

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

(19) World Intellectual Property

Organization

International Bureau

(43) International Publication Date

05 March 2020 (05.03.2020)



(10) International Publication Number

WO 2020/043749 A1

(51) International Patent Classification:

A23K 40/30 (2016.01) A23K 20/163 (2016.01)

A23K 20/189 (2016.01)

(21) International Application Number:

PCT/EP2019/072897

(22) International Filing Date:

28 August 2019 (28.08.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

18191889.7 31 August 2018 (31.08.2018) EP

(71) Applicant: **DSM IP ASSETS B.V.** [NL/NL]; Het Overloon 1, 6411 TE HEERLEN (NL).

(72) Inventors: **FUNDA, Elger**; c/o DSM Nutritional Products Ltd, Patent Department Wurmisweg 576, 4303 Kaiseraugst (CH). **KRAINZ, Odile**; c/o DSM Nutritional Products Ltd, Patent Department Wurmisweg 576, 4303 Kaiseraugst (CH). **PAPPENBERGER, Guenter**; c/o DSM Nutritional Products Ltd, Patent Department Wurmisweg 576, 4303 Kaiseraugst (CH). **STEINERT, Robert**; c/o DSM Nutritional Products Ltd, Patent Department Wurmisweg 576, 4303 Kaiseraugst (CH).

(74) Agent: **KURT, Manfred**; DSM Nutritional Products Ltd, Patent Department Wurmisweg 576, 4303 Kaiseraugst (CH).

(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, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, 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, 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).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))
- as to non-prejudicial disclosures or exceptions to lack of novelty (Rule 4.17(v))

Published:

- with international search report (Art. 21(3))

(54) Title: NEW DELIVERY SYSTEM

(57) Abstract: The present invention relates to a new delivery system for enzymes.



WO 2020/043749 A1

New Delivery System

The present invention relates to a new delivery system of enzymes (especially in the field of animal nutrition). Enzymes are i.e. useful for gut and metabolic health in animals (such as swine and poultry as well as fish), as well as in humans.

Enzymes serve a wide variety of functions inside living organisms. They are indispensable for signal transduction and cell regulation, often via kinases and phosphatases. They also generate movement, with myosin hydrolyzing ATP to generate muscle contraction, and transport cargo around the cell as part of the cytoskeleton. Other ATPases in the cell membrane are ion pumps involved in active transport.

An important function of enzymes is in the digestive systems of animals. Enzymes such as amylases and proteases break down large molecules (starch or proteins, respectively) into smaller ones, so they can be absorbed by the intestines. Starch molecules, for example, are too large to be absorbed from the intestine, but enzymes hydrolyze the starch chains into smaller molecules such as maltose and eventually glucose, which can then be absorbed. Different enzymes digest different food substances. In ruminants, which have herbivorous diets, microorganisms in the gut produce another enzyme, cellulase, to break down the cellulose cell walls of plant fiber.

Due to the importance of the enzymes in the digestive systems of animals, there is always a need for formulation comprising enzymes.

Now the goal of the present invention was to find an improved multiparticulate delivery system (formulation) to improve the stability of enzymes during the transport through the stomach so that the availability in the intestine and the efficacy of the nutraceuticals are improved.

Furthermore, the new delivery system should be producible in a simple and industrial applicable way.

It was found that when a core comprising at least one enzyme is coated with a specific inner and a specific outer coating, then the delivery system has improved properties. Furthermore, the delivery system can be produced in batch-wise as well as in by continuous process.

The new delivery system (DS) according to the present invention consists of

- (a) a core, which comprises at least one enzyme, and
- (b) an inner coating comprising at least one fermentable biopolymer, which is crosslinked, and
- (c) an outer coating which is resistant to stomach conditions.

The core of the delivery system of the present invention does only comprise at least one enzyme as an active ingredient. Other ingredients (which are auxiliary ingredients), which are used to formulate the core are also present.

The core of the delivery system according to the present invention is free of any nutraceuticals. Such nutraceuticals are organic acids, water soluble vitamins (especially B-vitamins), omega 3 fatty acids, omega 6 fatty acids, omega 8 fatty acids, long chain fatty acids, polyphenols (such as resveratrol or genistein), prebiotics, probiotics, essential oils, and antimicrobial peptides.

The invention is also related to a delivery system (DS1), which is delivery system (DS), wherein the core only comprises at least one enzyme as an active ingredient.

The invention is also related to a delivery system (DS2), which is delivery system (DS) or (DS1), wherein the core also comprises auxiliary ingredients, which are used to formulate the core.

The invention is also related to a delivery system (DS3), which is delivery system (DS), (DS1) or (DS2), wherein the core is free of any nutraceuticals.

The invention is also related to a delivery system (DS3'), which is delivery system (DS3), wherein the nutraceuticals are those chosen from the group consisting of organic acids, water soluble vitamins (especially B-vitamins), omega 3 fatty acids, omega 6 fatty acids, omega 8 fatty acids, long chain fatty acids, polyphenols (such as resveratrol or genistein), prebiotics, probiotics, essential oils, and antimicrobial peptides.

The core comprises at least one enzyme.

Enzymes can be classified based on the handbook *Enzyme Nomenclature* from NC-IUBMB, 1992), see also the ENZYME site at the internet: <http://www.expasy.ch/enzyme/>. ENZYME is a repository of information relative to the nomenclature of enzymes. It is primarily based on the recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology (IUB-MB), Academic Press, Inc., 1992, and it describes each type of characterized enzyme for which an EC (Enzyme Commission) number has been provided (Bairoch A. The ENZYME database, 2000, *Nucleic Acids Res* 28:304-305). This IUB-MB Enzyme nomenclature is based on their substrate specificity and occasionally on their molecular mechanism; such a classification does not reflect the structural features of these enzymes. Another classification of certain glycoside hydrolase enzymes, such as endoglucanase, xylanase, galactanase, mannanase, dextranase, lysozyme and galactosidase is described in Henrissat et al, "The carbohydrate-active enzymes database (CAZy) in 2013", *Nucl. Acids Res.* (1 January 2014) 42 (D1): D490-D495; see also www.cazy.org.

Of particular interest are "Feed Enzymes". To save on costs, many producers supplement feed with enzyme additives ("Feed Enzymes"), which enable them to produce more meat per animal or to produce the same amount of meat cheaper and faster.

Found in all living cells, enzymes catalyze chemical processes that convert nutrients into energy and new tissue. They do this by binding to substrates in the feed and breaking them down into smaller compounds. Feed enzymes can be classified by the type of substrate. For instance: proteases break down proteins into amino acids, carbohydrases split carbohydrates into simple sugars, and lipases take apart lipids into fatty acids and glycerol.

Commercially-available enzymes can be derived from plants and animals (e.g., actinidin from kiwi and rennet from calf stomachs) as well as microorganisms (e.g., amylase from *Bacillus* and lactase from *Aspergillus*). Aside from agriculture, other industries that utilize enzymes include the brewing, dairy, paper, biofuel, and rubber industries.

The composition of the invention may comprise an enzyme having phytase activity. The term "phytase activity" means the hydrolysis of phytate (myo-inositol hexakisphosphate) to (1) myo-inositol and/or (2) mono-, di-, tri-, tetra- and/or penta-phosphates thereof and (3) inorganic phosphate. According to the ENZYME site (<http://www.expasy.ch/enzyme/>),

three different types of phytases are known: the 3-phytase (alternative name 1-phytase; a myo-inositol hexaphosphate 3-phosphohydrolase, EC 3.1.3.8), the 4-phytase (alternative name 6-phytase, name based on 1L-numbering system and not 1D-numbering, EC 3.1.3.26), and the 5-phytase (EC 3.1.3.72). For the purposes of the present invention, all three types are included in the definition of phytase.

The composition of the invention may also comprise an enzyme selected from the group comprising of xylanase (EC 3.2.1.8); galactanase (EC 3.2.1.89); alpha-galactosidase (EC 3.2.1.22); protease (EC 3.4); phospholipase A1 (EC 3.1.1.32); phospholipase A2 (EC 3.1.1.4); lysophospholipase (EC 3.1.1.5); phospholipase C (3.1.4.3); phospholipase D (EC 3.1.4.4); amylase such as, for example, alpha-amylase (EC 3.2.1.1); arabinofuranosidase (EC 3.2.1.55); beta-xylosidase (EC 3.2.1.37); acetyl xylan esterase (EC 3.1.1.72); feruloyl esterase (EC 3.1.1.73); cellulase (EC 3.2.1.4); cellobiohydrolases (EC 3.2.1.91); beta-glucosidase (EC 3.2.1.21); pullulanase (EC 3.2.1.41), alpha-mannosidase (EC 3.2.1.24), mannanase (EC 3.2.1.25) and beta-glucanase (EC 3.2.1.4 or EC 3.2.1.6).

Preferred enzymes are phytase, xylanase, galactanase, alpha-galactosidase and protease.

The invention is also related to a delivery system (DS4), which is delivery system (DS), (DS1), (DS2), (DS3) or (DS3'), wherein the at least one enzyme is chosen from the group consisting of phytase, xylanase, galactanase, alpha-galactosidase and protease.

The delivery system according to the present invention comprises an inner coating, which needs to fulfill the criteria as defined. Suitable materials for the inner coating (fermentable biopolymer) are for example alginate, chitosan, pectin, cyclodextrin as well as other gums. Preferred coating materials for the inner coating are alginate or pectin.

The inner coating is crosslinked. This can be done by commonly known crosslinking compounds. In case alginate is used that can be done by Na and/or Ca ion (by the use of a salt). The crosslinker can be spray onto to core after having applied the inner coating or simultaneously. Or the coated particles can be dipped into a solution comprising the crosslinker.

Preferably the crosslinker is sprayed onto the particles after having applied the inner coating layer.

Another advantage of the present invention also lies therein that the production of the new delivery system according to the present invention can be done batch-wise as well as continuously. In contrast to the systems known from the prior art this is a huge advantage also in view of the industrial production of such product. The details of the process are disclosed below.

Therefore, the present invention relates to a delivery system (DS5), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3') or (DS4), wherein the material of the inner coating is chosen from group consisting of alginate, chitosan, pectin, cyclodextrin as well as other gums.

Therefore, the present invention relates to a delivery system (DS5'), which is the delivery system (DS5), wherein the material of the inner coating is alginate or pectin.

The inner coating layer is covering the core (more or less) completely. Ideally the (layer of the inner coating has (more or less) the same thickness when applied on the core.

Usually the thickness of the inner coating layer is at least 5µm and not more than 20µm.

Preferably, the thickness of the inner coating layer is between 5µm - 10µm.

Therefore, the present invention relates to a delivery system (DS6), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5) or (DS5'), wherein the thickness of the inner coating layer is 5µm - 10µm.

The inner coating layer is crosslinked with at least one crosslinking agent. Any suitable crosslinker can be used. Very suitable (and therefore preferred are Na and Ca ions (they are added in form of a salt).

Therefore, the present invention relates to a delivery system (DS7), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS3''), (DS4), (DS5), (DS5') or (DS6), wherein

the inner coating layer is crosslinked with at least one crosslinking agent (preferably with Na and/or Ca ions).

Therefore, the present invention relates to a delivery system (DS8), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6) or (DS7), wherein the crosslinked inner coating layer Na alginate or Na pectin.

The delivery system according to the present invention comprises an outer coating, which needs to fulfill the criteria as defined. Suitable materials which fulfill the criteria for the outer coating is for example shellac, methacrylate copolymers and fats.

Therefore, the present invention relates to a delivery system (DS9), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7) or (DS8), wherein the material of the inner coating is chosen from group consisting of shellac, methacrylate copolymers and fats.

The outer coating layer is covering the inner coating (more or less) completely. Ideally the layer of the outer coating has (more or less) the same thickness.

Usually the thickness of the outer layer is at least 10µm and usually less than 30 µm.

Preferably, the thickness of the inner coating layer is between 10 and 20µm.

Therefore, the present invention relates to a delivery system (DS10), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8) or (DS9), wherein the thickness of the outer coating layer is 10µm - 20µm.

The core of the delivery system according to the present invention is usually 10 – 85 wt-%, preferably 50 - 75 wt-%, based on the total weight of the delivery system.

Therefore, the present invention relates to a delivery system (DS11), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9) or (DS10), wherein the core of the delivery system is 10 – 85 wt-%, preferably 50 - 75 wt-%, based on the total weight of the delivery system.

The inner coating of the delivery system according to the present invention is usually 1 – 20 wt- %, preferably 1 - 10 wt-%, based on the total weight of the delivery system.

Therefore, the present invention relates to a delivery system (DS12), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10) or (DS11), wherein the inner coating of the delivery system is 10 – 85 wt-%, preferably 1 - 10 wt-%, based on the total weight of the delivery system.

The outer coating of the delivery system according to the present invention is usually 1 – 30 wt- %, preferably 15 - 30 wt-%, based on the total weight of the delivery system.

Therefore, the present invention relates to a delivery system (DS13), which is the delivery system (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11) or (DS12), wherein the outer coating of the delivery system is 1 – 30 wt- %, preferably 15 - 30 wt-%, based on the total weight of the delivery system

The delivery system according to the present invention can be up to 2mm in size. The size is defined by the longest diameter of the particle. The shape of the particle is not an essential feature of the present invention. Also, the size distribution of the particles is no essential. The size and the shape of the particle is mainly defined by the core of the delivery system. Depending on the use of the delivery system the size can be adjusted.

The delivery system according to the present invention is produced by commonly known technology.

Usually the core is produced in a first step and then the inner and outer coatings are applied.

The enzyme of the invention is formulated into a solid core. As stated above the core can comprise one or more auxiliary ingredients, which are useful to formulate the core.

Such auxiliary ingredients can be a salt (organic or inorganic zinc, sodium, potassium or calcium salts such as e.g. such as calcium acetate, calcium benzoate, calcium carbonate, calcium chloride, calcium citrate, calcium sorbate, calcium sulfate, potassium acetate, potassium benzoate, potassium carbonate, potassium chloride, potassium citrate, potassium

sorbate, potassium sulfate, sodium acetate, sodium benzoate, sodium carbonate, sodium chloride, sodium citrate, sodium sulfate, zinc acetate, zinc benzoate, zinc carbonate, zinc chloride, zinc citrate, zinc sorbate, zinc sulfate), starch or a sugar or sugar derivative (such as e.g. sucrose, dextrin, glucose, lactose, sorbitol), small organic molecules, flour, cellulose and minerals.

Therefore the present invention also related to a process of production (P) of any of the particles (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) or (DS13), wherein the process is carried out batch wise.

Therefore the present invention also related to a process of production (P1) of any of the particles (DS), (DS1), (DS2), (DS3), (DS3''), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) or (DS13), wherein the process is carried out continuously.

The new delivery systems (DS), (DS1), (DS2), (DS3), (DS3'), (DS3''), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) and/or (DS13) according to the present invention can be used as such or incorporated into application forms.

The new delivery systems (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) and/or (DS13) can used in any feed product.

The term "animal feed" refers to all animals except humans. Examples of animals are non-ruminants, and ruminants. Ruminant animals include, for example, animals such as sheep, goats, cattle, e.g. beef cattle, cows, and young calves, deer, yank, camel, lama, and kangaroo. Non-ruminant animals include mono-gastric animals, e.g. pigs or swine (including, but not limited to, piglets, growing pigs, and sows); poultry such as turkeys, ducks and chicken (including but not limited to broiler chicks, layers); horses (including but not limited to hotbloods, coldbloods and warm bloods), young calves; fish (including but not limited to amberjack, arapaima, barb, bass, bluefish, bocachico, bream, bullhead, cachama, carp, catfish, catla, chanos, char, cichlid, cobia, cod, crappie, dorada, drum, eel, goby, goldfish, gourami, grouper, guapote, halibut, java, labeo, lai, loach, mackerel, milkfish, mojarra, mudfish, mullet, paco, pearlspot, pejerrey, perch, pike, pompano, roach, salmon, sampa, sauger, sea bass, seabream, shiner, sleeper, snakehead, snap-per,

snook, sole, spinyfoot, sturgeon, sunfish, sweetfish, tench, terror, tilapia, trout, tuna, turbot, vendace, walleye and whitefish); and crustaceans (including but not limited to shrimps and prawns).

The term "animal feed" refers to any compound, preparation, or mixture suitable for, or intended for intake by an animal. Animal feed for a mono-gastric animal typically comprises concentrates as well as vitamins, minerals, enzymes, direct fed microbial, amino acids and/or other feed ingredients (such as in a premix) whereas animal feed for ruminants generally comprises forage (including roughage and silage) and may further comprise concentrates as well as vitamins, minerals, enzymes direct fed microbial, amino acid and/or other feed ingredients (such as in a premix).

The new delivery systems (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) and/or (DS13) can also be part of a premix formulation, which can then be used to formulate any feed product.

The invention also relates to a process for the production of a premix or a feed product using at least one delivery systems (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) or (DS13).

The invention also relates to a premix, or a feed product comprising at least one delivery systems (DS), (DS1), (DS2), (DS3), (DS3'), (DS4), (DS5), (DS5'), (DS6), (DS7), (DS8), (DS9), (DS10), (DS11), (DS12) or (DS13).

Claims

1. Delivery system consisting of
 - (a) a core, which comprises at least one enzyme, and
 - (b) an inner coating comprising at least one fermentable biopolymer, which is crosslinked, and
 - (c) an outer coating which is resistant to stomach conditions and releasing in the intestine.
2. Delivery system according to claim 1, wherein the core is free of any nutraceutical is chosen from the group consisting of organic acids, water soluble vitamins (especially B-vitamins), omega 3 fatty acids, omega 6 fatty acids, omega 8 fatty acids, long chain fatty acids, polyphenols (such as resveratrol or genistein), prebiotics, probiotics, essential oils, or antimicrobial peptides.
3. Delivery system according to claim 1 or claim 2, wherein the enzyme is chosen from the group consisting of phytase, xylanase, galactanase, alpha-galactosidase and protease.
4. Delivery system according to anyone of the preceding claims, wherein the inner coating layer is chosen from group consisting of alginate, chitosan, pectin, cyclodextrin as well as other gums and it is crosslinked with Na and/or Ca ions.
5. Delivery system according to anyone of the preceding claims, wherein the outer coating is chosen from group consisting of shellac, methacrylate copolymers and fats.
6. Process of production delivery systems according to any of the preceding claims, wherein the process is carried out batch wise.
7. Process of production delivery systems according to any of the preceding claims, 1 – 5, wherein the process is carried out continuously.

8. Process for the production of a premix or feed product using at least one delivery system according to any one of claims 1 – 5.
9. Premix or feed product comprising at least one delivery system according to claims 1 – 5.

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2019/072897

A. CLASSIFICATION OF SUBJECT MATTER

INV. A23K40/30 A23K20/189 A23K20/163
ADD.

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)
A23K

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 3 205 216 A1 (FUNDACIÓN TECNALIA RES & INNOVATION [ES]) 16 August 2017 (2017-08-16) paragraph [0004] paragraph [0010] paragraph [0033] - paragraph [0036] paragraph [0039] - paragraph [0040]; claims 1-15; examples 3-8 -----	1,3-6,8, 9
X	US 2008/175954 A1 (HORGAN MONIKA BARBARA [US] ET AL) 24 July 2008 (2008-07-24) paragraph [0002] - paragraph [0003] paragraph [0033] - paragraph [0034] paragraph [0047] paragraph [0146] - paragraph [0147]; claims 1-4, 6-11; examples 1-14 ----- -/-	1-5,7-9



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

"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

30 October 2019

Date of mailing of the international search report

08/11/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Kirchhoff, Eva

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/072897

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011/008293 A1 (BHANDARI BHESH [AU]) 13 January 2011 (2011-01-13) paragraph [0107] - paragraph [0108]; claims 1-3,7,8,11,19,20; examples 1-3 paragraph [0059] -----	1-9
A	JP 2013 224273 A (NISSHIN PHARMA INC) 31 October 2013 (2013-10-31) paragraph [0006] - paragraph [0007]; examples 1-3 & DATABASE WPI Week 201376 Thomson Scientific, London, GB; AN 2013-S76905 & JP 2013 224273 A (NISSHIN PHARMA KK) 31 October 2013 (2013-10-31) abstract -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/072897

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3205216	A1	16-08-2017	EP 3205216 A1 16-08-2017
			ES 2698384 T3 04-02-2019
			WO 2017137496 A1 17-08-2017

US 2008175954	A1	24-07-2008	AR 064956 A1 06-05-2009
			AU 2008206671 A1 24-07-2008
			BR PI0806805 A2 13-09-2011
			CA 2674529 A1 24-07-2008
			EP 2124609 A1 02-12-2009
			JP 2010517512 A 27-05-2010
			US 2008175954 A1 24-07-2008
			WO 2008087608 A1 24-07-2008

US 2011008293	A1	13-01-2011	AU 2008323624 A1 22-05-2009
			DK 2217363 T3 21-01-2019
			EP 2217363 A1 18-08-2010
			JP 5526033 B2 18-06-2014
			JP 2011504410 A 10-02-2011
			KR 20100114878 A 26-10-2010
			NZ 585407 A 28-10-2011
			US 2011008293 A1 13-01-2011
			WO 2009062254 A1 22-05-2009

JP 2013224273	A	31-10-2013	JP 5940869 B2 29-06-2016
			JP 2013224273 A 31-10-2013
