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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
División de Nuevas Creaciones
E. S. D.

Ref: EXPEDIENTE No 04-017688
Solicitud de patente a nombre de
KRAFT FOOD HOLDINGS, INC

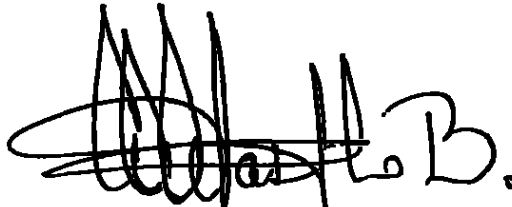
SUPERINDUSTRIA Y COMERCIO
Radicación : 04017688 00000002 Folios: 40
Fecha (AMD): 2004-05-14 16:51:47
Tramite : 002 PATENTES D 1 REGISTRO/ 444 REPUESTA
Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

Me refiero al oficio 03420 notificado en el asunto de la referencia y adjunto presento los siguientes documentos:

- 1- La copia certificada e la cesión en los Estados Unidos de América, la cual comprende además a todos los restantes países del mundo.
- 2- La copia certificada de la solicitud de patente estadounidense N° 10/377.541 del 28 de febrero de 2003, que en su texto corresponde íntegramente al colombiano. REC. PERIODO D. 4. 38715.

Como el expediente queda así completo, pido se ordene la publicación del extracto.

Atentamente,



JERONIMO CASTILLO BONILLA
C.C. 79.462.057 Bogotá
T.P. 104167 C.S. Judicatura

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SUPERINDUSTRIA Y COMERCIO
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Dependencia: 2020 DIVISION DE NUEVAS CREACIONES

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 04 - 38,715
FECHA : MAYO 14 DE 2004

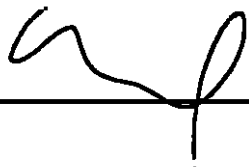
***** CONSIGNACION *****

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CASTILLO PINEDA	CONSIGNACION	BANCO POPULAR	050-00110-6	8782965	14/05/2004	118,000.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	82 INVOCACION DE UNA PRIORIDAD EN NU	118,000.00
	TOTAL :	\$ 118,000.00

SDM: CIENTO DIEZ Y OCHO MIL PESOS

RESPONSABLE : 

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

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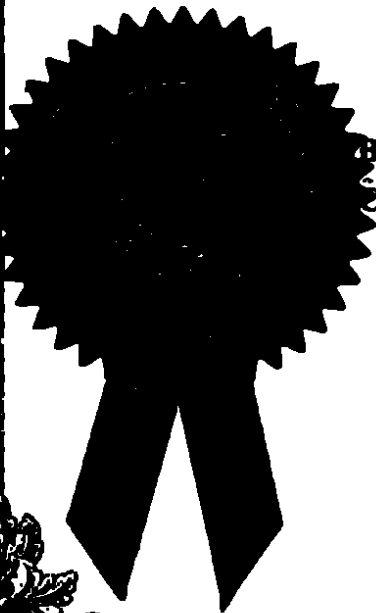
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**UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office**

March 16, 2004

**THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
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MAY 9, 2003.**



**By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS**

W. Montgomery
**W. MONTGOMERY
Certifying Officer**

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05-15-2003

5.9.05

FD-504 (Rev. 10-02) OMB No. (201) 0046 Pat. & Trademark Office		R SHEET	U.S. DEPARTMENT OF COMMERCE Patent and Trademark Office
102449204		Attorney Docket No. 87419	
To the Director of the United States Patent and Trademark Office: Please record the attached original documents or copy thereof.			
1. Name of conveying party(ies) Glen Baldwin Gary Lyn Zoller Almas Alashe Manuel Marquez-Sanchez Elaine Kola Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No		2. Name and address of receiving party(ies) Name <u>Kraft Foods Holdings, Inc.</u> Internal Address: _____ _____ Street Address: <u>Three Lakes Drive</u> _____ City <u>Northfield</u> State <u>IL</u> ZIP <u>60093</u> Additional name(s) and address(es) attached? ☐ Yes ☒ No	
3. Nature of conveyance ☒ Assignment ☐ Merger ☐ Security Agreement ☐ Change of Name ☐ Other _____ Execution Date <u>4/16/02 & 4/17/02</u>			
4. Application number(s) or (patent number(s)) If this document is being filed together with a new application, the execution date of the application is: <u>February 28, 2003</u> A. Patent Application No (s) <u>10377511</u> B. Patent No (s) _____ Additional numbers attached? ☐ Yes ☒ No			
5. Name and address of party to whom correspondence concerning document should be mailed. Name: <u>Richard A. Kaba</u> <u>FITCH, EVEN, TABIN & FLANNERY</u> Internal Address: _____ _____ Street Address: <u>Suite 1500</u> <u>120 South LaSalle Street</u> City <u>Chicago</u> State <u>IL</u> ZIP <u>60602-3408</u>		6. Total number of applications and patents involved: <u>1</u> 7. Total fee (37 CFR 3.41) <u>\$ 40.00</u> ☐ Enclosed ☒ Authorized to be charged to deposit account 8. Deposit Account Number: <u>08-1135</u> (Attach duplicate copy of this page if paying by deposit account)	
05/14/2003 171021 00000133 061125 10377511 DO NOT USE THIS SPACE			
01 FEB 03 15.00-01			
9. Statement and signature. To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document. <u>Richard A. Kaba</u> <u>30.562</u> <u>[Signature]</u> <u>May 5, 2003</u> Name of Person Signing Registration No. Signature Date Total number of pages including cover sheet, attachments, and document: <u>8</u>			

Fax documents to be recorded with required cover sheet information to (703) 306-6995
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P.O. Box 1480, Alexandria, VA 22313-1480

PATENT
REEL: 014060 FRAME: 0601

A S S I G N M E N T

I, CHERYL BALDWIN, of Mundelein, Illinois, AHMAD AKASHE, of Mundelein, Illinois, RATHNA KOKA, of Mt. Prospect, Illinois, BARY LYN ZELLER, of Glenview, Illinois and MANUEL MARQUEZ-SANCHEZ, of Lincolnshire, Illinois, for good and valuable consideration, receipt of which is hereby acknowledged, have assigned and do hereby assign to KRAFT FOODS HOLDINGS, INC., a Delaware corporation, of Three Lakes Drive, Northfield, Illinois 60093, its successors, assigns and legal representatives, the entire right, title and interest in and to all subject matter invented by us and disclosed in application for Letters Patent of the United States entitled

**MINERAL COMPLEXES OF LACTOBIONIC ACID AND METHOD OF USING
FOR MINERAL FORTIFICATION OF FOOD PRODUCTS**

Application No. 10/377,541; filed February 28, 2003, signed by us on the date shown below; and in and to all Letters Patent and all Convention and Treaty rights of all kinds, in all countries throughout the world, for all such subject matter. We agree to sign all documents necessary to secure all said Letters Patent and rights, and request issuance of all said Letters Patent to the above assignee in accordance with this request.

April 16, 2003

Cheryl Baldwin
CHERYL BALDWIN

April 16, 2003

Ahmad Akashe
AHMAD AKASHE

April 16, 2003

Rathna Koka
RATHNA KOKA

April 16, 2003

Bary Lynn Zeller
BARY LYNN ZELLER

April 17, 2003

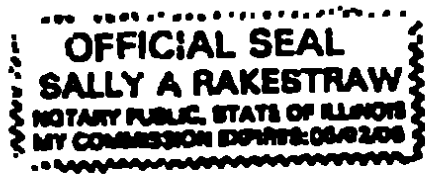
Manuel Marquez-Sanchez
MANUEL MARQUEZ-SANCHEZ

State of Illinois)
County of Clark) SS

I hereby certify that before me at Urbana,
in the County of Clark and State of Illinois
_____ personally appeared **CHERYL BALDWIN**, personally known by
me, who then and there was duly sworn by me and under oath
acknowledged that the foregoing Assignment was duly signed,
sealed and delivered by him on the date appearing at the
foot thereof.

April 16, 2003

Sally A. Rakestraw
Notary Public

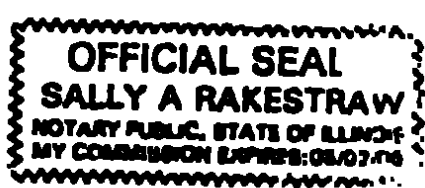


State of Illinois)
County of Clark) SS

I hereby certify that before me at Urbana,
in the County of Clark and State of Illinois
_____ personally appeared **AMOD AKASHI**, personally known by me,
who then and there was duly sworn by me and under oath
acknowledged that the foregoing Assignment was duly signed,
sealed and delivered by him on the date appearing at the
foot thereof.

April 16, 2003

Sally A. Rakestraw
Notary Public



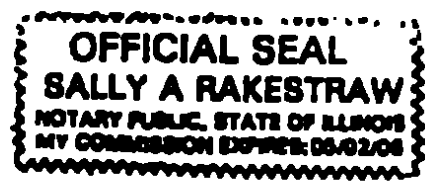
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State of Illinois)
County of Cook) SS

I hereby certify that before me at Ulenau,
in the County of Cook and State of Illinois
— personally appeared **RATHNA KOKA**, personally known by me,
who then and there was duly sworn by me and under oath
acknowledged that the foregoing Assignment was duly signed,
sealed and delivered by him on the date appearing at the
foot thereof.

April 16, 2003

Sally A. Rakestraw
Notary Public



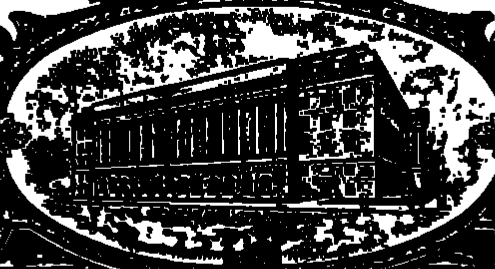
State of Illinois)
County of Cook) SS

I hereby certify that before me at Ulenau,
in the County of Cook and State of Illinois
— personally appeared **BARY LYN ZELLER**, personally known
by me, who then and there was duly sworn by me and under
oath acknowledged that the foregoing Assignment was duly
signed, sealed and delivered by him on the date appearing
at the foot thereof.

April 16, 2003

Sally A. Rakestraw
Notary Public





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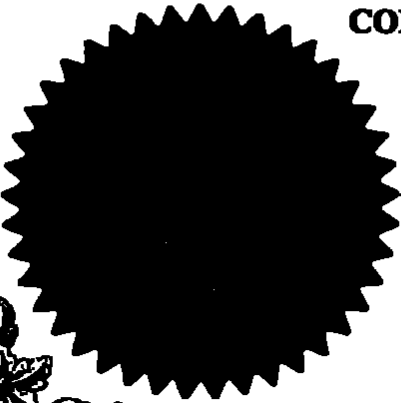
March 04, 2004

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 10/377,541

FILING DATE: February 28, 2003

**By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS**



W. Montgomery
W. MONTGOMERY
Certifying Officer

03 - 83378341 . 022803

UTILITY PATENT APPLICATION TRANSMITTAL
(for Noncontinuing, Nonprovisional Application)
under 37 C.F.R. § 1.53(b)

Attorney Docket No. 67419

Box PATENT APPLICATION
Commissioner of Patents and Trademarks
ATTENTION: Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R.
§ 1.53(b) is the nonprovisional, noncontinuing
patent application for:

Title: MINERAL COMPLEXES OF
LACTOBIONIC ACID AND METHOD OF
USING FOR MINERAL FORTIFICATION
OF FOOD PRODUCTS

First Named Inventor or Application Identifier:
Baldwin et al.

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

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Date of Deposit February 28, 2003

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Commissioner of Patents and Trademarks, Washington,
D.C. 20231.

Edward Price

(Typed or printed name of person mailing)

(Signature of person mailing)

- ☒ 19 pages of the specification (including claims) are enclosed.
- ☒ 4 sheet(s) of drawings are enclosed. ☒ Formal ☐ Informal
- ☐ An executed Oath or Declaration and Power of Attorney naming the actual inventors is enclosed.
- ☒ The names of persons believed to be the actual inventors are set forth in the enclosed unexecuted Oath or Declaration and Power of Attorney (§ 1.41(a) and § 1.53(b)).
- ☐ An Assignment of the invention to _____, and cover sheet are enclosed.
 - ☐ A check in the amount of \$ _____ to cover the fee for recording the assignment is enclosed.
 - ☐ The Recordation Form Cover Sheet includes authorization to charge our Deposit Account for recording the assignment.
 - ☐ A 37 C.F.R. § 3.73(b) statement is enclosed where an assignee seeks to take action.
 - ☐ An Information Disclosure Statement is enclosed.
 - ☐ A Form PTO/SB/08A is enclosed.
 - ☐ _____ References (copies) listed on the Form PTO/SB/08A are enclosed.
- ☒ A Return Receipt Postcard is enclosed (MPEP § 503).

Noncontinuing Utility § 1.53(b)-1-1202

Copy provided by USPTO from the PACR Image Database on 03/02/2004

- ☐ Priority of application number _____ filed on _____ in _____ is claimed under 35 U.S.C. §119.
- ☐ A certified copy of the priority document is enclosed.
- ☐ A Computer Program Listing Appendix is enclosed.
- ☐ A Transmittal Cover Letter for Computer Program Listing Appendix is enclosed.
- ☐ Two (2) Compact Discs are enclosed.
- ☐ A Nucleotide and/or Amino Acid Sequence Submission is enclosed.
- ☐ A Computer Readable Copy is enclosed.
- ☐ A Paper Copy (Identical to Computer Copy) is enclosed.
- ☐ A Statement Verifying Identity of above Copies is enclosed.
- ☒ The filing fee is calculated below:

Fee Calculation For Claims As Filed

Basic Fee							\$ 750.00
Independent Claims	2	-	3	=	0	x \$ 84.00	= \$ 0.00
Total Claims	20	-	20	=	0	x \$ 18.00	= \$ 0.00
Fee for Multiply Dependent Claims						\$ 280.00	
						Total Filing Fee	\$ 750.00

- ☐ Applicant(s) assert entitlement to Small Entity Status, reducing the Filing Fee by half to: \$ 0.00
- ☐ A check in the amount of \$_____ to cover the filing fee is enclosed.
- ☒ Charge \$ 750.00 to Deposit Account No. 06-1135.
- ☐ The payment of the Filing Fee is to be deferred until the Declaration is filed. Do not charge our Deposit Account.
- ☒ A separate written request under 37 C.F.R. §1.136(a)(3), which is a general authorization to treat any concurrent or future reply requiring a petition for an extension of time under 37 C.F.R. §1.136(a) for its timely submission as incorporating a petition for an extension of time for the appropriate length of time, is enclosed.

Attorney Docket No. 67419

☒ The Commissioner is hereby authorized to charge any additional fees which may be required in this application under 37 C.F.R. 551.16-1.17 during its entire pendency, or credit any overpayment, to Deposit Account No. 06-1135. Should no proper payment be enclosed herewith, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1135. This sheet is filed in triplicate.

☐ Also enclosed:

☒ Address all future communications to Customer Number 22242.



February 28, 2003

Date


Richard A. Kaba

Registration No. 30.582

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120 South LaSalle Street
Chicago, Illinois 60603-3406
Telephone: (312) 577-7000
Facsimile: (312) 577-7007

PATENT

Attorney Docket No. 67419

Commissioner of Patents and Trademarks
 ATTENTION: Assistant Commissioner for Patents
 Washington, D.C. 20231

Applicant(s): Baldwin et al.

Appln No.: N/A

Filed: Herewith

For: MINERAL COMPLEXES OF
 LACTOBIONIC ACID AND
 METHOD OF USING FOR
 MINERAL FORTIFICA

Group Art
 Unit:

N/A

Examiner: N/A

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 Commissioner of Patents and Trademarks, Washington,
 D.C. 20231.

Edward Price

(Typed or printed name of person mailing)

(Signature of person mailing)

**GENERAL AUTHORIZATION FOR PETITION FOR
 EXTENSION OF TIME UNDER 37 C.F.R. 51.136(a)(3)**

Applicant(s) hereby request under 37 C.F.R. 51.136(a)(3) by this general authorization that any concurrent or future reply submitted by Applicant(s) to the U.S. Patent and Trademark Office for the above-identified patent application requiring a petition for an extension of time under 51.136(a) for its timely submission be treated as incorporating therein a petition for an extension of time for the appropriate length of time.

If Applicant(s) do not timely pay for any extension fee(s) pursuant to 37 C.F.R. 51.136(a) which may become due for this application under 37 C.F.R. 51.17 by check, the Commissioner is hereby authorized to charge such fee(s), and any additional fees which may be required in this application under 37 C.F.R. 51.16-1.17 during its entire pendency, or credit any overpayment, to Deposit Account No. 06-1135.

February 28, 2003

Date

Richard A. Kaba

Registration No. 30,562

FITCH, EVEN, TABIN & FLANNERY
 Suite 1600
 120 South LaSalle Street
 Chicago, Illinois 60603-3406
 Telephone: (312) 577-7000
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General Authorization 0301

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 to United States Department of Agriculture surveys, as many as nine out of

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Docket 67419

ten women in the United States do not consume the recommended levels of calcium. And the elderly often have difficulty in increasing their calcium consumption due to decreasing appetites and metabolism. In addition to bone health, recent research suggests the importance of calcium in improving colon health, weight management, and other health issues.

A large number of calcium compounds or salts have been used to fortify food products. Calcium salts which have been suggested for use or have been used as food supplements include, for example, calcium pyrophosphate, calcium hexametaphosphate, monobasic calcium phosphate, calcium glycerophosphate, tricalcium phosphate, calcium acetate, calcium ascorbate, calcium citrate, calcium citrate malate, calcium carbonate, calcium gluconate, calcium lactate, calcium lactate gluconate, calcium malate, calcium oxide, calcium hydroxide, calcium sulfate, calcium tartrate, dicalcium citrate lactate, calcium fumarate, and calcium chloride.

These calcium supplements have been used in a wide variety of food products. For example, U.S. Patent 4,784,871 (November 15, 1988) provided a calcium fortified yogurt. According to the patent, any calcium compound which is acid soluble could be used. U.S. Patent 5,449,523 (September 12, 1995) and U.S. Patent 5,820,903 (October 13, 1998) also provided calcium-enriched yogurts. U.S. Patent 5,478,587 (December 27, 1995) provided calcium-enriched deserts.

U.S. Patent 5,834,045 (November 10, 1998) provided calcium fortified acid beverages. This patent reported that the use of a calcium source comprising calcium hydroxide and calcium glycerophosphate with any acidulant will result in a beverage product having a marked improvement in storage stability. U.S. Patent 5,855,936 (January 5, 1999) provided a blend of calcium salts balanced with soluble and insoluble salts which are stabilized with a source of glucuronic acid. This composition is capable of fortifying milk beverages and other dairy-based products without coagulation and sedimentation, and with improved palatability. The calcium salts must be stabilized with the glucuronic acid source. Other calcium sources could optionally be included. Other calcium-enriched beverages are disclosed in,

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Docket 67419

for example, U.S. Patent 4,642,238 (February 10, 1987; dietary and
nutritionally balanced drinks); U.S. Patent 4,701,329 (October 20, 1987; milk);
U.S. Patent 4,737,375 (April 12, 1988; carbonated and non-carbonated
beverages containing solubilized calcium and specific amounts of citric acid,
5 malic acid, and phosphoric acid as determined from specific ternary diagrams
provided therein); U.S. Patent 4,740,380 (April 26, 1988; soft drinks); U.S.
4,871,554 (October 3, 1989; fruit drink); U.S. Patent 4,851,243 (July 25,
1989; milk); U.S. Patent 4,840,814 (June 20, 1989; milk); U.S. 4,906,482
(March 6, 1990; soy milk); U.S. Patent 5,397,589 (March 14, 1995; milk); U.S.
10 Patent 5,690,975 (November 25, 1997; fermented milk); U.S. Patent
5,597,596 (January 28, 1997; low pH beverage); U.S. Patent 5,780,081 (July
14, 1998; milk); U.S. Patent 5,928,691 (July 27, 1999; milk); and U.S. Patent
5,897,892 (April 27, 1999; milk base products).

U.S. Patent 4,673,583 (June 16, 1987) provided a calcium-enriched
15 soy bean curd. U.S. Patent 5,215,769 (June 1, 1993) provided sauces and
salad dressings containing a soluble calcium source comprising specific
molar ratios of calcium citrate malate or calcium acetate. U.S. Patent
5,514,387 (May 7, 1996) provided calcium enriched crackers and other baked
goods; an emulsifier was used to avoid adverse effect on texture and
20 mouthfeel. U.S. Patent 5,840,354 (November 24, 1998) provided calcium-
enriched dried fruit products. U.S. Patent 5,945,144 (August 31, 1999)
provided a calcium fortified pasta product.

U.S. Patent 5,075,499 (December 24, 1991) provides dicalcium citrate-
lactate for use as a calcium supplement. Tablets of dicalcium citrate-lactate
25 were preferably taken on a daily basis. U.S. Patent 6,007,852 (December 28,
1999) relates to a calcium enriched natural cheese. The preferred calcium
source is tricalcium phosphate. The patent indicates that other calcium
sources (but does not specifically mention any specific sources) can be used
so long as the calcium source forms a suspension rather than a solution in
30 water, skim milk, or cheese milk. U.S. Patent 6,106,874 (August 22, 2000)
provides a low pH nutritional beverage which uses pectin-free fruit juice and a

calcium source selected from the group consisting of natural milk mineral concentrate, calcium lactate gluconate, and mixtures thereof.

Calcium sulfate has been found to significantly and adversely affect the organoleptic properties of food products to which it is added. Generally, added calcium sulfate results in bitterness and undesirable strong flavors with
5 added at significant levels. See, e.g., U.S. Patents 5,820,903 and 5,840,354. Tricalcium phosphate, although widely used, often contributes an undesirable "gritty" texture which, of course, limits the levels at which it can be incorporated in food products. See, e.g., U.S. Patent 5,449,523.

10 Calcium enrichment or fortification can adversely affect the organoleptic properties of the food or beverage product to which it is added. Examples of such unacceptable properties include off-flavors, flavor changes, off-colors, textural changes, and the like. Some calcium compounds have more adverse effects than others, especially at higher levels of calcium
15 addition. Thus, much of the currently available technology related to calcium addition does not provide the high levels of calcium addition desired. Further, the cost of some calcium forms is high and, thus, limits their usefulness. Thus, it is desirable to provide additional calcium compounds and/or other dietary minerals for use in food and beverage products which can provide
20 significant levels of dietary calcium or other dietary minerals without adverse effects on organoleptic properties and at lower cost. Additionally, the form of calcium can influence absorption and use by and in the body. Additionally, the absorption of calcium can be enhanced or inhibited by other compounds. For example, some carbohydrates can improve calcium absorption. Greger,
25 "Nondigestible Carbohydrates and Mineral Bioavailability," *J. Nutr.*, 129, 1434S-1435S (1999); Weaver, "Calcium in Food Fortification Strategies," *Internat. Dairy J.*, 8, 443-449 (1998); Brommage et al., "Intestinal Calcium Absorption in Rats Is Stimulated by Dietary Lactulose and Other Resistant Sugars," *J. Nutr.*, 123, 2186-2194 (1993).

30 Lactobionic acid (4-O- β -D-galactopyranosyl-D-gluconic acid; CAS Reg. No. 98-82-2) is a water soluble, white crystalline compound. It can be synthesized from lactose by oxidation of the free aldehyde group in lactose as

carried out catalytically, chemically, electrolytically, or enzymatically. Harju, *Bulletin of the IDF* 289, ch. 6., pp. 27-30, 1993; Satory et al., *Biotechnology Letters* 19 (12) 1205-08, 1997. The use of lactobionic acid or its salts as additives in food products previously has been suggested for several specific applications. Calcium or iron chelate forms of lactobionic acid has been described for dietary mineral supplementation. Riviera et al., *Amer. J. Clin. Nutr.*; 36 (6) 1162-69, 1982. U.S. Patent 5,851,578 describes a clear beverage having a non-gel forming fiber, and water soluble salts of calcium, with or without water soluble vitamins, with or without additional mineral salt supplements and buffered with food acids. The food acid buffering agent includes citric, lactic, maleic, adipic, succinic, acetic, acetic gluconic, lactobionic, ascorbic, pyruvic, and phosphoric acids, as well as combinations thereof. Calcium lactobionate, a salt form of lactobionic acid, has been approved for use as a firming agent in dry pudding mixes. 21 C.F.R. §172.720 (1999). Also, the possible use of lactobionic acid as a general food acidulant has been proposed, albeit without exploration or illustration. Timmermans, *Whey: Proceedings of the 2nd Int'l Whey Conf.*, Int'l Dairy Federation, Chicago, October 1997, pp. 233, 249. This article generally describes lactobionic acid as being useful as an antibiotics carrier, an organ transplant preservative, mineral supplement, growth promoter of bifidobacteria, or as a co-builder in detergents in its potassium salt form. More recently, the use of lactobionic acid in cheese and other dairy products has been described in copending U.S. Patent Application Serial Number PCT US02/14337, filed May 7, 2002, (International Publication WO 02/089592) which is owned by the same assignee as the present application and which is hereby incorporated by reference.

The present invention provides mineral complexes of lactobionic acid which are very effective as mineral fortification agents and which do not significantly affect the organoleptic or textural properties of the food or beverage to which they are added. Such mineral complexes can be produced in a cost effective manner from inexpensive starting materials such as lactose or whey.

SUMMARY OF THE INVENTION

The present invention generally relates to mineral complexes, especially calcium complexes, of lactobionic acid which are especially useful for mineral fortification of food and beverage products. For purposes of this invention, the use of the term "lactobionic acid" also includes its lactone as well as mixtures of the acid and its lactone. (See, e.g., Dutta et al., "Study of the Lactone-Acid-Salt Equilibria and Hydrolysis Kinetics for Lactobionic - Lactone," *Indian J. Chem.*, vol 9, 229-232 (March 1971).) The mineral complexes of the present invention include calcium complexes of lactobionic acid, magnesium complexes of lactobionic acid, potassium complexes of lactobionic acid, sodium complexes of lactobionic acid, iron complexes of lactobionic acid, zinc complexes of lactobionic acid, copper complexes of lactobionic acid, chromium complexes of lactobionic acid, selenium complexes of lactobionic acid, manganese complexes of lactobionic acid, and the like. Mixtures of these mineral complexes may also be used. The mineral complexes of lactobionic acid provided in the present invention delivers a soluble, stable, clean tasting mineral source suitable for mineral fortification of a wide variety of food and beverage products. The high solubility of the mineral complexes of the present invention in water allows for the preparation of mineral-fortification of foods and beverages which are clean tasting and non-gritty. The preferred mineral complex of the present invention is the calcium complex of lactobionic acid.

The mineral complexes of lactobionic acid of the present invention are prepared by mixing lactobionic acid with a mineral source such as mineral hydroxide, mineral carbonate, mineral oxide, or mixtures thereof with an edible acid such as citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof. Thus, the preferred calcium complex of lactobionic acid of the present invention is prepared by mixing lactobionic acid with a calcium source such as calcium hydroxide, calcium carbonate, calcium oxide, or mixtures thereof with an edible acid such as citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid,

succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof. Generally, an aqueous solution containing about 1 to about 95 percent lactobionic acid is mixed with about 1 to about 50 percent of the mineral source (e.g., calcium source) and about 1 to about 50 percent of the edible acid to form the desired
5 mineral complex; generally the pH of the final aqueous solution is about 2 to about 8. More preferably, an aqueous solution containing about 50 to about 90 percent lactobionic acid is mixed with about 5 to about 25 percent of the mineral source (e.g., calcium source) and about 2 to about 20 percent of the edible acid to form the desired mineral complex. An especially preferred
10 calcium complex of lactobionic acid is prepared by mixing lactobionic acid with calcium hydroxide and citric acid.

The present invention is also directed to mineral-fortified food and beverage products containing a mineral complex of lactobionic acid prepared by mixing lactobionic acid with a mineral source such as a mineral hydroxide,
15 mineral carbonate, mineral oxide, or mixtures thereof with an edible acid such as citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof. Generally, the mineral-fortified food and beverage products of this invention will contain about 0.2 to about 20 percent of the calcium
20 complex of lactobionic acid. Preferably, a single serving of the mineral-fortified food or beverage products of the present invention contain sufficient quantities of the mineral in the form of the corresponding mineral complex of lactobionic to provide about 5 to about 200 percent of the recommended United States Daily Value of calcium, more preferably about 10 to about 35
25 percent of the recommended United States Daily Value of that mineral. Calcium fortification of food and beverage products using the calcium complex of lactobionic acid of the present invention is especially preferred.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 shows the Differential Scanning Calorimetry results (top
30 portion of each panel) and the Thermal Gravimetric Analysis results (bottom portion of each panel) for crystalline calcium salt of lactobionic acid (Panel A),

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crystalline citric acid (Panel B), a mixture of crystalline calcium salt of lactobionic acid and crystalline citric acid (Panel C), and an inventive calcium lactobionic acid complex (Panel D).

DETAILED DESCRIPTION OF THE INVENTION

5 The mineral complexes of the present invention are prepared by mixing lactobionic acid, a mineral source, and an edible acid in an aqueous solution. The mineral complexes of the present invention include calcium complexes, magnesium complexes, potassium complexes, sodium complexes, iron complexes, zinc complexes of lactobionic acid and the like.

10 Mixtures of these mineral complexes may also be used. The calcium complex of lactobionic acid is especially preferred. Suitable mineral sources include mineral hydroxides, mineral carbonates, mineral oxides, or mixtures thereof. Generally, the preferred mineral source is the corresponding mineral hydroxide. Suitable edible acids include citric acid, lactic acid, acetic acid,

15 malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof. Generally, the preferred edible acid is citric acid.

 The mineral complexes of the present invention are sufficiently soluble in food or beverage products to provide at least about 5 percent, and in some

20 cases, depending on the actual product, much higher, of the current United States recommended Daily Value of the mineral per single serving size of the food or beverage product. For purposes of this invention, a single serving size for a food product is about 28 g and for a beverage product is about 240 ml or 8 ounces. For purposes of this invention, the current United States

25 recommended Daily Value of the mineral is considered to be the value published by the United States Food and Drug Administration as of the filing date of the current application. The current United States recommended Daily Value for calcium is 1000 mg per day.

 The preferred calcium complex of lactobionic acid of the present

30 invention is prepared by mixing lactobionic acid with a calcium source such as calcium hydroxide, calcium carbonate, calcium oxide, or mixtures thereof with

an edible acid such as citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof. Generally, an aqueous solution containing about 5 to about 95 percent lactobionic acid is mixed with about 1
5 to about 50 percent of the mineral source (e.g., calcium source such as calcium hydroxide in the preferred embodiment) and about 1 to about 50 percent of the edible acid (e.g., citric acid in the preferred embodiment) to form the desired mineral complex; generally the pH of the final aqueous solution is about 2 to about 8. More preferably, an aqueous solution
10 containing about 50 to about 90 percent lactobionic acid is mixed with about 5 to about 25 percent of the mineral source and about 2 to about 20 percent of the edible acid to form the desired mineral complex. Generally, mixing of the components are carried out at or near room temperature. An especially preferred calcium complex of lactobionic acid is prepared by mixing
15 lactobionic acid with calcium hydroxide and citric acid. Mixed complexes can also be prepared if desired by mixing two or more mineral sources with lactobionic acid and the edible acid. Physical mixtures of two or more separately prepared mineral complexes can also be used.

The mineral complexes of this invention can be prepared by combining
20 the lactobionic acid, mineral source, and edible acid in an aqueous solution. The mineral complex may be maintained as formed in the aqueous solution or may be collected as a solid complex by removing the water medium using any conventional drying technique. Generally it is preferred that the mineral complexes are collected in a solid form; the solid complexes will generally be
25 easier to store and use. Conventional methods can be used to collect the solid mineral complex. Generally, however, gentle methods such as freeze drying, spray drying, drum drying, and the like are preferred to remove the water and obtain the solid mineral complex.

Lactobionic acid is generally a white crystalline powder. Lactobionic
30 acid may be obtained commercially (e.g., Lonza Inc., Fairlawn, N.J.; Sigma, St. Louis, MO) or prepared through chemical or enzymatic oxidation of lactose or a lactose-containing substrate. The lactobionic acid can be

prepared by saccharide chemical oxidation or bioconversion processes (e.g., catalytic action of a carbohydrate oxidase enzyme) using lactose or a lactose-containing substrate (e.g., whey or whey permeate) as the starting material. Suitable carbohydrate oxidase enzymes include, for example, lactose
5 oxidase, glucose oxidase, hexose oxidase, and the like, as well as mixtures thereof. Generally, lactose oxidase is preferred. A particularly suitable enzyme for lactose oxidation has been developed by Novozymes A/S and is described in Patent WO 9931990, which is hereby incorporated by reference.

Cellobiose dehydrogenase is also a useful enzyme for converting
10 lactose to lactobionic acid. Canevascini et al., *Zeitschrift fur Lebensmittel Untersuchung und Forschung*, 175: 125-129 (1982). This enzyme is, however, complex and requires the use of a relatively expensive co-factor (e.g., quinones, cytochrome C, Fe(III), and the like); it also requires immobilization. Also, a second enzyme, laccase, is required to regenerate
15 the co-factor used with cellobiose dehydrogenase. The use of glucose-fructose oxidoreductase to oxidize lactose results in two products, sorbitol and lactobionic acid, and a further separation procedure is necessary to recover the lactobionic acid product. Nidetzky et al., *Biotechnology and Bioengineering*, Vol. 53 (1997). Nonetheless, glucose-fructose
20 oxidoreductase also is a suitable enzyme for the practice of this embodiment of the invention. Of course, other methods can be used to prepare the lactobionic acid for use in the present invention.

The mineral complexes of the present invention can be incorporated into various food and beverage products to provide mineral-fortification food
25 and beverage products. Generally, the mineral-fortified food and beverage products of this invention will contain about 0.2 to about 20 percent of the mineral complex of lactobionic acid. Preferably, a single serving of the mineral-fortified food or beverage products of the present invention contain sufficient quantities of the mineral in the form of the corresponding mineral
30 complex of lactobionic to provide about 5 to about 200 percent of the recommended United States Daily Value of calcium (i.e., about 50 to about 2000 mg calcium), more preferably about 10 to about 35 percent of the

recommended United States Daily Value of calcium (i.e., about 100 to about 350 mg calcium). Calcium fortification of food and beverage products using the calcium complex of lactobionic acid of the present invention is especially preferred.

5 Having generally described the embodiments of the process illustrated in the figures as well as other embodiments, the invention will now be described using specific examples which further illustrate various features of the present invention but are not intended to limit the scope of the invention, which is defined in the appended claims. All percentages used herein are by
10 weight, unless otherwise indicated. All patents and other publications referenced herein are hereby incorporated by reference.

EXAMPLE 1. Lactobionic acid crystals (58 g; Lonza Inc., Fairlawn, NJ) were completely dissolved in 500 g deionized water. Citric acid (6 g; Sigma, St. Louis, MO) was then completely dissolved in the solution; calcium
15 hydroxide (10 g; Sigma, St. Louis, MO) was then completely dissolved in the solution. The final pH of the calcium complex solution was about 4.6. The aqueous solution was mixed for about 10-30 minutes at room temperature and then freeze dried. About 65 g (about 87 percent yield) of the desired white solid calcium complex containing about 8 percent calcium was
20 obtained. The calcium complex was dissolved in water at room temperature to provide a clear solution with about 2000 mg calcium per single beverage serving size (i.e., about 240 ml or 8 ounces). The calcium complex was more soluble than calcium citrate; it contained more calcium and had better flavor than pure calcium lactobionate available commercially. Thus, the calcium
25 complex better suited in food and beverage applications than other calcium salts or commercially available calcium lactobionate.

EXAMPLE 2. A fortified liquid beverage was prepared using the calcium complex of Example 1. The following formulations were prepared by simply mixing the components together at room temperature:

	Inventive (%)	Control (%)
Calcium Complex	2.1	0
Water	98.8	98.9
Flavor	0.3	0.3
Citric Acid/Malic Acid	0.5	0.5
Colorant	0.0001	0.0001
Preservative (EDTA, sorbate, benzoate, or potassium citrate)	0.17	0.17
Artificial Sweetener (sucralose or acesulfame K)	0.05	0.05
Clouding Agent (Givaudan Flavors Corp.)	0.06	0.06

The inventive sample provided about 300 mg calcium per serving (about 240 ml). The control sample was prepared in the same manner as the inventive sample except that it did not contain any of the calcium complex. Samples of the inventive and control samples (20 ml at room temperature) were provided to a trained panel of 17 members in a discrimination sensory test. No significant differences were detected between the inventive and the control samples. Thus, the inventive calcium fortified sample provided a sensory impression essentially identical with the control sample and had no off-flavors, objectionable sensory notes, or textural defects.

Example 3. Combinations of calcium lactobionic acid (Sigma, St. Louis, MO) with either monocalcium citrate or tricalcium citrate were compared with the calcium complex of Example 1 in similar beverages as described in Example 2 above. The various salts and the calcium complex were added at levels to provide about 1000 mg calcium per single serving. Beverages were prepared containing the following amounts of calcium salts or inventive calcium complex:

Sample	Calcium Lactobionic Acid (5.3% Ca)	Monocalcium Citrate (9% Ca)	Tricalcium Citrate (21% Ca)	Inventive Calcium Complex (8% Ca)
Comparative #1	15.8 g	1.8 g	-	-
Comparative #2	15.8 g	-	0.76 g	-
Inventive	-	-	-	12.5 g

Similar water samples containing the above amounts of calcium salts or calcium complex were also prepared. The calcium complex dissolved easily in either the beverage formulation or water to provide a clean tasting, non-gritty beverage. Comparative samples #1 and #2, however, were not completely soluble in either the beverage formulation or water.

EXAMPLE 4. The calcium content of the inventive beverage of Example 2 was increased to provide about 1000 mg calcium (i.e., about 100 percent of the DV of calcium) per 240 ml single serving size. The calcium complex completely dissolved in the beverage. The resulting beverage had acceptable flavor and appearance.

EXAMPLE 5. Beverages as prepared in Examples 2 and 3 containing the inventive calcium complex of Example 1 as well as aqueous solutions containing similar amounts of the calcium complex of Example 1 were stored under refrigerated conditions. Similar levels of conventional calcium sources (e.g., monocalcium citrate, tricalcium citrate, and calcium fumarate) were prepared in aqueous solutions or similar beverages formed noticeable sediments within about 1 week under such storage conditions. No sediments or precipitates were observed in the samples containing the calcium complex of this invention after 7 months of refrigerated storage.

EXAMPLE 6. This examples illustrates several methods of preparing the calcium complex other than the one described in Example 1.

(1) Lactobionic acid (29 g) was dissolved in 250 ml water to which was added calcium hydroxide (5 g) with stirring. Stirring was continued for about 10 minutes, after which citric acid (3 g) was added. Within a few minutes, all

solids were completely dissolved. The final pH of the resulting calcium complex solution was about 6.0.

(2) Lactobionic acid (29 g) and citric acid (3 g) were dissolved in water (250 ml). Calcium hydroxide (5 g) was then completely dissolved in the water solution to provide the calcium complex. The final pH of the resulting calcium complex solution was 7.0.

(3) A calcium complex was prepared as in subpart (1) above except that the amount of lactobionic acid was increased to 35.5 g. The final pH of the resulting calcium complex solution was 4.2.

The calcium complexes prepared in subparts (1) - (3) were evaluated in the same manner as in Examples 2, 3, and 4 above. Performance was essentially the same as the calcium complex as prepared in Example 1.

EXAMPLE 7. A zinc complex was prepared by mixing water (250 g), lactobionic acid (55 g), zinc carbonate (10 g), and citric acid (10 g). The final pH of the solution was about 3.4. A portion of the zinc complex was freeze dried. The freeze dried zinc complex was sufficiently soluble in water such that a clean tasting beverage could be prepared containing 200 percent of the United States Daily Value of zinc.

EXAMPLE 8. A calcium complex of lactobionic acid was prepared as in Example 1 except that lactic acid was used according to the following formulation.

	<u>Ingredient</u>	<u>Weight (g)</u>
	Water	400
	Lactobionic Acid	60
	Calcium Hydroxide	10
	Lactic Acid (85%)	9

The resulting calcium complex solution had a final pH of about 4.7. A portion of the calcium complex was freeze dried. It exhibited good solubility in water.

Example 9. Differential Scanning Calorimeter and Thermal Gravimetric Analyst of (A) crystalline calcium salt of lactobionic acid, (B) crystalline citric acid, (C) a mixture of crystalline calcium salt of lactobionic

acid and crystalline citric acid, and (D) an inventive calcium lactobionic acid complex as prepared in Example 1 above. The results are shown in Figure 1 wherein for each Panel the Differential Scanning Calorimetry is on the top and the Thermal Gravimetric Analysis is on the bottom. The results obtained
5 shown that the inventive calcium lactobionic acid complex (Panel D) is very different from the calcium salt of lactobionic acid (Panel A), citric acid (Panel B), or mixtures thereof (Panel C).

While the invention has been particularly described with specific reference to particular process and product embodiments, it will be
10 appreciated that various alterations and modifications may be based on the present disclosure, and are intended to be within the spirit and scope of the present invention as defined by the following claims.

CLAIMS

What is claimed is:

1. A mineral complex of lactobionic acid comprising lactobionic acid, a mineral source, and an edible acid, wherein the mineral complex is prepared by mixing lactobionic acid, the mineral source, and the edible acid in an aqueous solution and wherein the mineral complex can be incorporated in a food or beverage product to provide about 5 to about 200 percent of the current recommended United States Daily Value of the mineral per single serving size of the food or beverage product.

2. The mineral complex of lactobionic acid as defined in claim 1, wherein the mineral source is a mineral hydroxide, mineral carbonate, a mineral oxide, or mixtures thereof and the edible acid is citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof.

3. The mineral complex of lactobionic acid as defined in claim 2, wherein the mineral complex is prepared by mixing about 5 to about 95 percent lactobionic acid, about 1 to about 50 percent of the mineral source, and about 1 to about 50 percent of the edible acid in the aqueous solution.

4. The mineral complex of lactobionic acid as defined in claim 2, wherein the mineral complex is prepared by mixing about 50 to about 90 percent lactobionic acid, about 5 to about 25 percent of the mineral source, and about 2 to about 20 percent of the edible acid in the aqueous solution.

5. The mineral complex of lactobionic acid as defined in claim 1, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, copper, chromium, selenium, manganese, or mixtures thereof.

6. The mineral complex of lactobionic acid as defined in claim 2, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, copper, chromium, selenium, manganese, or mixtures thereof.

7. The mineral complex of lactobionic acid as defined in claim 3, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, copper, chromium, selenium, manganese, or mixtures thereof.

8. The mineral complex of lactobionic acid as defined in claim 4, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, copper, chromium, selenium, manganese, or mixtures thereof.

9. The mineral complex of lactobionic acid as defined in claim 1, wherein the mineral is calcium.

10. The mineral complex of lactobionic acid as defined in claim 2, wherein the mineral is calcium.

11. The mineral complex of lactobionic acid as defined in claim 4, wherein the mineral is calcium.

12. The mineral complex of lactobionic acid as defined in claim 6, wherein the mineral is calcium.

13. A mineral-fortified food or beverage product comprising about 0.2 to about 20 percent of complex of lactobionic acid comprising lactobionic acid, a mineral source, and an edible acid, wherein the mineral complex is prepared by mixing lactobionic acid, the mineral source, and the edible acid in an aqueous solution and wherein the mineral complex can be incorporated in a food or beverage product to provide about 5 to about 200 percent of the current recommended United States Daily Value of the mineral per single serving size of the food or beverage product.

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14. The mineral-fortified food or beverage product as defined in claim 13, wherein the mineral source is a mineral hydroxide, a mineral carbonate, a mineral oxide, or mixtures thereof and the edible acid is citric acid, lactic acid, acetic acid, malic acid, gluconic acid, tartaric acid, fumaric acid, adipic acid, succinic acid, ascorbic acid, phosphoric acid, or mixtures thereof.

15. The mineral-fortified food or beverage product as defined in claim 14, wherein the mineral complex is prepared by mixing about 5 to about 95 percent lactobionic acid, about 1 to about 50 percent of the mineral source, and about 1 to about 50 percent of the edible acid in the aqueous solution.

16. The mineral-fortified food or beverage product as defined in claim 14, wherein the mineral complex is prepared by mixing about 50 to about 90 percent lactobionic acid, about 5 to about 25 percent of the mineral source, and about 2 to about 20 percent of the edible acid in the aqueous solution.

17. The mineral-fortified food or beverage product as defined in claim 15, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, copper, chromium, selenium, manganese, or mixtures thereof.

18. The mineral-fortified food or beverage product as defined in claim 16, wherein the mineral is calcium, magnesium, potassium, sodium, iron, zinc, or mixtures thereof.

19. The mineral-fortified food or beverage product as defined in claim 17, wherein the mineral is calcium.

20. The mineral-fortified food or beverage product as defined in claim 18, wherein the mineral is calcium.

**MINERAL COMPLEXES OF LACTOBIONIC ACID AND METHOD OF
USING FOR MINERAL FORTIFICATION OF FOOD PRODUCTS**

ABSTRACT

Mineral complexes, especially calcium complexes, of lactobionic acid
5 which are especially useful for mineral fortification of food and beverage
products are provided. The preferred calcium complex of lactobionic acid
provided in the present invention delivers a soluble, stable, clean tasting
calcium source suitable for calcium fortification of a wide variety of food and
beverage products. The mineral complexes are prepared by mixing
10 lactobionic acid, a mineral source, (e.g., mineral hydroxide), and an edible
acid (e.g., citric acid) in an aqueous solution.

**DECLARATION
FOR UTILITY OR DESIGN
PATENT APPLICATION**

) Attorney Docket No.: 87419
)
) First Named Inventor: Cheryl Baldwin
)
)
) Application Number: N/A
)
) Filing Date: HEREWITH
)
)
) Group Art Unit: N/A
)
) Examiner Name: N/A

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**MINERAL COMPLEXES OF LACTOBIONIC ACID AND METHOD OF USING
FOR MINERAL FORTIFICATION OF FOOD PRODUCTS**

(Title of Invention)

the specification of which:

☒ is attached hereto, or

☐ was filed by an authorized person on my behalf on _____ as United States Application Number _____ or PCT International Application Number _____, and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States of America, listed below, and I have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application, on this invention filed by me or my legal representatives or assigns and having a filing date before that of the application on which priority is claimed:

Declaration 1-0201

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<u>Prior Foreign Application Number(s)</u>	<u>Country</u>	<u>Foreign Filing Date</u>	<u>Priority Not Claimed</u>
			☐
			☐
			☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet attached hereto.

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

<u>Provisional Application Number(s)</u>	<u>Provisional Application Filing Date</u>

☐ Additional provisional application numbers are listed on a supplemental priority data sheet attached hereto.

I hereby claim the benefit under Title 35, United States Code, §120, of any prior United States application(s), or under §365(c) of any PCT international application(s) designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known by me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

<u>Prior U.S. Application Number</u>	<u>Prior PCT International Application Number</u>	<u>Filing Date of U.S. or PCT International Application</u>	<u>Patent Number (if applicable)</u>

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet attached hereto.

As a named inventor, I hereby appoint the practitioners associated with Customer Number 22242, with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and request that all correspondence and telephone calls in respect to this application be directed to FITCH, EVEN, TABIN & FLANNERY, Suite 1600, 120 South LaSalle Street, Chicago, Illinois 60603-3406, Telephone No. (312) 577-7000, Facsimile No. (312) 577-7007, CUSTOMER NUMBER 22242.

Declaration 2-0201

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I hereby declare that all statements made herein of my own knowledge are true, and that all statements made herein on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity or enforceability of the application or any patent issued thereon.

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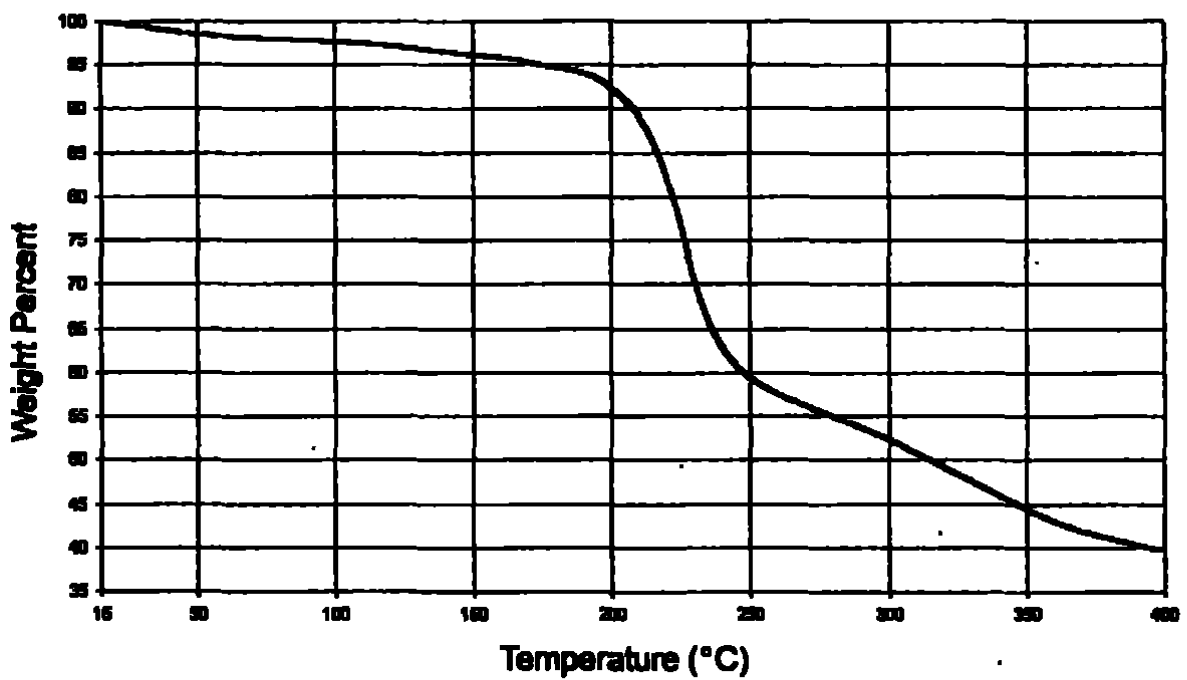
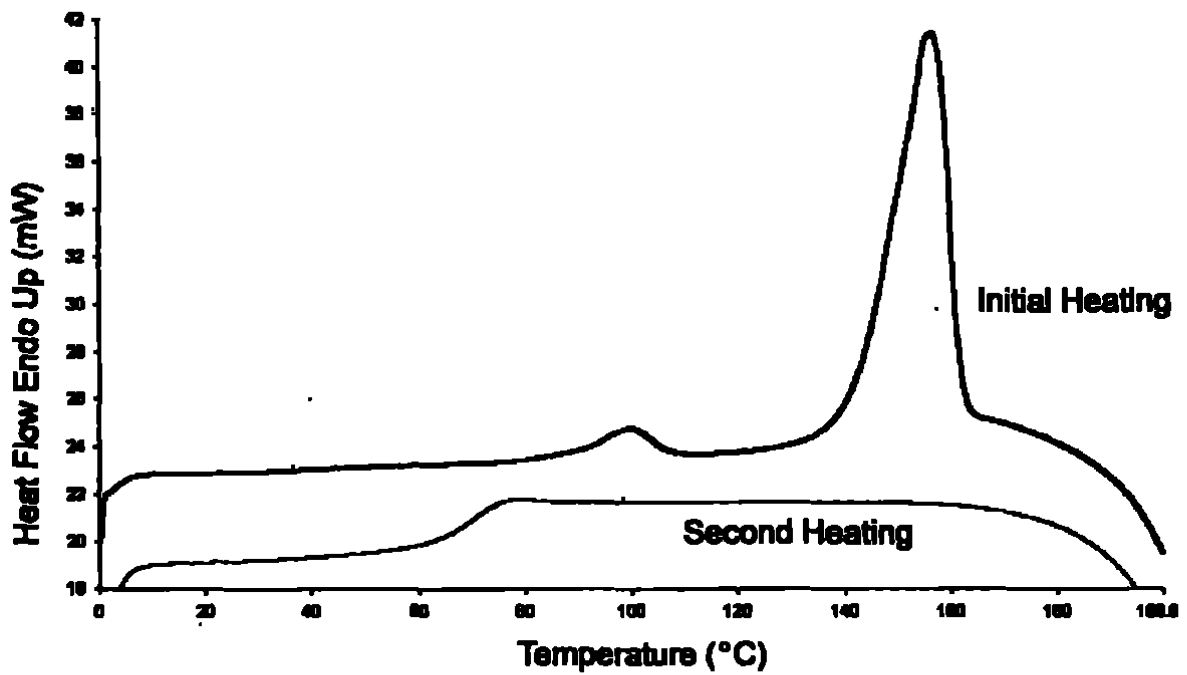
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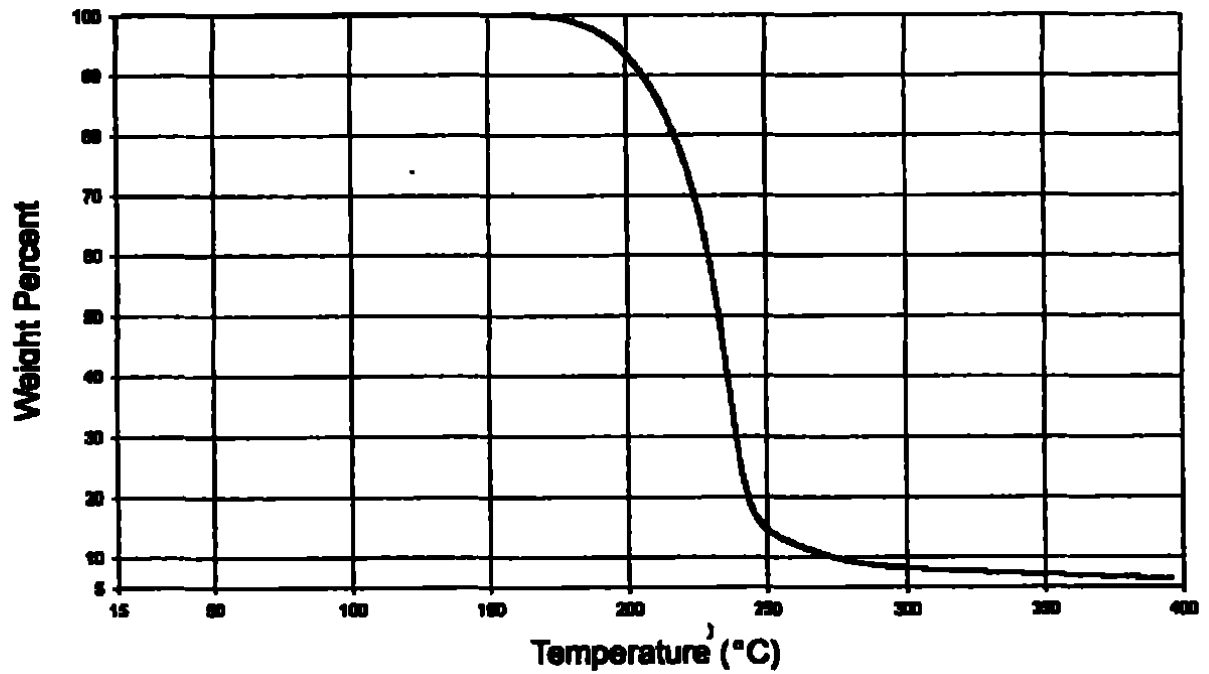
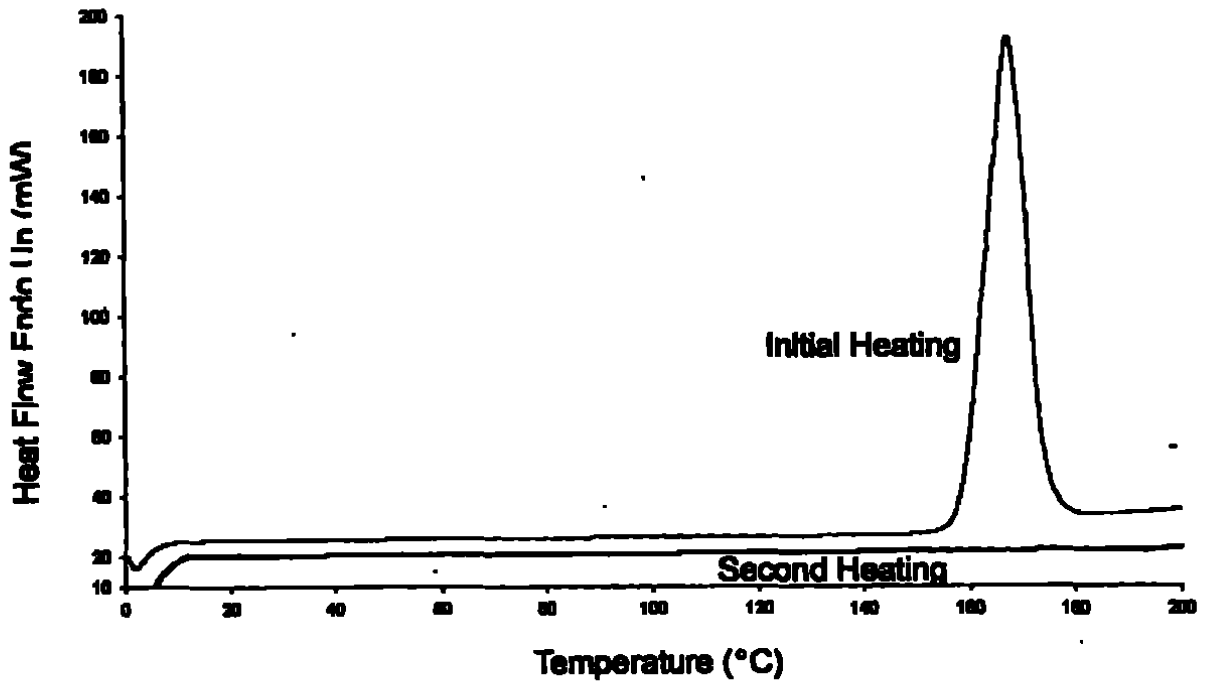
Declaration 4-0201

Figure 1



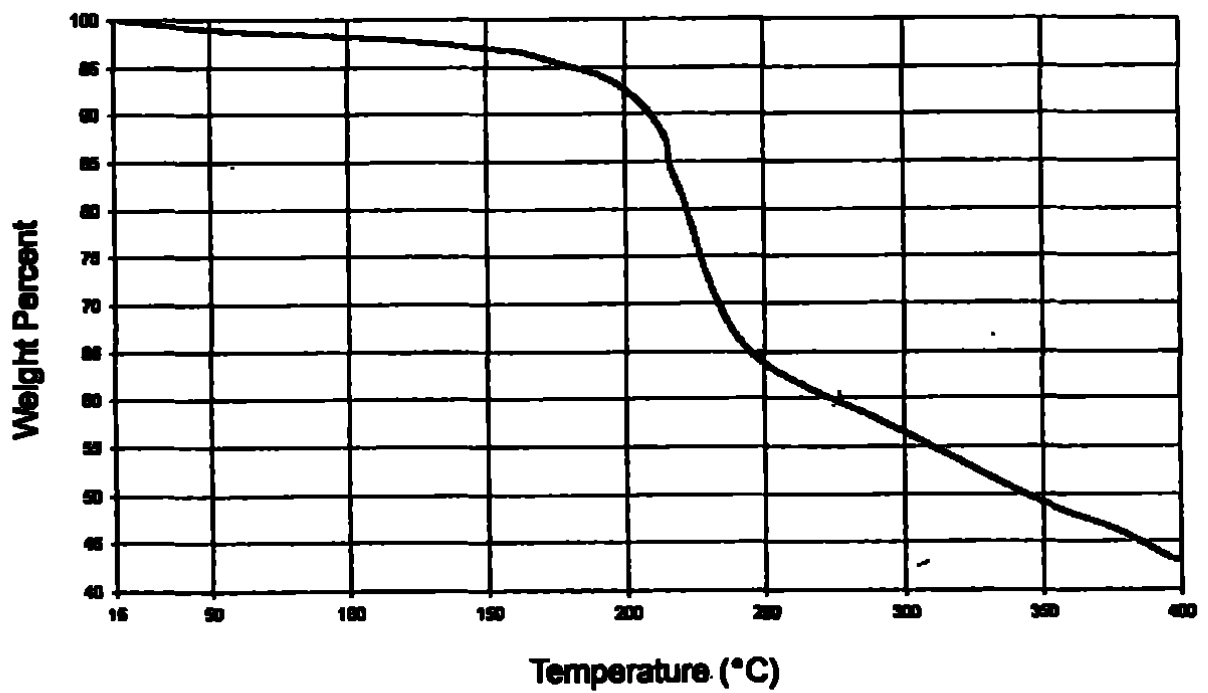
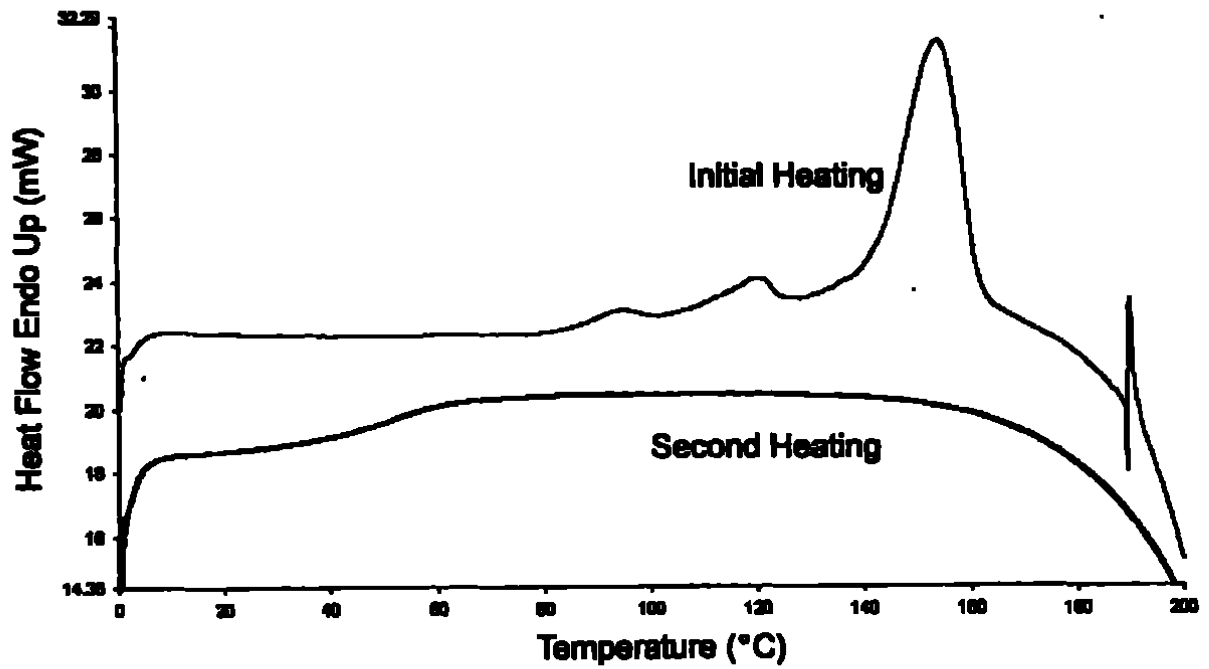
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Figure 1 (cont)



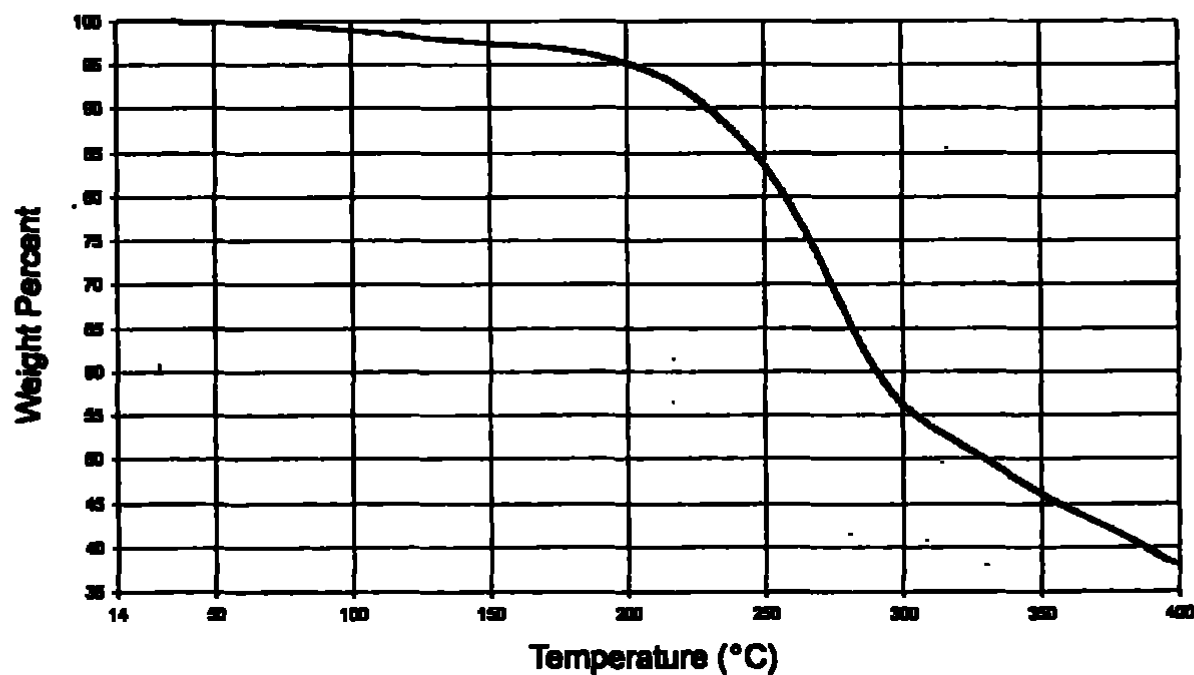
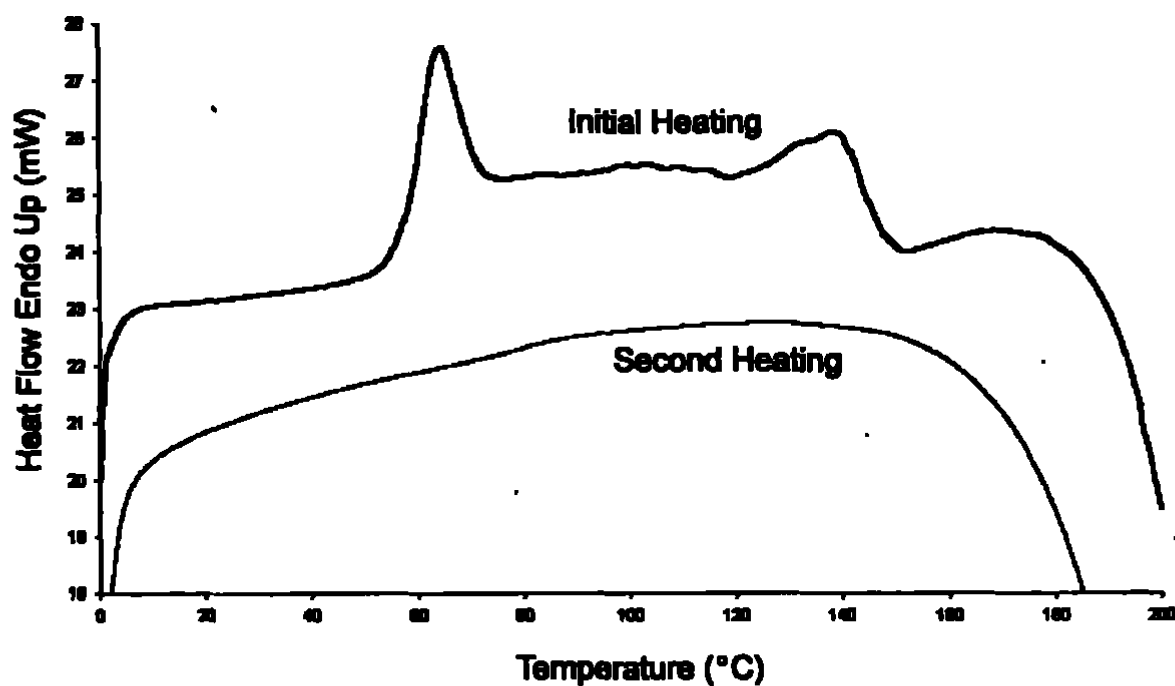
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Figure 1 (cont)



C

Figure 1 (cont)



D



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Industria y Comercio
SUPERINTENDENCIA**2do. EXAMEN DE FORMA PATENTE DE INVENCION**

Folio 87

Radicación No 04-17688

Concepto No. 798

Clasificación Internacional de Patentes A 23 L 2/02 ; 1/304

Practicado el examen de acuerdo a lo establecido en el Art. 38 de la Decisión 486 se determinó que esta solicitud de Patente de Invención:

REVISION TECNICA

- SI ☒ NO ☐ Contiene un resumen de la invención (Art.26-e).
- SI ☒ NO ☐ Contiene el título o nombre de la invención (Art.27-d).
- SI ☒ NO ☐ Contiene la descripción de la invención (Art.26-b).
- SI ☒ NO ☐ NO APLICA ☐ Contiene los dibujos necesarios para comprender la invención (Art.26-d)
- SI ☒ NO ☐ Contiene una o más reivindicaciones. (Art.26-c).
- SI ☐ NO ☐ NO APLICA ☒ Han sido desarrollados los productos y/o procedimientos a partir de recursos genéticos o de sus productos derivados de los que cualquiera de los Países Miembros es país de origen. (Art. 26- h).
- SI ☐ NO ☐ NO APLICA ☒ Los productos y/o procedimientos han sido obtenidos o desarrollados a partir de los conocimientos tradicionales de las comunidades indígenas, afroamericanas, o locales de los países miembros, de acuerdo a lo establecido en la Decisión 391 y sus modificaciones y reglamentaciones vigentes.(Art.26-i).
- SI ☐ NO ☐ La invención se refiere a un producto relativo a un material biológico. (Art.26-j).
- SI ☒ NO ☐ NO APLICA ☐ La prioridad coincide con la materia reivindicada.
- SI ☒ NO ☐ **CUMPLE LOS REQUISITOS TÉCNICOS**

REVISION JURIDICA

- SI ☒ NO ☐ NO APLICA ☐ Presentó el documento en que consta la cesión del derecho a la patente otorgado por el inventor al solicitante o a su causante (art. 26-k, Dec 486/2000).
- SI ☒ NO ☐ NO APLICA ☐ Presentó el poder otorgado al abogado, con el lleno de los requisitos jurídicos exigidos.
- SI ☒ NO ☐ NO APLICA ☐ Acreditó la existencia y representación de la sociedad solicitante.
- SI ☒ NO ☐ NO APLICA ☐ Presentó la copia certificada de la prioridad invocada en los términos establecidos en los artículos 10 y 11, Dec. 486.
- SI ☒ NO ☐ **CUMPLE LOS REQUISITOS JURÍDICOS**

[] OBSERVACIONES Y OTROS:

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Bogotá D. C., 29-09-2004

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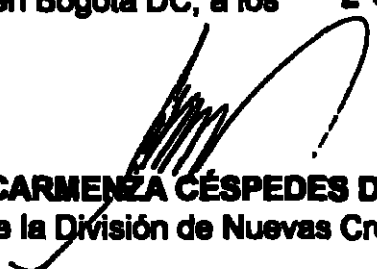
Doctor(a)
JERONIMO CASTILLO BONILLA
Apoderado(a)

REFERENCIA:	Radicación No.	04 - 17688
	Trámite	002
	Evento	001
	Actuación	416
	Oficio No.	1637
	Folios	001

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486 de la Comisión de la Comunidad Andina, y en las demás disposiciones vigentes sobre la materia, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial, conforme lo establece el artículo 40 de la misma Decisión.

Siendo manifestación expresa del interesado, la solicitud no será publicada antes de los doce (12) meses contados a partir de la fecha de presentación, por lo tanto la publicación en este caso se realizará a partir del día 27 de febrero de 2005.

Cúmplase
Dado en Bogotá DC, a los **29 OCT. 2004**


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones

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