pH 8, 60°C, 3 hours) of pectin from green tea leaf, comprising: residual cellulose not separated in the extraction; and 41,6 wt% of pectin (%GA) having a degree of methoxylation, i.e. a degree of esterification (DE), of 24,7%; the number-average molecular weight (M_n) and the weight-average molecular weight (M_w) of the composition being 104 and 334 kDa, respectively.

D2 (page 16, lines 23-25; claims 1, 4, 6, 21, 25, 28) discloses a gelling composition obtained by acid extraction of pectin from e.g. citrus peel, comprising: cellulose; and 5-45 wt% pectin (%GA) having a DE of 45-90%, both ranges showing a significant overlap with the presently-claimed ranges.

The common matter cannot therefore constitute a single general inventive concept.

Since invention 1 is completely anticipated by the cited prior art, it does not have any additional features. The objective problem solved by invention 1 is therefore to provide a further gelling composition.

The additional features of invention 2 are all the features of the method of present claim 25. The objective problem solved invention 2 is to monitor a chemical reaction involving a material comprising a pectin component and a cellulosic component.

Since the problems are different, the different additional features cannot be considered as "corresponding special technical features".

As the claims comprise neither the same, nor corresponding special technical features, there can be no single general inventive concept and the requirements of unity of invention are not met.

Re Item V

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

1. Reference is made to the following documents:

D1: Zhang Chen et al., Food Hydrocolloids 98 (2020) 105246

D2: WO 91/15517 A1 (GRINDSTED PROD AS) 17 October 1991

D3: Manrique et al., Postharvest Biology and Technology 25 (2002) 99-107

2. **Claims 1-5, 8-11, 13-15 and 37-39** are not novel (Art.33(2) PCT):

D1 (abstract; paragraph 2.2; tables 1, 3) discloses a gelling composition obtained by alkaline extraction (pH 8, 60°C, 3 hours) of pectin from green tea leaf, comprising: residual cellulose not separated in the extraction; and 41,6 wt% of pectin (%GA) having

a degree of methoxylation, i.e. a degree of esterification (DE), of 24,7%; the number-average molecular weight (Mn) and the weight-average molecular weight (Mw) of the composition being 104 and 334 kDa, respectively.

D2 (page 16, lines 23-25; claims 1, 4, 6, 21, 25, 28) discloses a gelling composition obtained by acid extraction of pectin from e.g. citrus peel, comprising: cellulose; and 5-45 wt% pectin (%GA) having a DE of 45-90%, both ranges showing a significant overlap with the presently-claimed ranges. D2 does not disclose a molecular weight of about 50-275 kDa; however, due to the lack of clarity discussed in point 1 of Item VIII, this feature cannot represent a distinguishing feature of the claims.

Since the compositions of D1 and D2 have the same components of the compositions of present claims, they are assumed to have the same properties *inherently*.

2.1. Dependent **claims 6-7 and 12** at least *prima facie* not inventive (Art.33(3) PCT), as all their additional features fall within the customary practice of the skilled person are not associated with unexpected technical effects.

3. **Claims 16-24** are at least *prima facie* not inventive, as they seem to define a more complicate method for obtaining a compositions with the same features of the prior art: the methods of D1 and D2 include an alkaline and an acid extraction, respectively, which seem to cause at least a partial de-esterification of pectin (by alkaline or acidic hydrolysis) inherently; since the final composition of present claims is identical to the compositions of D1 and D2, including the esterification degree, it is not clear what is the purpose of combining the acid and the alkaline step.

4. **Claims 34-36** are not inventive, as they relate to conventional uses of gelling pectin compositions.

5. **Claims 25-33** are novel but *prima facie* not inventive for the following reasons:

a. **D3** (abstract; paragraphs 2.5 and 3; fig.1-3), which can be considered as the closest prior art, discloses the use of the absorption bands at 1630 and 1740 cm⁻¹ in FT-IR spectroscopy for determining the methyl esterification degree (MED) of pectin fractions, including the imidazole-HCl extracted fraction (ISF) "which is rich in pectin molecules associated to the middle lamella" and therefore contains cellulose inherently.

D3 does not disclose monitoring the esterification/deesterification reaction. However, monitoring a reaction by measuring the variation of parameter which is known to change between the reagent and the product is obvious to the skilled person.

D3 does not disclose a wavenumber range of about 845-1400 cm⁻¹. However, the spectra of figures 2 and 3 of D3 include several absorption bands in such region; therefore, in the absence of a specific/unexpected technical effect, the use of such absorption bands seems to be an obvious alternative to D3.

b. Irrespective of the above objection, inventive step cannot be acknowledged because of the objection discussed in Item VIII, point 4 below.

Re Item VIII

Certain observations on the international application

1. **Claims 1-39** are not clear (Art.6 PCT), as they do not specify how the molecular weight is determined, e.g. whether it is a number-average molecular weight (Mn), a weight-average molecular weight (Mw) or a viscosity-average molecular weight (Mv).
2. Due to the term "about" present in **all claimed ranges**, the claimed ranges are considered to be anticipated by the ranges or values of the prior art also when they are not exactly identical.
3. The second ingredient of **claims 37-38** is completely undefined and can be anything; it cannot therefore represent a distinguishing feature of the claims (Art.6 PCT).
4. Concerning **claims 25-33**, the application discloses in a sufficiently clear and detailed way (Art.5 and 6 PCT) only the degree of esterification of pectin as a second parameter, see example 6.