



(51) International Patent Classification:

A23J 3/34 (2006.01) A23L 27/21 (2016.01)
A23J 1/02 (2006.01) A23L 27/40 (2016.01)

(21) International Application Number:

PCT/BR2017/050282

(22) International Filing Date:

27 September 2017 (27.09.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

BR102016022710-0

29 September 2016 (29.09.2016) BR

(71) Applicant: BRF S.A [BR/BR]; Rua Jorge Tzachel, 475,
88301-600 Itajaí (BR).

(72) Inventor: DEGENHARDT, João; Rua Iomerê, 753,
89560-000 Videira (BR).

(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.

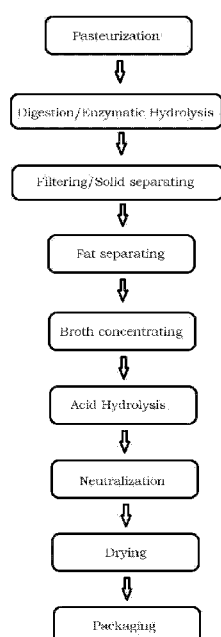
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, 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).

Published:

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

(54) Title: A PROCESS FOR PRODUCING AN ANIMAL PROTEIN HYDROLYSATE, ANIMAL PROTEIN HYDROLYSATES
AND ITS USES

FIGURE 1



(57) Abstract: The invention relates to a process for producing an animal protein hydrolysates using following steps: (a) subjecting raw material to the pasteurization process, by means of a thread system with controlled temperature and speeds; (b) performing an enzymatic digestion with proportions of 1.5:3,000 to 3.0:3,000 (enzyme:raw material); (c) filtering the resulting mixture of enzymatic digestion; (d) correcting pH of broth with the addition of acid and incorporation of an antifoaming agent; (e) performing an initial centrifugation to separate the liquid and solid phases, followed by flotation with aeration and/or a second centrifugation after the disposal of the solid phase; (f) concentrating broth upon controlled temperature, vacuum and °Brix; (g) performing acid hydrolysis with addition of hydrochloric acid (HCl), and the neutralization with potassium hydroxide (KOH); (h) cooling protein hydrolysate, optionally with the correction of °Brix with the potassium hydroxide (KCl) that was internally generated by the process itself; and (i) processing mixture and dry the protein hydrolysate. Also, the current patent application concerns the animal protein hydrolysate (HPA) obtained through the process of the present invention, and its uses and/or applications in food industry, such as condiments, seasonings and/or powder meat flavors, particularly in the manufacturing of meat products.

“A PROCESS FOR PRODUCING AN ANIMAL PROTEIN HYDROLYSATE, ANIMAL PROTEIN HYDROLYSATES AND ITS USES”

FIELD OF THE INVENTION

[001] The invention relates to a process for producing an animal protein hydrolysates using following steps: (a) subjecting raw material to the pasteurization process, by means of a thread system with controlled temperature and speeds; (b) performing an enzymatic digestion with proportions of 1.5:3,000 to 3.0:3,000 (enzyme:raw material); (c) filtering the resulting mixture of enzymatic digestion; (d) correcting pH of broth with the addition of acid and incorporation of an antifoaming agent; (e) performing an initial centrifugation to separate the liquid and solid phases, followed by flotation with aeration and/or a second centrifugation after the disposal of the solid phase; (f) concentrating broth upon controlled temperature, vacuum and °Brix; (g) performing acid hydrolysis with addition of hydrochloric acid (HCl), and the neutralization with potassium hydroxide (KOH); (h) cooling protein hydrolysate, optionally with the correction of °Brix with the potassium hydroxide (KCl) that was internally generated by the process itself; and (i) processing mixture and dry the protein hydrolysate. Also, the current patent application concerns the animal protein hydrolysate (HPA) obtained through the process of the present invention, and its uses and/or applications in food industry, such as condiments, seasonings and/or powder meat flavors, particularly in the manufacturing of meat products.

BACKGROUND OF THE INVENTION

[002] The protein hydrolysis consists of processing the mixture of meat, water, and proteolytic enzymes. The proteolytic enzymes are used to extract proteins from meat, separating and removing the lipids and other undesirable materials, forming a uniform protein material with

low fat content. This process releases peptides and amino acids, which contributes to the stronger flavor and taste of meat.

[003] The meat protein hydrolysates are used to change food functional properties and as a source of small peptides and amino acids in dietary foods. These hydrolysates can be incorporated into several products, as balanced formulations for athletes, weight loss diets, and used for animal feeding, such as pigs and calves, and as protein supplement for animal feed. In human food, meat protein hydrolysates serve as supplement in biscuits and products like hamburger, chicken nuggets, and others. Also, they can be used in food diet for people with digestion or low protein-adsorption problems, by virtue of its high digestibility and the essential amino acids.

[004] In the last few years, several studies have demonstrated that small peptide-rich preparations, particularly dipeptides and tripeptides resulting from the partial hydrolysis of proteins, have a gastrointestinal absorption that is more efficient than intact protein and free amino acids. Also, these peptides present a lower osmolarity when comparing than free amino acids, and are best tolerated by individuals with absorption problems. Therefore, the availability of nutritionally balanced products that use the protein hydrolysates can provide an important protein intake in food diets.

[005] However, the protein hydrolysates usually have a bitter taste, resulting from the release of hydrophobic amino acids that are within the protein.

[006] In agents used for seasoning food, there are chemical seasonings such as sodium glutamate or sodium inosinate and natural seasonings mainly produced from animals or plants. A large proportion of natural seasonings comprise extract seasonings and amino acid seasonings. Extract seasonings are produced from condensed extracts of stock farm

products, vegetables, marine products, and the like. Amino acid seasonings are protein hydrolysates produced by decomposing protein into amino acids.

[007] As processes for decomposing protein into amino acids, there are acid digestions using hydrochloric acid and enzymatic digestions. Amino acid seasonings produced by decomposing vegetable protein with hydrochloric acid are called HVP (Hydrolyzed Vegetable Protein) while those produced by decomposing animal protein with hydrochloric acid are called HAP (Hydrolyzed Animal Protein), both of which are widely used as food seasonings. The raw materials of HVP and HAP are vegetable protein of defatted soybeans and animal protein such as protein of fish or bone residues remaining after taking meat, respectively. HVP and HAP, which are produced by decomposition with hydrochloric acid, enable high decomposition at a low cost and have strong umami. However, reactions of hydrochloric acid with fat components can generate toxic chlorohydrin or mutagenic compounds and causes safety concerns.

[008] On the other hand, enzymatic digestions, which use enzymes to decompose protein instead of hydrochloric acid, provide safe seasoning. However, without high decomposition (amination ratios: 55% or higher), appropriate seasonings are not available, because of the bitter taste caused by generation of peptides. High decomposition with enzymatic digestions entails technical difficulties and requires a large amount of enzyme, which often leads to poor costs performance. Here, an amination ratio is one of the indicators which show a decomposition rate of protein, and a higher amination ratio means that the decomposition has proceeded. An amination ratio (%) is expressed in the following equation:

$$\text{formol nitrogen (F-N)/total nitride (T-N)} \times 100$$

[009] A large number of other processes have been proposed to decompose protein using enzymes or rice malt whereas they are mostly for vegetable protein (mainly wheat protein). A typical technique for highly decomposing vegetable protein is a method of producing soy sauce, which has already been commercialized. As for animal protein, however, a high decomposition is deemed to be difficult. There are few seasonings produced by decomposing meat or bone with enzymes at present, and techniques for the methods have not yet been established.

[010] For example, the publication of Japanese Patent No. 2960864 describes a seasoning produced by dissolving and recovering muscular protein from bone or the like with enzymes, followed by mixing the resultant with rice malt. This technique is effective for elevating a nitrogen utilization ratio. However, during the decomposition and fermentation steps, a large amount of salt added to prevent putrefaction hinders enzymatic activity, which consequently extends the time for decomposition and fermentation. In addition, the amination ratio is only 33.0% which is problematically low.

[011] Most of the extract seasonings are, in the case of muscular protein, extracts produced by thermal extraction with water (hydrothermal extraction) from meat. Hydrothermal extraction of meat leaves a large amount of residue, which is not utilized effectively. A process of decomposing the residue with rice malt is known as described in the publication of Japanese Patent No. 2631200, for example.

[012] In the process of animal protein hydrolysis, meat is roughly divided into muscular protein (the protein forming muscle fibers, such as actomyosin, miogen, and globulin) and structural protein (the protein forming connective tissues, such as collagen and elastin) (see table 1, below: Complete protein content in meat, "Meat Chemistry", 1964, p.

163). Muscular protein is partially soluble in water or salt solution and solidifies by heating. On the other hand, collagen, which is a main component of structural protein, is insoluble in water, but thermally decomposed by heating into gelatin and dissolves.

TABLE 1

Kind of meat	Portion	Protein content (% in total protein)	
		Complete (muscular protein)	Incomplete (structural protein)
Beef	back	84	16
	breast	72	28
	shank	44	56
Lamb	upper loin	80	20
	breast	73	27
	shank	50	50
Pork	back	91	9
	ham	88	12
Chicken	breast	92	8

[013] The publication of Japanese patent JP 5-84050 discloses a method of preparing a seasoning by decomposing gelatin with enzymes and separating it with a membrane.

[014] In hydrothermal extraction, trace constituents in muscular protein (amino acids, nucleic acids, etc.) are extracted to provide extract with rich flavor, whereas muscular protein itself solidified by heating is not utilized. On the contrary, collagen, which is structural protein, is gelatinized by heating and dissolves while gelatin itself has feeling of thickness but less tasty.

[015] As described above, in hydrothermal extraction, muscular

protein is not utilized, which holds nitrogen utilization ratios at a lower level. Furthermore, since extract from bone contains gelatin as its principal component, it only exhibits weak taste. In addition, it is not possible to highly decompose extract produced by hydrothermal extraction from chicken bone with commercially-available enzymes

[016] European patent application EP 2.612.558 shows the production of fat, protein hydrolysate and minerals from animal raw material by the thermolysis, comprises: (a) optionally crushing the raw material and mixing with water; (b) heating the mixture in an autoclave and hydrolyzing for 0.5-2 hours; (c) separating the resulting three-phase system comprising of a liquid fatty phase, an aqueous protein hydrolysate phase and sediment into the phases; (d) optionally subjecting the aqueous protein hydrolysate phase to ultrafiltration to separate amino acids and peptides, water soluble, having molecular weight of more than 20 kDa; and (e) optionally concentrating and/or drying aqueous protein hydrolysate phase.

[017] Japanese patent JPH 6105665 discloses a process to produce a hydrolyzed seasoning having high tastiness without containing an unfavorable chlorinated compound such as dichloropropanol (DCP) or monochloropropanediol (MCP). When an animal protein for a food with low lipid content is hydrolyzed with hydrochloric acid, any chlorinated compound is hardly produced by carrying out the hydrolysis under mild conditions at a constant level or below. These conditions are achieved by setting hydrolyzing conditions of the protein so as to provide $\leq 1\%$ lipid content based on the protein and $\leq 60\%$ hydrolytic ratio. Since the tasting power of the hydrolysate under these conditions is lower than that of the complete hydrolysis, the hydrolysate having high tasting power can be obtained by supplementing the insufficient hydrolytic ratio according to the hydrolysis with the hydrochloric acid and a

proteolytic enzyme in combination.

[018] Korean patent application KR 101052337 describes a method for producing a meat extraction seasoning solution and/or meat extracted seasoning and a producing method of powder condiment and/or seasoning with meat taste. A producing method of a meat extraction seasoning solution comprises the following steps: (a) mixing 100 parts of water by weight, 40~60 parts of ground beef by weight, and 0.1~1 parts of proteinase by weight; (b) hydrolyzing the mixture at 45~65°C for 1~5 hours at the pH of 6~9 for obtaining hydrolysate; (c) adding 20~40 parts of soy sauce by weight into the hydrolysate, and (d) heating the mixture for 10~60 minutes at 80~110°C to obtain a first mixture; cooling the first mixture, and (e) adding 10~20 parts of salt by weight, 2~12 parts of sugar by weight, 10~20 parts of seasoning powder by weight, and 5~15 parts of rice concentrate; and (f) concentrating the mixture into the sweetness of 30~50 °Brix.

[019] Korean patent KR 870001618 proposes an animal protein hydrolysate prepared by the following steps: (a) washing 1 kg of cow bone with tap water, added in equal amount, of water, (b) autoclaving the mixture at 120°C for 20 min, cooling to 40°C, (c) adjusting with HCl to pH 2.0, and (d) treating with 0.05% pepsin (10000 units/g) based on the substrate for 3 hours.

[020] Brazilian patent application PI 0414297-7 provides a process for production of a highly safe seasoning by decomposition of meats or bones remaining after the removal of meat (particularly chicken meat, bones, and wastes) with enzymes. Also, the intention is to use nitrogen at high concentrations as compared with the existing low level of nitrogen use. When decomposing the protein of chicken meat, chicken waste or chicken bones, only the muscular protein is decomposed using an autolytic enzyme or an autolytic enzyme with an enzymatic agent

containing peptidase. According to this invention, the process for the production of a protein hydrolysate occurs through (a) selecting raw material which can be chicken meat, carcasses (bodies without head, wings, organs and legs) of chicken waste (adult chicken), carcasses of young chicken, bones remaining after the removal of chicken meat (chicken bones), and like; (b) pretreatment of the raw material, previously cut for extraction with water (average size of 3 mm to 10 mm); (c) extracting muscular protein and separating solid matter, adding 100 to 300 parts of water, by weight, to each 100 parts of chopped material, by weight, with agitation and, optionally, adding enzyme, with an alkali for decomposition of protein; (d) decomposition of muscular protein by centrifugation to separate oil and fat contents at 40 to 60°C; (d) production of a gelatin type extract; (e) preparation of the hydrolyzed seasoning; and (f) recovery ratio of protein.

[021] The international publication WO 2004/021797 claims a method for recovering peptides/amino acids and oil/fat from one or more protein-containing raw materials characterized in that it comprises the following steps: (a) grinding the raw materials; (b) heating the ground raw materials to a temperature in the range of 40-62°C, preferably 45-58°C; (c) optionally before and/or after the heating step, separating oil/fat from the raw materials in order to obtain a first oil product; (d) adding water, the water having approximately the same or the same temperature as the raw materials, and wherein the pH of the water is adjusted by adding calcium; (e) hydrolysing the raw materials with endogenous enzymes in order to prepare a hydrolysate; (f) optionally during the hydrolysis step, adding a pH adjuster in order to maintain the desired pH value of the hydrolysate; (g) heating the hydrolysate to 75-100°C, preferably 85-95°C; (h) removing large particles from the hydrolysate, including non-hydrolyzed proteins,

which can be returned to the hydrolysis; (i) optionally separating off fat/oil in order to obtain a second oil product; (j) coagulating the proteins; (k) removing the coagulated proteins; (l) optionally separating off fat/oil in order to obtain a third oil product; (m) optionally concentrating the remaining amino acids and short peptides; and (n) optionally drying the concentrate in order to obtain dry short peptides and amino acids.

[022] The international publication WO 98/27828 refers to a flavour enhancer which is low in monosodium glutamate, which is substantially free of 5'-IMP and 5'-GMP and which enhances both meat, vegetable and dairy flavours. Particularly, this invention also relates to process for producing a soy protein hydrolysate, the process comprising the steps of: (i) forming an aqueous suspension of a soy protein containing starting material; (ii) heating said aqueous suspension for at least from about 1 minute to about 15 minutes at a temperature of from about 60°C to about 82°C; (iii) incubating said suspension with a protease mixture comprising endoprotease and exoprotease activity to obtain an amino acid level in the suspension of from about 20% to about 55%; and (iv) adjusting the pH and temperature of said suspension to inactivate said endoprotease and exoprotease and obtain said soy protein hydrolysate.

[023] Brazilian patent application BR 102014018071-0 provides a new method to obtain protein hydrolysate from chicken meat with low sodium content and resulting product. The solution proposed provides for a differential product with the stronger taste and low content of ashes and sodium. The product is obtained by enzymatic hydrolysis of chicken meat, purified by centrifugation, nanofiltration, dialysis, and drying. The powder product does not have a bitter taste and has multiple applications as an ingredient for food and meat products.

[024] The international publication WO 2015/170988 describes a method for the preparation of a protein hydrolysate comprising phospholipids and at least 6 w/w% cholesterol, the weight ratio between cholesterol and phospholipids being between 1:0.5 and 1:3, comprising the steps of: (a) providing animal tissue and/or a combination thereof, (b) subjecting tissue to hydrolysis to obtain a protein hydrolysate, (c) subjecting protein hydrolysate to heat treatment (antimicrobial) and (d) drying antimicrobially treated protein hydrolysate.

[025] On the above, the Applicant developed an improved method and/or process for producing an animal protein hydrolysate resulting in a seasoning and/or condiment product with physical and chemical characteristics that overcome the state of the art products.

DESCRIPTION OF THE DRAWINGS

[026] Figure 1 shows a flowchart of the process for producing an animal protein hydrolysate of the present invention.

DESCRIPTION OF THE INVENTION

[027] The invention relates to a process for producing an animal protein hydrolysates using following steps: (a) subjecting raw material to the pasteurization process, by means of a thread system with controlled temperature and speeds; (b) performing an enzymatic digestion with proportions of 1.5:3,000 to 3.0:3,000 (enzyme:raw material); (c) filtering the resulting mixture of enzymatic digestion; (d) correcting pH of broth with the addition of acid and incorporation of an antifoaming agent; (e) performing an initial centrifugation to separate the liquid and solid phases, followed by flotation with aeration and/or a second centrifugation after the disposal of the solid phase; (f) concentrating broth upon controlled temperature, vacuum and °Brix; (g) performing acid hydrolysis with addition of hydrochloric acid (HCl), and

the neutralization with potassium hydroxide (KOH); (h) cooling protein hydrolysate, optionally with the correction of °Brix with the potassium hydroxide (KCl) that was internally generated by the process itself; and (i) processing mixture and dry the protein hydrolysate. Also, the current patent application concerns the animal protein hydrolysate (HPA) obtained through the process of the present invention, and its uses and/or applications in food industry, such as condiments, seasonings and/or powder meat flavors, particularly in the manufacturing of meat products.

[028] In one embodiment, in the process for producing an animal protein hydrolysates of the present invention, the raw material is previously collected, particularly from a meat source and is further stored at a temperature range between 0°C to 10°C to allow its efficient use in step (a) of the preparation of protein hydrolysate.

[029] In step (a) of this process, the pasteurization is performed at temperatures of about 65°C to 85°C and speeds around 10 rpm to 25 rpm. Also, the said thread system comprises 4 threads operating at controlled speed from 20% to 90% using an inverter of system frequency, notably through a jacketed worn thread system, allowing the injection of vapor. Optionally, during the pasteurization process in step (a), it is possible to add a quantity of about 10% to 20% of water volume (for example, 300 liters to 600 liters of water) in the proportion of 1:1, wherein the remaining water is added later to buffer tank to facilitate the deagglomeration and the decompaction of raw material. Consequently, the raw material is directed to a stainless steel tank containing a load cell and then water is added in the proportion of 1:1 (raw material:water).

[030] Particularly, the step (b) of enzymatic digestion is performed with proteolytic enzymes in digesters and jacketed stainless steel tanks for

about 1 to 2 hours, at temperatures of about 53°C to 72°C.

[031] The filtration step (c) can be performed with static, rotary sieves and/or a percolator.

[032] In step (d), the pH of the broth obtained is corrected to a range of 5.4 to 5.6 by adding acid, preferably phosphoric acid 85% and the incorporation of about 0.01% to 0.05% of an antifoaming agent, particularly the dimethylsiloxane emulsion under agitation of approximately 25 to 35 rpm and temperature from 85°C to 95°C.

[033] Consequently, in step (e), the broth is initially centrifuged in a decanter to separate the liquid phase, and after the disposal of solids, the liquid phase is stored in stainless steel tanks to go subsequently thorough a flotation process or a second centrifugation in order to separate the fat and lees (the solid part of low density). The flotation process is preferably performed for around 10-25 minutes with aeration by injection of microbubbles with pressure of 5-10 bar, using a cavitation pump with speeds of 1,600 L/h to 3,000 L/h. Then, the limpid and transparent liquid is placed in the plate centrifuge and stainless steel tank and subsequently in the vacuum concentrator.

[034] In step (f), the broth is vacuum concentrated at a temperature from about 80°C to 95°C and 25 to 35 °Brix.

[035] In step (g), the acid hydrolysis occurs, preferably with the addition of approximately 25% to 50% of hydrochloric acid (HCl) and maintained for 15 to 30 minutes at temperatures of 95°C to 125°C, wherein said broth is transferred to a vitrified reactor, with internal pressure of 1.2 to 2.5 bar. The broth is then neutralized by adding a base, preferably potassium hydroxide (KOH) in quantities of about 22% to 44%, maintaining the broth for approximately 10 to 25 minutes or until a pH of 6-7 is obtained.

[036] The broth in step (h) is cooled down to a temperature of about

75°C to 90°C. Optionally, if the protein hydrolysate has a °Brix of 25 or above, the Brix is adjusted to values below 25 with the addition of the potassium chloride (KCL) that is generated in step (g) of neutralization.

[037] Finally, the mixing step (i) of the process using, preferably a shaft paddle mixer. Dextrin and anti-humectants are added to the liquid resulting from hydrolysis in the step of spray drying, and further mixed for about 20 minutes with agitation. Then, the mixture goes to a dryer with temperatures of 80°C to 99°C to yield a powder with $\leq 2\%$ humidity.

[038] In another embodiment, the patent application refers to the animal protein hydrolysate obtained through the process of the present invention, wherein it shows characteristics such as protein content of about 14% to 18%; humidity content less than or equal to 2%; fat content less than or equal to 1%; potassium content of about 28% to 35%; and a final pH of 6.0 to 7.0.

[039] In another embodiment, the present invention provides the uses and/or applications of animal protein hydrolysate resulting from the process of this invention in the food industry, such as condiments, seasoning and/or powder meat flavors, particularly in the production of meat products or products in the form of sachet, preferably as a replacer of the table salt and/or decrease sodium content.

CLAIMS

1. A PROCESS FOR PRODUCING AN ANIMAL PROTEIN HYDROLYSATE comprising the following steps:

- (a) subjecting raw material to the pasteurization process, by means of a thread system with controlled temperature and speeds;
- (b) performing an enzymatic digestion with proportions of 1.5:3,000 to 3.0:3,000 (enzyme:raw material);
- (c) filtering the resulting mixture of enzymatic digestion;
- (d) correcting pH of broth with the addition of acid and incorporation of an antifoaming agent;
- (e) performing an initial centrifugation to separate the liquid and solid phases, followed by flotation with aeration and/or a second centrifugation after the disposal of the solid phase;
- (f) concentrating broth upon controlled temperature, vacuum and °Brix;
- (g) performing acid hydrolysis with addition of hydrochloric acid (HCl), and the neutralization with potassium hydroxide (KOH);
- (h) cooling protein hydrolysate, optionally with the correction of °Brix with the potassium hydroxide (KCl) that was internally generated by the process itself; and
- (i) processing mixture and dry the protein hydrolysate.

2. PROCESS, according to claim 1, characterized by the fact that this raw material is previously collected, particularly from a meat source, and then stored at a temperature range between 0°C to 10°C to allow its efficient use in step (a) of the preparation of protein hydrolysate.

3. PROCESS, according to claim 1, characterized by the fact that the pasteurization process of step (a) is performed at temperatures of about 65°C to 85°C and speeds around 10 rpm to 25 rpm.

4. PROCESS, according to claim 1, characterized by the fact that the thread system comprises 4 threads operating at controlled speed from 20% to 90% using an inverter of system frequency, notably through a jacketed worn thread system, allowing the injection of vapor.

5. PROCESS, according to claim 3, characterized by the fact that the pasteurization in step (a) also comprises the addition of a quantity of about 10% to 20% of water volume in the proportion 1:1.

6. PROCESS, according to claim 1, characterized by the fact that the step (b) of enzymatic digestion is performed with proteolytic enzymes in digesters and jacketed stainless steel tanks for about 1 to 2 hours, at temperatures of about 53°C to 72°C.

7. PROCESS, according to claim 1, characterized by the fact that the filtration step (c) is made with static, rotary sieves and percolator.

8. PROCESS, according to claim 1, characterized by the fact that the pH of the broth obtained in step (d) is corrected to a range of 5.4 to 5.6 by adding acid and the incorporation of about 0.01% to 0.05% of an antifoaming agent under agitation of approximately 25 to 35 rpm and temperature from 85°C to 95°C.

9. PROCESS, according to claim 8, characterized by the fact that the acid is preferably the phosphoric acid 85%.

10. PROCESS, according to claim 8, characterized by the fact that the antifoaming agent particularly comprises a dimethylsiloxane emulsion.

11. PROCESS, according to claim 1, characterized by the fact that the broth in step (e) is initially centrifuged in a decanter to separate the liquid phase, and after the disposal of solids, the liquid phase is stored in stainless steel tanks.

12. PROCESS, according to claim 11, characterized by

the fact that step (e) additionally comprises a flotation process or second centrifugation for the separation of fat and lees.

13. PROCESS, according to claim 12, characterized by the fact that the flotation process is performed for about 10-25 minutes, with aeration by injection of microbubbles with pressure of 5 to 10 bar.

14. PROCESS, according to claim 13, characterized by the fact that the injection of microbubbles is performed using a cavitation pump with speeds of 1,600 L/h to 3,000 L/h.

15. PROCESS, according to claim 1, characterized by the fact that the broth in step (f) is vacuum concentrated at a temperature from about 80°C to 95°C and 25 to 35 °Brix

16. PROCESS, according to claim 1, characterized by the fact that the acid hydrolysis of the step (g) occurs preferably with the addition of approximately 25% to 50% of hydrochloric acid (HCl), and maintained for 15-30 minutes under temperatures of 95°C to 125°C.

17. PROCESS, according to claim 16, characterized by the fact that the concentrated broth is then transferred to a vitrified reactor with the internal pressure of 1.2 to 2.5 bar.

18. PROCESS, according to claim 17, characterized by the fact that the broth is also neutralized by adding a base, preferably potassium hydroxide (KOH) in quantities of about 22% to 44%, maintaining the broth for approximately 10 to 25 minutes or until a pH of 6-7 is obtained.

19. PROCESS, according to claim 1, characterized by the fact that the cooling down in step (h) comprises the decrease of temperature of broth to a temperature of about 75°C to 90°C.

20. PROCESS, according to claim 19, characterized by the fact that the step (h) comprises optionally the adjustment of °Brix to less than 25 with the addition of the potassium chloride (KCL) which is

generated in the step (g) of neutralization.

21. PROCESS, according to claim 1, characterized by the fact that the mixing step (i) of the process using, preferably a shaft paddle mixer.

22. PROCESS, according to claim 21, characterized by the fact that the step (i) still comprises the step of spray drying through the addition of dextrin and anti-humectants to the liquid resulting from the hydrolysis and further mixed for about 20 minutes with agitation.

23. PROCESS, according to claims 21 and 22, characterized by the fact that step (i) still comprises the delivery of the mixture to a dryer with approximately temperatures of 80°C to 99°C.

24. ANIMAL PROTEIN HYDROLYSATES, obtained by the process described in claims 1 to 23, characterized by the fact that it has a protein content of about 14% to 18%.

25. ANIMAL PROTEIN HYDROLYSATES, according to claim 24, characterized by the fact that it has a humidity content that is less than or equal to 2%.

26. ANIMAL PROTEIN HYDROLYSATES, according to claims 24 and 25, characterized by the fact that it has a fat content that is less than or equal to 1%.

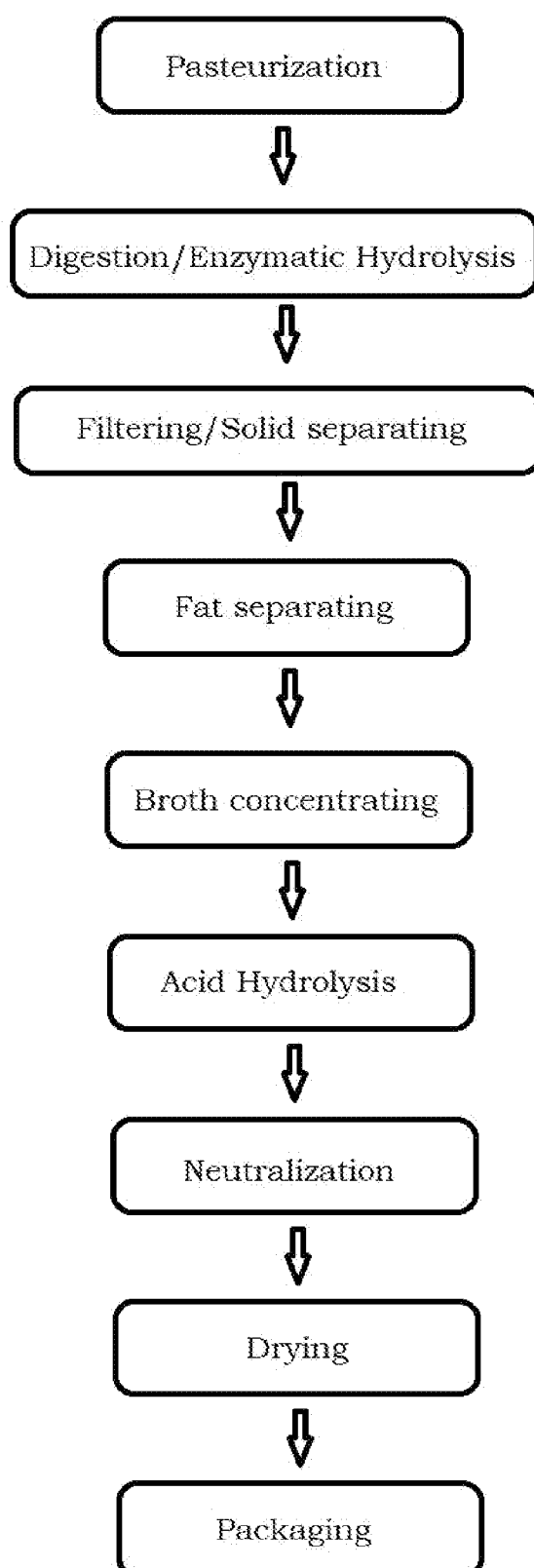
27. ANIMAL PROTEIN HYDROLYSATES, according to claims 24 to 26, characterized by the fact that it has a potassium content that is about 28% to 35%.

28. ANIMAL PROTEIN HYDROLYSATES, according to claims 24 to 27, characterized by the fact that it has a final pH of 6.0 to 7.0.

29. USES OF ANIMAL PROTEIN HYDROLYSATES, characterized by its use as condiments, seasoning and/or powder meat flavors, particularly in the production of meat products or products in

the form of sachet.

30. USES, according to claim 29, characterized by the fact that it additionally comprises a replacer of the table salt and/or decrease sodium content.

FIGURE 1

INTERNATIONAL SEARCH REPORT

International application N°

PCT/BR2017/050282

A. CLASSIFICATION OF SUBJECT MATTER

A23J3/34 (2006.01), A23J1/02 (2006.01), A23L27/21 (2016.01), A23L27/40 (2016.01)

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)

A23J

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

Banco de Patentes Brasileiro (INPI - BR)

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

EPODOC, WEB OF SCIENCE, ESPACENET

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claims N°
Y	BR 9200080 A (CPC INTERNATIONAL INC [US]) 06 October 1992 (1992-10-06) Description, line 15, page to line 26, page 12 Claim 26 and 27	1
A	All document -----	2 – 30
Y	BR PI0800081 A (SADIA S A [BR]) 17 June 2008 (2008-06-17)	1
X	Description, line 20, page 4 to line 15, page 10 Claims 1 to 8	29, 30
A	All document -----	2 – 28

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

* Special categories of cited documents:

“A” document defining 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 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

18 December 2017

Date of mailing of the international search report

19/12/2017

Name and mailing address of the ISA/BR



INSTITUTO NACIONAL DA
PROPRIEDADE INDUSTRIAL
Rua Sao Bento nº 1, 17º andar
cep: 20090-010, Centro - Rio de Janeiro/RJ
+55 21 3037-3663

Facsimile N°:

Authorized officer

Ricardo Schmitz Ongaratto

Telephone N°:

+55 21 3037-3493/3742

INTERNATIONAL SEARCH REPORT

International application N°

PCT/BR2017/050282

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claims N°
X	BR 0105516 A (RODRIGUES ROBERTO [BR]) 26 August 2003 (2003-08-26) Description, page 1, lines 9 to 15	29, 30
A	All document -----	1 – 28
X	BR PI0414297 A (TOMOE FOOD RES CO LTD [JP]) 14 November 2006 (2006-11-14) Description, line 8, page 1 to line 30, page 2	29, 30
A	All document -----	1 – 28
A	BR 0015587 A (AJINOMOTO KK [JP]) 23 July 2002 (2002-07-23) All document	1 – 30
A	US 2012252065 A1 (BEYE GARRISON [CA]) 04 October 2012 (2012-10-04) All document	1 – 30
A	WO 2015050294 A1 (INNOWAY CO LTD [KR]) 09 April 2015 (2015-04-09) All document	1 – 30
A	US 4220723 A (ROEHM GMBH [DE]) 02 September 1980 (1980-09-02) Examples 1 to 8	1 – 23
A	EP 0271964 A2 (ENICHEM SINTESI [IT]) 22 June 1988 (1988-06-22) Table II	1 – 23
A	RU 2002125597 A 27 March 2004 (2004-03-27) All document	1 – 23
A	US 2011129565 A1 (INGENIERIA RAMFER LTDA [CL]) 02 June 2011 (2011-06-02) All document -----	1 – 23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application N°

PCT/BR2017/050282

Patent documents cited in search report	Publication date	Patent family members	Publication date
BR 9200080 A	1992-10-06	AT 164730 T AU 1023592 A AU 650313 B2 CA 2059015 A1 DE 69225006 D1 EP 0495391 A1 ES 2113893 T3 FI 920154 A IE 920033 A1 JP H0556753 A KR 100254916 B1 MX 9200126 A NO 920162 D0 US 5180597 A	1998-04-15 1992-07-16 1994-06-16 1992-07-15 1998-05-14 1992-07-22 1998-05-16 1992-07-15 1992-07-15 1993-03-09 2000-05-01 1992-07-01 1992-01-13 1993-01-19
----- BR PI0800081 A -----	----- 2008-06-17 -----	----- Nenhum -----	----- ----- -----
BR 0105516 A	2003-08-26	Nenhum	
----- BR PI0414297 A	----- 2006-11-14	----- CN 1852664 A CN 100553486 C EP 1665939 A1 HK 1097704 A1 JP WO2005027657 A1 JP 4094026 B2 KR 20060083452 A MX PA06003039 A TW 200514510 A US 2007077333 A1 WO 2005027657 A1	----- 2006-10-25 2009-10-28 2006-06-07 2010-08-20 2007-11-15 2008-06-04 2006-07-20 2006-06-20 2005-05-01 2007-04-05 2005-03-31
----- BR 0015587 A	----- 2002-07-23	----- BR 0015587 B1 AR 031059 A1 AU 7964100 A CN 1413259 A CN 1218044 C DE 60027932 D1 EP 1331273 A1 JP WO2002036802 A1 MX PA02001730 A MY 129014 A TW I286572 B US 2003012848 A1 US 6803062 B2 WO 0236802 A1	----- 2011-09-20 2003-09-03 2002-05-15 2003-04-23 2005-09-07 2006-06-14 2003-07-30 2004-03-11 2004-02-26 2007-03-30 2007-09-11 2003-01-16 2004-10-12 2002-05-10
----- US 2012252065 A1 -----	----- 2012-10-04 -----	----- Nenhum -----	----- ----- -----
WO 2015050294 A1	2015-04-09	AU 2014330269 A1 CA 2926181 A1 CN 105637096 A EP 3052641 A1 JP 2016531951 A	2016-05-26 2015-04-09 2016-06-01 2016-08-10 2016-10-13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application N°

PCT/BR2017/050282

Patent documents cited in search report	Publication date	Patent family members	Publication date
		KR 20160081911 A	2016-07-08
		US 2016262425 A1	2016-09-15
-----	-----	-----	-----
US 4220723 A	1980-09-02	AR 216829 A1	1980-01-31
		BR 7808335 A	1979-08-07
		CA 1116008 A	1982-01-12
		DE 2756739 A1	1979-06-21
		DE 2842918 A1	1980-04-17
		DE 2853840 A1	1979-06-28
		FR 2411828 A1	1979-07-13
		FR 2412265 A1	1979-07-20
		GB 2011910 A	1979-07-18
		JP S5491485 A	1979-07-19
		JP S6243654 B2	1987-09-16
		JP S5498799 A	1979-08-03
		JP S5811941 B2	1983-03-05
		SE 7813079 A	1979-06-21
		SE 447053 B	1986-10-27
		SU 798098 A1	1981-01-23
		US 4187217 A	1980-02-05
-----	-----	-----	-----
EP 0271964 A2	1988-06-22	EP 0271964 A3	1989-02-22
		AT 79518 T	1992-09-15
		DE 3781254 D1	1992-09-24
		IT 8622748 D0	1986-12-18
		IT 1199811 B	1989-01-05
		IT 8622749 D0	1986-12-18
		IT 1199812 B	1989-01-05
		IT 8622750 D0	1986-12-18
		IT 1199813 B	1989-01-05
-----	-----	-----	-----
RU 2002125597 A	2004-03-27	RU 2226841 C1	2004-04-20
-----	-----	-----	-----
US 2011129565 A1	2011-06-02	US 8628817 B2	2014-01-14
		DK 201170176 A	2011-04-14
		JP 2015119720 A	2015-07-02
		JP 5861153 B2	2016-02-16
		JP 2012517222 A	2012-08-02
		MA 32417 B1	2011-06-01
		NO 20110383 A1	2011-03-11
		NO 340459 B1	2017-04-24
		PE 00532011 A1	2011-01-29
		WO 2010089695 A1	2010-08-12
		ZA 201008588 B	2012-02-29
-----	-----	-----	-----