

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

To:

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20240522

IMPORTANT NOTIFICATION

International application No.
PCT/ES2024/070352

International filing date (day/month/year)
06.06.2024

Priority date (day/month/year)
09.06.2023

Applicant
Aurum Process Technology, S.L.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☐ the international application in the language in which it was filed
 - ☒ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
 - ☒ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

- | | |
|------|---|
| 1, 2 | as originally filed |
| 3-6 | filed with the demand for preliminary international examination |

Claims, Numbers

- | | |
|-----|---------------------|
| 1-9 | as originally filed |
|-----|---------------------|

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 22.04.2025 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-9</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-9</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-9</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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 KR 2023 0029318 A (MAEIL DAIRIES CO LTD [KR]) 3 March 2023 (2023-03-03)
- D2 CN 112 438 365 A (INNER MONGOLIA YILI IND GROUP) 5 March 2021 (2021-03-05)

2 Novelty and inventive step

- 2.1 The problem pointed by the present application (p. 3 I.25-27) is the need for a continuous line process for obtaining solubilised seed extracts for the production of food beverages which, unlike current processes, works in a continuous line instead of in batches.
- 2.2 D1 aims to solve the same problem, as it discloses (par.[0007]) a method for producing an oat beverage base that does not require a separate process using an enzyme reaction tank by performing continuous processes through an in-line facility capable of simultaneous grinding and enzymatic digestion.
- 2.3 D1 may be seen as the closest prior art to the subject-matter of claim 1, as it relates to a similar method for the manufacture of a solubilised seed extract, comprising most of the technical features of independent claim 1 and aiming to solve the same problem as the present invention.
- 2.4 D1 discloses (claim 1 of the translated document) a process that is continuously performed, wherein raw oats are heat-treated by steam, introduced in the grinding unit and an enzymatic treatment is performed simultaneously with trituration (i.e. grinding) to produce enzymatically digested ground oatmeal, the enzymatically decomposed oatmeal is supplied to the decanter centrifugal separator to obtain okara and oat suspension and the oat suspension is supplied to the UHT processing unit to produce an enzyme inactivated and sterilized oat beverage base.
- 2.5 The subject-matter of claim 1 therefore differs from this known process in that:

- the steps of grinding and enzymatic treatment are carried out sequentially in two consecutive, distinct and separate steps while in D1 they are simultaneous and
- the separation of the liquid extract is done by filtration, while in D1 is done by centrifugal decantation

and is therefore new (Article 33(2) PCT).

- 2.6 The separate sequential process of claim 1 enables independent control of parameters such as processing times, motor speeds, temperatures, etc., allowing each stage to be optimized in terms of both yield and product quality.
- 2.7 The problem to be solved by the present invention may be regarded as to provide an optimized continuous process for production of solubilised seed extracts.
- 2.8 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: the skilled person starting from D1 would have no incentive to separate the steps, as this would be even contrary to the aim of D1, i.e. to provide a process which does not require a separate enzyme reaction tank [0007], such that the process is simplified [0033]. It is of course generally known to sequentially apply the steps of heating, grinding and enzymatic treating in batch processes, see for instance the process disclosed in D2. However, it is considered that the skilled person would not have modified the process in D1 by separating the grinding and enzymatic treatment steps, since there is no motivation in the prior art, in expectation of some improvement or advantage.
- 2.9 Claims 2-9 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

3 Industrial applicability

- 3.1 The subject-matter of claims 1-9 meets the requirements of Article 33(4) PCT, as it can be applied in food industry.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20240522	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/ES2024/070352	International filing date (day/month/year) 06.06.2024	Priority date (day/month/year) 09.06.2023	
International Patent Classification (IPC) or national classification and IPC INV. A23L2/385			
Applicant Aurum Process Technology, S.L.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ a total of <u>8</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ a separate electronic file containing a sequence listing (<i>sent to the International Bureau only</i>)			
4. This report contains indications relating to the following items: ☒ 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			
Date of submission of the demand 09.04.2025		Date of completion of this report 12.05.2025	
Name and mailing address of the international preliminary examining authority:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040		Authorized officer Munteanu, I Telephone No. +49 89 2399-5648	



If grains are used as raw material, it is also necessary to grind them beforehand.

The conventional process of obtaining plant-based beverages is energy-intensive in the stages of grinding the seeds, separation of solids by centrifugal decanting and the necessary concentration from an initial dilution with a high proportion of water, which is added in a ratio of at least 4:1 to the weight of the seeds.

As mentioned above, one or more enzyme treatments are required, which are carried out in batch process tanks, known as batch process. In other words, a tank is filled with the product to be treated, the treatment is carried out and the treated product is discharged for further processing. In order to operate continuously, a battery of enzymatic treatment tanks is needed, so that there is always one tank receiving the product to be treated and another tank delivering the treated product.

As the process involves loading and unloading tanks and several stages of enzymatic treatment, it requires a large investment in industrial machinery, the process times are long and cause qualitative degradation and it is not possible to ensure that all seeds are treated under the same conditions and at the same time.

There is therefore a need for a process to obtain solubilised seed extracts for the production of plant-based milk substitute beverages that overcomes the aforementioned drawbacks of the current state of the art.

Document KR20230029318 describes a continuous method for producing an oat beverage base using in-line equipment. The process involves grinding steam-treated oats with enzymes and water, followed by separation of solid residues and oat suspension in a decanter centrifuge. The suspension is then subjected to ultra-high temperature (UHT) treatment for sterilization and enzyme deactivation. The method integrates grinding, enzymatic decomposition, separation, and sterilization into a continuous process using sequential in-line equipment.

DESCRIPTION OF THE INVENTION

The object of the invention consists of a continuous line process for obtaining solubilised

seed extracts for the production of food beverages which, unlike current processes, works in a continuous line instead of in batches.

5 The procedure is especially designed for the case where food beverages are the substitute for milk, and more particularly for the case of oatmeal, but not limited to these options.

The procedure for obtaining solubilised seed extracts basically comprises the following sequence of successive stages:

- 10 - Heat treatment of the seeds with a reduced proportion of water;
- In-line grinding of the seeds to form a paste;
- Addition of enzymes to the paste and in-line maintenance for solubilisation of components;
- Separation of the liquid extract by continuous filtration; and
15 - Continuous washing of the separated solids for maximum extraction yield, using the wash water in the first stage of seed treatment.

20 The main difference with respect to current treatments is that it is a completely in-line process, i.e. from the beginning the seed advances without including any stage in which it is treated in a reactor or tank to retain it. Moreover, in the particular case of oats, the seed is subjected to a multi-enzymatic treatment in a single stage.

25 The continuous in-line process with a single enzymatic treatment step reduces process times, simplifies the design of the production plant and reduces the investment cost. In addition, the energy consumption of the grinding stage is greatly reduced, thanks to the hydration and heating pre-treatment that softens the seeds. Energy consumption in solids separation is also reduced by the use of filtration instead of decanting.

30 The process makes it possible to obtain an extract with a higher initial concentration because it requires the addition of a much smaller quantity of water than in current processes, thus making it possible to produce a concentrated extract with a much lower energy consumption in the concentration phase. This concentrated extract reduces packaging, storage and transport costs, and is then diluted at the time of preparation of the final beverage for consumption.

PREFERRED EMBODIMENT OF THE INVENTION

A detailed explanation of an example of a preferred embodiment of the subject matter of the present invention is given below.

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The described continuous in-line process for obtaining solubilised seed extracts for the production of food beverages comprises the following sequence of steps:

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- heat treatment of the seeds with water. For this purpose, an auger feeder is used to feed a continuous quantity of seeds together with a controlled flow of water into the upper part of a vertical mixing tank, into which steam is also injected to control the temperature of the process. The treated mixture of seed and water is drawn from the bottom of the tank also continuously, thus ensuring a uniform treatment time for the seeds.

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- in-line grinding of the seeds to form a paste, by means of an in-line shear mill placed at the outlet of the heat treatment tank;

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- enzymatic treatment of the slurry, with continuous injection of the enzymes into the inlet pipe of the slurry to the grinder by means of a dosing pump, and in-line holding for solubilisation of components, inside a vertical holding tank, with adequate volume so that the residence time of the product in the tank is sufficient to complete the enzymatic reactions;

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- separation of the liquid extract by continuous filtration, by introducing the product inside a cylindrical sieve with a scraping system on the wall of the sieve to prevent clogging, so that the liquid phase passes through the sieve and the solid phase advances to the exit of the sieve;

- washing of the solids in a vertical column down which they flow in counter current with a flow of wash water. At the bottom of the column the washed solids are removed and at the top of the column the wash water is recovered for the initial seed treatment stage; and

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- concentration of the extract obtained to achieve the desired final concentration, by means of a forced circulation tubular concentrator.

The hot hydration pre-treatment of the whole seeds facilitates subsequent grinding. In the enzyme treatment, a water: seed ratio of 2:1 is used for solubilisation. The seed paste also undergoes a single enzymatic solubilisation treatment with a combination of several different enzymes such as alpha-amylase, gluco-amylase, protease or cellulase,

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which act together and simultaneously.

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Our ref.

20240522

Madrid,

April 9, 2025

International Patent Application PCT/ES2024/070352

Publication number: WO2024252049

Title: "PROCESS FOR OBTAINING SOLUBILIZED SEED EXTRACTS FOR THE PRODUCTION OF FOOD BEVERAGES"

Applicant: AURUM PROCESS TECH S L

Applicant's ref.: 20240522

Applicant's observations to the International Search Report (ISR) according to Art. 34 PCT

Dear Sirs:

In view of the objections raised by the Examiner in the written opinion accompanying the International Search Report (ISR), we herewith submit the following documents in order to file our observations and amendments to the pointed-out deficiencies of the above-mentioned International Patent Application, namely:

- Working copy of description replacement pages showing the amendments introduced, wherein the new parts are underlined, and the deleted parts are barred; and
- Replacement description pages.

Further, please find below also our response, including basis for amendments made to the claims, identifying the passages of the original application on which they are based.

(1) DESCRIPTION AMENDMENTS (Art. 34 PCT)

The prior art, namely document D1, has been acknowledged in the description according to Rule 5.1 (a)(ii) PCT.

(2) INVENTIVE STEP (Art. 33(3) PCT): COMMENTS ON PRIOR ART

In accordance with the reasoning set out by the Examiner in the Written Opinion accompanying the International Search Report (ISR), it is considered that document D1 (KR20230029318) represents the closest prior art to the subject matter of independent claim 1.

Document D1 relates to a method for preparing an oat-based beverage, and describes a process carried out continuously in an in-line installation that sequentially comprises a grinding unit, a decanter centrifuge unit, and a UHT treatment unit. The method comprises the following sequence:

- (a) steam heat treatment in the grinding unit of raw oats; complex enzymes including α -amylase, β -glucanase and protease; and brewing water; thereby producing enzymatically decomposed ground oat products by simultaneously carrying out grinding and enzymatic treatment;
- (b) feeding the enzymatically decomposed oat mash to the decanter centrifuge in order to separate the okara and the oat suspension; and
- (c) supplying the oat suspension to the UHT treatment unit to produce a base of enzymatically deactivated and sterilized oat beverage.

The Examiner indicates that the only difference between the process disclosed in document D1 and the subject matter defined in claim 1 lies in the separation step: while in D1 solid separation is carried out by means of centrifugal decantation, in claim 1 it is performed by continuous filtration.

However, the Applicant does not agree that this is the only distinguishing feature between the process of current claim 1 and that described in D1, since document D1 does not specify that the heat treatment, grinding and enzymatic treatment are carried out in three sequential steps but clearly discloses that these three operations are performed simultaneously in the first step (a) of its industrial process.

While acknowledging that D1 describes a continuous in-line process, the Applicant would again respectfully emphasize that there are substantial differences. For instance, the process of D1 comprises three stages:

- 1) A first stage, performed in the so-called grinding unit, in which, simultaneously with the grinding, the oat is subjected to heat treatment, water addition, and enzymatic treatment.
- 2) A second stage, performed in the decanter centrifuge unit, consisting of centrifugal separation of the solid part (okara).
- 3) A third stage, performed in the UHT treatment unit, consisting of UHT treatment for inactivation and sterilization.

In contrast, the process described in claim 1 comprises a sequence of four consecutive but independent stages, each carried out in separate equipment, as indicated in the description (see pages 5–6). These four independent stages are:

- 1) Initial heat treatment of the seeds with addition of water.
- 2) In-line grinding of the seeds treated in the previous step to form a paste.
- 3) Enzymatic treatment of the paste and in-line holding for solubilization of components.
- 4) Separation of the liquid extract by continuous filtration.

Unlike D1, where the operations on the raw material are carried out in a single process step (first step in the grinding unit), in claim 1 these are performed in three consecutive, distinct, and separate steps. In a fourth and final step, separation of the liquid phase is carried out by continuous filtration.

Indeed, both processes aim to prepare plant extracts by means of enzymatic treatment. However, D1 is much more restrictive in its scope, as it is defined as a method for preparing an oat beverage, whereas the present application is defined as a method for obtaining solubilised seed extracts for beverage production.

This difference in approach is significant and results in most of the claims in document D1 referring to specific values of process parameters (temperatures, quantities of enzymes added, motor speeds, processing times...) that optimize the production of its oat beverage following the method of its first claim, whereas the claims of this patent application are mainly directed to additional or optional features of the process described in claim 1.

Since both processes involve enzymatic treatment, which require specific conditions of temperature, moisture and grinding of the raw material, it is logical — as correctly noted by the Examiner — that both processes define the same operations: heat treatment, grinding, and enzymatic treatment, as these are essential for the enzymatic reaction to take place. These operations are indeed common to both processes, but also to many others.

However, the three operations on the raw material that are performed simultaneously in a single process step (the first step) in D1, are carried out sequentially in three consecutive, distinct and separate steps (steps 1, 2 and 3) in claim 1 of the present application, followed by a fourth and final step of separating the liquid phase by continuous filtration.

The fact that these operations are separated into three steps and performed using distinct and separate equipment represents a substantial difference in the currently claimed industrial method, as it enables independent control of parameters such as processing times, motor speeds, temperatures, etc., allowing each stage to be optimized in terms of both yield and product quality.

For instance, in the case of the heat treatment of the seeds, the process described in this application allows the application of high temperatures (even above 100°C) to achieve complete and rapid hydration. If enzymatic treatment were carried out simultaneously with the heat treatment, as in D1, the enzymes would be degraded, and the treatment would not be effective. Furthermore, completing the heat treatment prior to grinding results in softening of the seeds, thus facilitating the grinding performed in the subsequent step and significantly reducing energy consumption.

Consequently, the technical effect arising from all these differences can be described as an optimization of the process for obtaining solubilized extracts. The objective technical problem to be solved by these differences is therefore how to optimize the production of solubilized extracts.

Faced with the need to optimize the production of solubilized extracts, the skilled person finds no teaching in D1 that would motivate them to implement the modifications leading to the process described in claim 1, namely:

- separating the operations on the raw material into three steps carried out in distinct and separate equipment; and

- modifying the separation step to perform continuous filtration of the liquid extract.

Therefore, starting from the teachings of D1, the skilled person would not arrive at a process as described in claim 1 without exercising an inventive step.

In other words, the process claimed in the present application involves an inventive step that results in a process — and an associated industrial production line — that is markedly different from the one derived from implementing the method disclosed in D1, with distinct process stages and industrial equipment. Moreover, the claimed process enables the production of a final product with characteristics, yields and costs that differ significantly from those obtained by traditional production methods such as that described in D1.

In view of the foregoing, the Applicant respectfully submits that claim 1 involves an inventive step in accordance with Art. 33(3) PCT. Consequently, claims 2–9 also meet the requirement of inventive step, at least by virtue of their dependency on claim 1.

(3) FINAL REMARKS

For all the above, Applicant respectfully considers that amended Claims are novel and inventive over prior art documents cited in the ISR.

In view of the submitted comments and amendments of claims, a favourable reconsideration is hereby respectfully requested.

Best regards,

H&A

Association of professional representatives nº 709