(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
04 July 2024 (04.07.2024)

WIPO | PCT

(10) International Publication Number
WO 2024/144486 A1

(51) International Patent Classification:
A23G 1/04 (2006.01) *A23G 1/42* (2006.01)

(21) International Application Number:
PCT/TR2022/051725

(22) International Filing Date:
30 December 2022 (30.12.2022)

(25) Filing Language: Turkish

(26) Publication Language: English

(30) Priority Data:
2022/021397 29 December 2022 (29.12.2022) TR

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

WO 2024/144486 A1

(54) Title: A METHOD FOR PRODUCTION OF OIL-BASED FLUID PRODUCTS

(57) Abstract: The present invention relates to a method related to semi-product production for obtaining oil-based fluid products where particle refining processes are not needed since sugar and other ingredients with low particle sizes are used as raw material and where energy and time costs are refined and which is realized in shorter durations.

A METHOD FOR PRODUCTION OF OIL-BASED FLUID PRODUCTS

TECHNICAL FIELD

The present invention relates to a method related to semi-product production for obtaining oil-based fluid products where particle refining processes are not needed since sugar and other food ingredients with low particle sizes are used as raw material and where energy and time costs are refined and which is realized in shorter durations.

PRIOR ART

As known in the related technical field, in order to be able to use food ingredient as raw material in obtaining oil-based fluid products like chocolate and cream, said food ingredients must have a value between 10-50 microns (this value may change according to product). Therefore, the raw material food ingredients, which are to be used in production of oil-based fluid products like chocolate and cream, are passed through 2-roll refiner and 5-roll refiner and are subjected to refining processes and the particle sizes thereof are refined from 1800-2000 microns to 10-50 microns. Said refining processes are realized at two steps, namely, pre-refining and final refining. In pre-refining step, oil-based fluid product raw material ingredients, mixed together in a mixer, can be refined to particle size values of 150-200 µm. Then, in the final refining step where there are five rolls, particle size of oil-based fluid product raw material ingredients can be refined to between 10-50 µm. The raw material ingredients which reach a specific particle size value are transferred to the conching equipment and gain characteristic features as oil-based fluid product. The oil-based fluid product whose aromatic characteristics are improved is tempered and the desired oil crystal form is obtained and is molded (if it is chocolate-based) or is brought to the desired form and is transformed into end product and is presented to consumers. As a result of all of said processes, the oil-based fluid products can be obtained.

In the art, in case refining processes for obtaining oil-based fluid products do not take place efficiently, raw material ingredients may not have homogenous particle sizes. Said technical problems lead to low efficiency of conching processes. Since conching process cannot be realized at high efficiency, this leads to disadvantages in organoleptic perspective for consumers of oil-based fluid products which are the end products.

As known in the art, the process steps, where refining processes are realized, lead to time and energy consumption for obtaining oil-based fluid products. Moreover, change and maintenance of the equipment which realizes refining processes lead to additional costs. Therefore, it has been detected that a method for obtaining oil-based fluid product, where application of refining processes is not needed, shall provide technical advantages in terms of cost, time and energy when compared with methods applied in the present art.

As a result, methods for production of oil-based products, where application of refining process steps and usage of refining equipment are not needed, have to be researched and developed for the related technical field.

BRIEF DESCRIPTION OF THE INVENTION

The present invention relates to a method for production of semi-products for obtaining oil-based fluid products.

The main object of the present invention is to provide a method where raw materials which have low particle size values are used for production of oil-based fluid products. As the first process, raw materials, which have low particle sizes, are obtained which can be used in production of oil-based fluid products. Afterwards, other process steps can become applicable without needing to subject said raw materials to refining processes. By means of this, usage of refining equipment in production processes can be eliminated. This technical solution enables refining of energy costs, labor and time per unit product.

In another perspective, the present invention relates to a production method which enables realization of conching processes with high efficiency since there remains no need to realize refining processes for obtaining food ingredients with low particle sizes.

Another object of the present invention is to provide a method where change and maintenance costs of the equipment, used in refining processes for production of oil-based fluid products, are eliminated.

DETAILED DESCRIPTION OF THE INVENTION

In this detailed description, the subject matter relates to a method related to semi-product production for obtaining oil-based fluid products where particle refining processes are not needed since sugar and other ingredients with low particle sizes are used as raw material

and where energy and time costs are refined and which is realized in shorter durations, and is explained with references to examples without forming any restrictive effect in order to make the subject more understandable.

In the invention, the term “functional food ingredient” describes a mixture comprising various components like sugar, whey protein, protease enzymes used in obtaining oil-based fluid products. In the invention, the “functional food ingredient” composition can change in accordance with the end product to be obtained and in accordance with the characteristics desired in the end product. The protection scope of the invention is not narrowed to the “functional food ingredient” composition and the characteristics thereof. The subject desired to be added to the protection scope of the invention is that functional food ingredients can be obtained with the targeted particle sizes.

In the invention, “sugar” is used for describing sucrose or white sugar.

In the invention, “sucrose or white sugar” used as raw material describes crystal structured substances obtained traditionally from herbs and particularly from sugar cane and sugar beet and used as sweetener in foods and in beverages.

In the invention, the term “invert sugar syrup” is described as the liquid product obtained by releasing mono-saccharides as a result of hydrolysis of sucrose with acids or enzymes.

In the invention, the term “oil-based fluid products” describes the products which have low humidity and which have high proportion of oil and which cover products like chocolate, cream, etc.

In another perspective, the present invention relates to obtaining sugar and other food ingredients which have low particle sized and which are used as functional food ingredient component in production of oil-based fluid products.

As known in the art, in order to realize inversion of sucrose; processes with acids, processes with enzymes, processes with ion-exchanging columns can be applied. The present invention owners suggest that inversion processes are realized by means of enzymes for obtaining low particle sizes of the invert sugar which shall exist as component in functional food ingredients in the subject matter method. By means of this, raw material functional food ingredients can be obtained with low particle size values and high sweetness value. In the present art, in order to obtain invert sugar, essentially inversion of sucrose can be realized

with various acids. In processes of inversion by means of acids; there are disadvantages like there is acid usage, the temperature where reaction takes place is high and depending on this, energy need and cost increase, reaction control is difficult and inversion efficiency is low, and the taste may be affected unfavorably because of the irritating characteristic of acids. Lower proportions of fructose can be obtained since acids are used in inversion processes and as a result of this, the inversion efficiency is low. This condition leads to not obtaining the desired levels in sweetness values of invert sugar which is considered to be substituted instead of white sugar. In order to eliminate these disadvantages, invertase enzymes are used in inversion processes of sucrose in order to obtain raw material ingredient in the subject matter.

As known in the art, the ingredients used as raw material in obtaining cream, chocolate and similar oil-based fluid products must have particle sizes between 10 and 50 microns. The biggest technical disadvantage in obtaining functional food ingredients with said particle size values is the particle size of the sugar used as sweetener. Therefore, it is very important to obtain sugar, which exists in the functional food ingredient, at low particle sizes. In the art, functional food ingredients, comprising sugar and other components which shall exist in production of oil-based fluid products like chocolate and creams, are subjected firstly to 2-roll refiner pre-refining process and then, they are subjected to 5-roll refiner final refining process.

In the subject matter method, the particle sizes obtained from invert powder sugar as a result of processes are at a value between 10 and 50 microns. Accordingly, the raw material, comprising invert powder sugar, can be used as functional food ingredient in obtaining oil-based fluid products like cream and chocolate with high sweetness and with suitable particle size values without needing application of any refining process.

The innovative characteristic of the present invention is that the invert powder sugar is used as sweetener functional food ingredient component in production of oil-based fluid products like cream and chocolates, etc. without subjecting invert powder sugar to any refining processes. By means of this, an oil-based fluid product production method can be obtained where usages of refining process steps and equipment are eliminated. In order to provide said technical advantages and solutions, the subject matter method for semi-product production for obtaining oil-based fluid products comprises the process steps of:

a) subjecting white sugar to inversion reactions by means of invertase enzymes, and obtaining invert sugar syrup including equal amounts of fructose and glucose sugars,

b) subjecting the obtained invert sugar syrup to drying processes in the sprayed drying device together with whey protein which is the drying agent which provides increasing of the glassy transition temperature and which provides keeping of the components together, and then obtaining functional food ingredients which are in powder form and which have homogenous particle sizes at a value between 10 and 50 microns,

c) subjecting the obtained powder functional food ingredients to conching processes without needing refining processes, and obtaining semi-finished products for oil-based fluid products which have homogenous particle sizes.

In the subject matter method, the functional food ingredient can be obtained since the sugars, which shall exist in the functional food ingredient, are invert sugars and since said invert sugar is subjected to sprayed drying processes by mixing it with other components added in accordance with the end product which is desired to be obtained. Since the particle sizes of the obtained functional food ingredient are between 10 and 50 microns, there remains no need for the refining processes. Afterwards, the obtained functional food ingredient is subjected to conching process, and semi-finished products can be obtained. The obtained semi-finished product is subjected to tempering and molding processes which are known in the art and which can show difference in parameters in accordance with the oil-based fluid product which is desired to be produced.

Table 1. Inversion Process Parameters

Process parameter	Parameter value
Sucrose solution	60%-75%
Invertase enzyme amount	2-8 mL/kg
Process duration	12-36 hours
Process temperature	50-65 °C
Medium pH value	4-6

As a result of inversion process of the sucrose solution by means of the values mentioned in Table 1, glucose at a value between 45% and 55% by weight is obtained and fructose at a value between 45% and 55% by weight is obtained.

In the invention, if preferred, protease enzyme can be used in order for the raw material, which includes invert sugar, to include protein at specific weight proportions in the subject matter method. Protease enzyme provides fragmenting of the protein which exists in whey

protein used as drying agent in process step b), and by means of this, it provides the raw material to include amino acid structured components at specific weight proportions.

In the invention, as a result of inversion processes realized by means of invertase enzymes, invert sugar (it can be called syrup for describing that it is in liquid form) which is in liquid form is obtained. Invert syrup can be frequently used in products like various confectionaries, pastry and floury products. However, in order to be able to use invert sugars as substitution instead of sucrose in oil-based fluid products like chocolate and cream, invert sugars must be obtained in solid form.

In the subject matter method, by means of usage of invert sugar, which has particle size between 10 and 50 microns, as raw material as a result of application of a), b) and c) process steps, the below mentioned technical solutions are provided;

- there remains no need for artificial sweeteners used for decreasing sugar,
- there remains no need for applying refining processes to the oil-based fluid mixture since the size of sugar particles is lower than the products which are refined by means of rolls,
- the need for 2-roll refiner and 5-roll refiner equipment is eliminated since refining process is not needed,
- energy cost is refined since refining equipment is removed from the process,
- homogenous particle sizes are obtained and thanks to this, conching processes are realized with high efficiency,
- agglomeration problem is refined or eliminated by means of homogenous distribution,
- time loss consumed as a result of refining is avoided,
- the amount of humidity which has to be removed in the conching process is refined since a mixture is formed with raw materials which have low humidity ingredient and depending on this, the duration is shortened at a proportion between 20% and 50% in the conching process,
- the qualities of oil-based products are increased, particularly fluidity (like viscosity and yield value) of oil-based products are increased depending on low humidity.

The subject matter method is subjected to processes in conching machine without being subjected to refining processes since subject matter method comprises process steps of a), b) and c). As known in the art, refining processes are realized by refining particle sizes of food ingredients. However, since said refining processes are not realized with high efficiency, the particle size distributions of food ingredients, which are to be used as raw material in end products, are not homogenous. This unfavorable condition decreases also the efficiency of

the conching process. The food ingredient, which does not have homogenous particle size distribution needed for the end product, may lead to technical disadvantages in taste and organoleptic characteristics of end products. The mentioned technical disadvantages known in the present art are eliminated in the subject matter method. The targeted functional ingredient particle size can be obtained in a clearer manner as a result of sprayed drying processes. The functional ingredient obtained in the targeted particle sizes increases also the performance efficiency of the conching process. Because of all the technical solutions and advantages mentioned here, a functional food ingredient can be obtained which has homogenous particle size distribution, and final oil-based fluid products, which include this functional food ingredient as raw material and which have high taste and organoleptic characteristics, can be obtained.

The protection scope of the present invention is set forth in the annexed claims and cannot be restricted to the illustrative disclosures given above, under the detailed description. It is because a person skilled in the relevant art can obviously produce similar embodiments under the light of the foregoing disclosures, without departing from the main principles of the present invention.

CLAIMS

1. The present invention is a method related to semi-product production for obtaining oil-based fluid products where particle refining processes are not needed since sugar and other ingredients with low particle sizes are used as raw material and where energy and time costs are refined and which is realized in shorter durations, **characterized in that** the subject matter method comprises the steps of:
   - subjecting white sugar to inversion reactions by means of invertase enzymes, and obtaining invert sugar syrup including equal amounts of fructose and glucose sugars,
   - subjecting the obtained invert sugar syrup to drying processes in the sprayed drying device together with whey protein which is the drying agent which provides increasing of the glassy transition temperature and which provides keeping of the components together, and then obtaining functional food ingredients which have homogenous particle sizes at a value between 10 and 50 microns and which are in powder form,
   - subjecting the obtained powder functional food ingredients to conching processes without needing refining processes, and obtaining semi-finished products for the oil-based fluid products which have homogenous particle sizes.

2. The method according to claim 1, **wherein** protease enzyme is added to the sprayed drying process for obtaining raw material which includes protein.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/TR2022/051725

A. CLASSIFICATION OF SUBJECT MATTER

A23G 1/04 (2006.01)i; A23G 1/42 (2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A23G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

TURKPATENT Database

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO Abstract & Fulltext Databases, Google Scholar, ScienceDirect & Keywords: oil based, fluid, semi product, sugar, invertase, enyzme, invert syrup, spray drying, powder, conching, protease,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2021242997 A1 (CARGILL INC [US]) 02 December 2021 (2021-12-02) paragraphs 0016, 0096	1-2
A	WO 2019023558 A2 (CARGILL INC [US]) 31 January 2019 (2019-01-31) paragraph 0019	1-2
A	AU 2020365395 A1 (NESTLE SA) 31 March 2022 (2022-03-31) Whole document	1-2

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 February 2024	**13 February 2024**

Name and mailing address of the ISA/TR	Authorized officer
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/TR2022/051725

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				EP	4044821	A1	24 August 2022
				MX	2022003799	A	27 April 2022
				WO	2021074271	A1	22 April 2021