

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
9 December 2004 (09.12.2004)

PCT

(10) International Publication Number
WO 2004/105498 A2

(51) International Patent Classification⁷: **A23C**
(21) International Application Number:
PCT/US2004/017191
(22) International Filing Date: 28 May 2004 (28.05.2004)
(25) Filing Language: English
(26) Publication Language: English
(30) Priority Data:
60/473,950 28 May 2003 (28.05.2003) US

(71) Applicant (for all designated States except US): **FMC CORPORATION** [US/US]; 1735 Market Street, Philadelphia, PA 19103 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **FJAEREIDE, Therese** [NO/NO]; Stalsbergsgate 12, N-3612 Kongsberg (NO). **TSAL, Albert, G.** [US/US]; 109 Sweetbay Lane, New Castle, DE 19720 (US).

(74) Agents: **FAIR, Paul, A.** et al.; FMC Corporation, 1735 Market Street, Philadelphia, PA 19103 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MILK BASED PRODUCTS CONTAINING COATED ALGINATES

(57) Abstract: A milk based product containing an alginate and a meltable oil or fat such as a hydrogenated vegetable oil are disclosed. The composition may be prepared by fluidized bed process or Rollo-mixer. The milk based products may be mousse, pudding, flan, and aerated toppings, and the alginates coated with a meltable oil or fat can be added into cold milk for processing such products.

WO 2004/105498 A2

MILK BASED PRODUCTS CONTAINING COATED ALGINATES

This application claims the benefit of U.S. Provisional Application No.
5 60/473,950, filed May 28, 2003.

FIELD OF THE INVENTION

A milk based product containing an alginate and a meltable oil or fat such as
a hydrogenated vegetable oil are disclosed. The compositions may be prepared by a
10 fluidized bed process or Rollo-mixer. The milk based products may be mousse,
pudding, flan, and aerated toppings.

BACKGROUND OF THE INVENTION

Alginates have found limited utility in milk-based products due to their
15 interaction with calcium ions present in milk. This interaction results in an increase
in viscosity, which cannot be handled in conventional milk product processing
equipment and processes. Solutions, which have been proposed, include use of a
sequestrant such as a phosphate to initially bind with the calcium. Addition of such
material does not prevent viscosity buildup and introduces other problems including
20 adversely affecting the taste of the products.

SUMMARY OF THE INVENTION

The present invention is directed to a milk based product containing an
alginate coated with a meltable oil or fat, wherein the milk based product may be
mousse, pudding, flan, and aerated topping. The present invention also relates to an
25 improved alginate composition comprising an alginate and a protective meltable oil
or fat, such as a hydrogenated vegetable oil. The composition may be prepared by a

fluidized bed process or any other process such as a Rollo-mixer, which deposits a uniform layer of the oil or fat on the surface of the alginate. The composition may be used in a variety of milk-based products prepared on conventional equipment for preparing similar products and other calcium containing products which are processed at elevated temperature; for example, adding the dry ingredients in the composition to cold milk and then processing at elevated temperatures. At elevated temperatures the milk binds the calcium and makes it unavailable for the alginate gelling reaction. Hence, when the coating around the alginate melts, the alginate can dissolve without interference from calcium present in the milk. Upon cooling, the calcium will be release and the alginate gel can be formed. The composition may also be used in other calcium containing products where delayed release of the alginate is desired, or in low calcium applications with a need for delayed release of the alginate for viscosity purposes. The alginate may be released by heat as described above or by shear forces breaking the coating. The coating may also act as a dispersion agent, resulting in a fast dissolution of the alginate upon heating.

DETAILED DESCRIPTION OF THE INVENTION

As indicated above, the milk based products of the present invention contain an alginate coated with a protective meltable oil or fat. As used herein, the term alginate refers to alginic acid, salts of alginic acid, especially the water-soluble salts of alginic acid, and mixtures thereof. Alginic acid is a polyuronic acid made up of two uronic acids: D-mannuronic acid and L-guluronic acid. The ratio of mannuronic acid and guluronic acid varies with factors such as seaweed species, plant age, and seasonal variations. Alginic acid in the form of mixed water insoluble salts, in

which the principal cation is calcium, is found in the fronds and stems of seaweeds of the class *Phaeophyceae*, examples of which are *Fucus vesiculosus*, *Fucus spiralis*, *Ascophyllum nodosum*, *Macrocystis pyrifera*, *Alaria esculenta*, *Lessonia nigrescens*, *Lessonia trabeculata*, *Laminaria longicuris*, *Laminaria digitata*,
5 *Laminaria hyperborea*, *Laminaria saccharina*, *Laminaria cloustoni*, *Laminaria japonica*, *Ecklonia maxima*, *Durvillea potatorum* and *Durvillea Antarctica*.

Alginic acid is substantially insoluble in water. It forms water-soluble salts with the alkali metals, magnesium, ammonium, the lower amines, and certain other organic bases. These salts form viscous aqueous solutions. The salts are stable in
10 alkaline media, but are converted to alginic acid when the pH is lowered below about pH 4. Water-insoluble calcium alginate is formed if any calcium is present in the medium.

Methods for the recovery of water-insoluble alginic acid and its water-soluble salts, especially sodium alginate, are well known. Alginic acid is typically
15 extracted from the seaweed raw material as sodium alginate. The resulting slurry is clarified by flotation, centrifugation, and/or filtration to remove suspended solids. The alginic acid is then precipitated with acid, such as sulfuric acid, or a combination of acid and a calcium salt, to form insoluble alginate, predominately as alginic acid. The resulting precipitate is typically dewatered by filtration or by
20 pressing. Following dewatering, the dewatered alginic acid may contain up to about 65 wt% to 80 wt% of water. Esterified derivatives such as propylene glycol alginate are also available.

The resulting dewatered alginic acid may be dried and ground. Alternatively, the dewatered alginic acid may be neutralized with, for example,

sodium carbonate, and the resulting blended mixture dried and ground, forming a dry powder that is soluble in cold water.

Recovery methods are described, for example, in Green, U.S. Pat. No. 2,036,934, and Le Gloahec, U.S. Patent U.S. Pat. No. 2,128,551.

5 In Green's process, seaweed is treated with dilute acid, such as dilute hydrochloric acid, followed by water washing. This converts the natural alginate salts present to alginic acid. Salts, residual hydrochloric acid, and water-soluble organic materials are then removed by washing. The pretreated seaweed is then chopped or milled and an excess of sodium carbonate added together with a quantity
10 of water to extract the water-soluble sodium alginate formed. The mixture is filtered to recover the clarified sodium alginate solution to which a solution of calcium chloride is added to precipitate the alginate in the form of water-insoluble calcium alginate. The highly hydrated precipitate is separated from the solution of sodium chloride, excess calcium chloride, and soluble color bodies, particularly phenolic
15 compounds, usually present in the original extract. The precipitate may retain some color bodies, even after water washing, so calcium hypochlorite is added as a bleaching agent. The precipitate is then treated with dilute hydrochloric acid to convert the purified calcium alginate to alginic acid. This gelatinous precipitate is washed with water to remove excess hydrochloric acid and calcium salts.

20 In the Le Gloahec process, seaweed is treated with a solution of calcium chloride and the water-soluble components of the seaweed are then extracted and removed by draining. The seaweed is then treated with dilute hydrochloric acid, drained, and water washed. Sodium carbonate is added and the seaweed mixture milled and diluted with water to extract the sodium alginate. The slurry is aerated to
25 separate insoluble materials by a method of air flotation and the residual clarified

solution is treated with a decolorizing agent. The purified sodium alginate may be recovered by conventional means, as for example, by alcohol precipitation. To recover alginic acid, the solution is treated with dilute sulfuric acid, the precipitate being separated and pressed to remove the aqueous solution containing sodium sulfate and excess sulfuric acid. The precipitate is dehydrated with alcohol, washed with further quantities of alcohol, and then dried to produce alginic acid.

Alginic acid may be converted to a salt by treatment with the appropriate carbonate, for example, sodium carbonate, potassium carbonate, ammonium carbonate, magnesium carbonate, calcium carbonate, etc. The resulting salt is dried and milled to the desired particle size.

Any meltable oil or fat that will provide a protective coating on the alginate may be used. Preferred results are achieved with a hydrogenated vegetable oil. Highly hydrogenated vegetable oils include, for example, coconut oil, palm oil, palm kernel oil, rapeseed oil, soybean oil, palm oil, sunflower oil, corn oil, canola oil, cottonseed oil, and peanut oil. The degree of hydrogenation should be such that the oil has a melting point of at least 35 °C, preferably at least 55 or 60 °C. The amount of oil should be sufficient to prevent hydration in cold milk. The meltable oil or fat may generally be used in an amount of 20-80 wt%, based on the total weight of the coated alginate particle, particularly, 56-80 wt%, more particularly, 60-80 wt%, more particularly, 62-80 wt%.

In a preferred process for preparing the compositions of the present invention, the alginate is coated with the oil or fat in a fluidized bed process. Such processes are known in the art. If desired, the process can include a pulverizing step in which the alginate is granulated. In the fluidized bed process the following steps

may be used: First, the alginate is added to the fluidized bed and heated (though heating the alginate is not required). Then, the alginate is coated by spraying the oil at a temperature above its melting point. Finally, the product is cooled to recover the coated alginate. It is possible to apply multiple layers of the same or a different oil/fat by cooling the coated product and then introducing a second or subsequent amount of oil or fat.

The composition of the present invention comprises an alginate core and an oil or fat wherein the oil or fat provides a continuous layer of a hydrophobic coating around the alginate core. It is important that the coating completely encases the alginate since any openings, even pinholes, in the coating results in the alginate starting to swell, ultimately breaking the coating and exposing the alginate to calcium ions. The alginate/oil or fat compositions are useful in a variety of milk based products including mousse, aerated toppings, flan, yogurt, yogurt mousse, pudding, ice cream, canned milk or cream, thickened cream, custards and other ready to eat dairy products. They may also be employed in any other products involving the presence of calcium ions (or not) and processing at elevated temperatures, such as soy based and fruit based products, cheese and cheese snacks, fudge and neutral fillings/toppings, and instant hot prepared food applications.

In order to describe the invention in more detail, the following examples are set forth, but it should be understood that the invention is not construed as being limited thereto. In the Examples, the following standard materials and test procedures were used. The coated materials were prepared on an MP1 fluidized bed or in a Rollo-Mixer®. Protanal GP2055 refers to an uncoated alginate commercially available from FMC and was used as the control in some of the

Examples below. Lactogel FC 3263 refers to a carrageenan commercially available from FMC, and is a mixture of carrageenans extracted from *Gigartina* and *Euchema* seaweeds and further contains an amount of sugar for dairy applications of about 10%. Emulsifier (E472b) refers to mono- and diglycerins of fatty acids available from Danisco as Lactem P22. SMP refers to Skimmed Milk Powder. Alginate (200 mesh) refers to a sodium alginate at least 99% of which will pass through 200 mesh. Alginate (80 mesh) refers to a sodium alginate at least 99% of which will pass through 80 mesh, respectively. Alginate (60 mesh) refers to a sodium alginate at least 99% of which will pass through 60 mesh. Rape seed oil 62 refers to Crestaflake 262 available from Croda Foods. OR refers to Over Run and is measured by how much the volume increases by whipping. Firmness was measured by a TA-XT Texture analyzer. Unless otherwise indicated herein, all parts, percents, ratios and the like are by weight.

15

Example 1

Part A: Alginate powder (200 mesh) was granulated using a dispersion solution of 1% alginate in water to yield a granulate with a residual moisture of less than 10 % and a mean particle size of about 500 microns by the following process:

The MP-1 fluidized bed unit equipment was preheated with 70 °C inlet air temperature. Two kg of alginate powder (200 mesh) was added and heated for 2 minutes to reach a product bed temperature of 40°C. The powder was then granulated by spraying with 900 g of a 1% alginate dispersion in water over 13 minutes. The spray rate was increased from 70 g/min after 2 minutes to 100 g/min.

After 9 minutes, the spray rate was reduced to 40g/min and the inlet air temperature

increased from 80 to 100° C. The air volume was adjusted from 80 to 120 m³/h as required for the movement of the product during the process. The product temperature decreased during spraying to 33.5°C. After 15 minutes of processing time, the nozzle was cleaned with water. The product was then dried for 15 minutes, until the product temperature reached 64° C (inlet air temperature of 110°C). The residual moisture content (%) after 8 minutes of drying was 9.39% (IR; at 130°C / 15 minutes). The inlet air temperature was lowered to 24°C to cool the product until the product temperature was <40°C. Total process time was 40 minutes. The process yielded 1845 grams of granulate having a residual moisture of 6.49% (IR: at 10 130°C/15 minutes).

Part B: The alginate granulate produced in Part A was coated with rape seed oil 62 (m.p. = 62°C) to provide a coated alginate with a protective film (i.e., to keep the alginate from hydrating in cold milk) by the following process: The MP-1 fluidized bed unit was preheated with 50 °C inlet air temperature and then filled with 15 1.0 kg of alginate granules and heated by inlet air for 2 minutes to reach a product temperature of 40°C. The granules were then coated by spraying 500 g of rape seed oil 62 (m.p = 62°C) at 70°C over 10 min to give a composition having about 33.3% coating on the alginate. The air flow was adjusted between 80 to 160 m³/h as needed during processing to provide adequate movement of the product. The product temperature increased to 50.0 °C during coating. The product was cooled over 8 minutes to a product temperature <30 °C, and then heated over 3 minutes up to a product temperature of 40 °C. A second coat was added by spraying another 500 g of the molten rape seed oil within 10 min to give a composition of about 50% coating. The product temperature increased up to 49.0° C during coating. The 20 product was cooled over 8 min to aproduct temperature <30 °C. A sample of 200 25

grams of the 50% coated product was removed. The remaining coated granules were heated again for 4 minutes until the product temperature was 40° C. A third coat was added by spraying in further 500 g of the rape seed oil (60 % coating) within 10 minutes. Product temperature increased to 48.0 °C. The product was
5 cooled for 9 minutes to <30°C and discharged. The granules had a smooth surface. Yield was 2240g.

Example 2

Alginate particles which passed through an 80 mesh screen were coated with
10 a Rape seed oil 62 (m.p. 62°C) to provide coated alginate having 60% by weight of coating by the following process: Two kg of alginate particles (80 mesh) were heated in a fluidized bed to 40 °C by inlet air at 50 °C. The alginate particles were sprayed with molten Rape seed oil 62 (preheated to 80 °C), i.e., 290 grams of oil coating was sprayed over 8 minutes while the air volume was adjusted to maintain
15 particle mixing. The product temperature increased to 44.2 °C. The product was then cooled below 30 °C over 3 minutes. The coating process was repeated multiple times. Samples of the coated alginate particles were taken after 40%, 50% and 60% by weight of coating was applied.

20

Example 3

A fat coated alginate comprised of 40 wt% sodium alginate and 60 wt% hydrogenated soybean oil was prepared in a Rollo-Mixer ®, model 31-10/90, 0.3m³ working volume, 5 HP motor by the following process. 90 kg sodium alginate, 60

mesh, was loaded into the mixer. The variable speed drive was adjusted for 5 rpm blender rotation. The Soybean oil (Dritex S from Humko Oil Products) was preheated and melted in 55 gallon drums using wraparound drum heaters. An insulated enclosure was used to maintain the oil temperature at approximately 82 °C.

- 5 Electric heating tape was used to keep the liquid feed line hot during the coating process. Air pressure at 14-15 psig was used to pneumatically deliver the molten oil to one single fluid nozzle (VeeJet spray nozzle 2506 from Spraying Systems Co.). The spray rate was 82 kg/h and 95kg/h for batch 1 and 2, respectively. One third of the fat was sprayed on followed by a cooling period of ten minutes, giving an
- 10 average total batch time of approximately 2.8 h. During the coating process the outside of the mixer was cooled down by a water spray keeping the mixer contents temperature below 58°C. The yield was 225 kg coated alginate with the following particle size distribution:

- 15 Table 1 Particle size distribution of coated alginate prepared in Rollo-mixer®.

Screen	Batch 1			Batch 2		
	On screen g	Cumulative g	%	On screen g	Cumulative g	%
12	124.5		41.5	148.9		49.6
14	46.4	170.9	56.9	48.1	190.7	63.5
16	41.3	212.2	70.7	34.4	225.1	75.0
18	24.0	236.2	78.8	20.0	245.1	81.7
20	22.0	258.2	86.1	19.0	264.1	88.0
30	25.1	283.3	94.4	19.7	283.8	94.6
Pan	11.0	294.3	98.1	10.3	294.1	98.0

- 20 Batch 1 was separated in two fractions based on particle size; smaller than 20 mesh (-20 mesh) and between 12 and 20 mesh (-12+20 mesh) and then characterized by measuring the viscosity, alginate and fat content compared to the

initial batch composition (as is). 6.0 g product was weighed in a beaker and approximately 600 g deionized water added. The beaker was placed in a heating bath at 85°C and the solution stirred with a mechanical stirrer for 7 minutes until the fat was melted and the alginate dissolved. The solution was brought to room temperature and the total weight of solution adjusted to 650 g with deionized water giving a concentration of 1% of the coated alginate (0.4% alginate). The temperature of the solution was adjusted to 20°C before viscosity was measured on a Brookfield LV viscometer (60 rpm, spindle 1). The fat was then separated from the solution by filtration through a microfiber filter (520 B11, Schleicher & Schuell) in a Büchner funnel. The filter holding the fat was dried over night in room temperature and weighed to determine amount of fat in the sample. The content of alginate in the filtered solution was found by adding a part of the solution to a 5% solution of Calcium chloride. The precipitated calcium alginate was washed in hot water followed by ethanol and then dried at 105°C over night before weighing. The results are presented in table 2.

Table 2 Characterization of Batch 1

Fraction	Viscosity (mPas)	Measured Alginate content (%)*	Measured Fat content (%)
as is	42.9	34.2	56.8
- 20 mesh	38.3	32.1	60.9
-20+12 mesh	40.8	33.2	61.1

*Gram dry alginate precipitated per gram coated alginate as is

Example 4

Testing of coated alginate particles in a chocolate mousse formulation

The coated alginate compositions from examples 1 and 2 (60%coated) were evaluated in a standard ready-to-eat chocolate mousse. The product compositions in Table 3 were prepared in twenty liter batches using APV pasilac UHT platform by dry blending the powder ingredients. The dry blended ingredients were added to cold milk and stirred for 10 minutes. Continuous heat treatment was taking place in three steps involving pre-heating, sterilization and cooling at 160 l/h. The mixture was preheated going through the first section of the plate heat exchanger to 75°C for 20 seconds, sterilized for 7 seconds at 140°C and cooled down to 20°C. A 10 liter sample was recovered from the batch and refrigerated stored overnight. The sample was whipped with a Mandomix LAB 50 from HAAS - MONDOMIX B.V. Whipping parameters: flow rate 80 RPM; air pressure inlet: 5 bar; counter pressure 4 bar; mixing head pressure: 4 bar; air flow: 30%; mixing head speed 1400 rpm. The % overrun was determined on the whipped product. The target was 100% overrun. Whipped product was tested for firmness after 24 hours storage using a TA-XT-2 Texture analyzer. Samples were refrigerated overnight before the measurement. Temperature of the samples during the measurement was: 4°C; Cylindrical Probe SMSP/25 3cm x 2.5cm diameter; Penetration speed 1mm/sec; penetration distance 10mm. The control sample with uncoated alginate was not possible to run through the APV pasilac UHT because the dry ingredients had to be added into cold milk. For the uncoated alginate this resulted in an immediate viscosity build up and too high of a pressure in the equipment. The control mousse was therefore prepared by the following procedure using a Stephan mixer: All dry ingredients were dry blended before added to the preheated cream and milk mix at 90°C. The solution

was then heated to 90°C under agitation (scraper on, and central mixer on position 2) and stirred for 10 minutes at 90°C. A 10 l sample was collected and refrigerated over night. The mousse was whipped with a Mondomix Lab 50 from HAAS – MONDOMIX B.V. using the following parameters: Flow rate 80 RPM; air pressure inlet: 5 bars; counter pressure: 4bars; mixing heat pressure: 4 bars; air flow: 30%; mixing head speed: 1400 rpm; Overrun target = 100%. Firmness was determined using a TA-XT- Texture analyzer as described above.

Table 3

10

	Control	3-1	3-2
	Weight (g)	Weight (g)	Weight (g)
Protanal GP 2055	180	0	0
Coated alginate - 60% raps (Example 2)	0	200	0
Coated alginate - 60% raps (Example 1)	0	0	200
Lactogel FC 3263	64	64	64
Emulsifier (E472b)	140	140	140
Cocoa	1000	1000	1000
Sugar	2800	2800	2800
SMP	800	800	800
Cream 40%	2940	2940	2940
Full fat milk	12076	12056	12056
Total weight	20000	20000	20000

Using a coated alginate lowered the product viscosity during processing in the APV pasilac UHT. The pressure required to discharge the hot product at a flow rate of 160 l/hr was acceptable at 7 bars (Example 3-1) and excellent at 4 bars (example 3-2). The functionality of the coated alginate stabilizer in the mousse product was good. It is possible to arrive at the same type of product texture using the coated alginate as with an uncoated alginate. The mousse prepared in Example

3-1 using the coated alginate with 60% rape seed oil coating had a firmness that was higher than for the standard mousse formulation, but an equivalent mouth texture to the standard mousse. The mousse prepared in Example 3-2 had a firmness that was the same as the standard mousse. Both had a mouth texture equivalent to the texture of the standard product.

Sample	Control	3-1	3-2
Firmness after 24 hr (g)	77	113	71

Example 5

10

Chocolate mousse comprising fat coated alginate as single gelling agent.

The coated alginate prepared in examples 2 and 3 were evaluated in a standard ready to eat chocolate mousse with the coated alginate being the only gelling agent. Three other samples prepared in a similar process as described in example 2, consisting of 40% alginate and 60% of three different hydrogenated fats (rapeseed-, soybean- and palmoil) were also evaluated. The five different coated alginates are presented in table 5-2.

The product composition in Table 5-1 was prepared in 25 l batches in the commercial equipment APV Pasilac UHT Platform by the following process: all dry ingredients were dry blended and added to the cold milk and cream under agitation. The mix was heated to 75°C and then homogenized at 75°C and 50 bars. The product was then sterilized at 140°C for 7 seconds. Flow rate of the product during pre-heating / sterilisation: 150/160 l/h. A 10 liter sample was recovered and

refrigerated overnight. The mousse was then whipped using a Mandomix Lab 50 from HAAS – MONDOMIX B.V. using the following parameters: flow rate 80 RPM; air pressure inlet: 5 bars; counter pressure: 4bars; mixing heat pressure: 4 bars; air flow: 30%; mixing head speed: 1400 rpm; overrun target = 100%. The whipped product was tested for firmness after 24 hours storage using a TA-XT-2 Texture analyzer. Samples were refrigerated overnight before the measurement. Temperature of the samples during the measurement: 4°C; Cylindrical Probe SMS P/25 3cm x 2.5cm diameter; Penetration speed 1mm/sec; penetration distance 10mm. The measured firmness is presented in table 5-3.

10

Table 5-1 Composition of Chocolate mousse

Ingredient	Amount
Coated alginate (40% alginate/60% fat)	250 g
Emulsifier (4291)	175 g
Cocoa D11A	1 250 g
Sugar	3 500 g
SMP	1 000 g
Cream (40%)	3 675 g
Full fat milk	15 150 g
Total	25 000 g

15

Table 5-2 Composition of coated alginates used in preparation of mousse

Sample	Process	Run	Alginate (40%)	Fat (60%)
5-1	Example 2	I	80 mesh	Rapeseed, Crestaflake 262
5-2	Example 3 Batch 2, -20 mesh	I	60 mesh	Soybean, Dritex S
5-3	Fluid bed	II	60 mesh	Rapeseed, melting point 67°C
5-4	Fluid bed	III	60 mesh	Palm, melting point 62°C
5-5	Fluid bed	III	60 mesh	Soybean, melting point 62°C

20

Table 5-3 Firmness of mousse after 24 h

Sample	Firmness (g)		
	Run I*	Run II	Run III
5-1	58.7	80.3	79.7
5-2	80.9		
5-3		118.4	
5-4			116.6
5-5			114.1

5

Although the firmness reflected above for Run 1 was low due to technical problems with the pump during preparation, the data still shows that the mousse prepared by all the five different coated alginates had a good mouth texture, though sample 5-5 appeared to have an off taste compared to standard products.

10

Example 6

Aerated topping

The following concept may be used to prepare a gelatin free whipped dairy topping based on coated alginate technology of the invention. The ingredients are listed in Table 6-1. The process equipment used to prepare the topping can be as described in example 4 and 5, or equivalent. Dry blend dry ingredients are dispersed into the milk under medium agitation. Pre-heat to 75-80°C and homogenize at 75°C, 200 bar. Sterilize at 135°C-140°C for 4-10 seconds. Cool the mixture to 5-10°C and whip with a mondomix or similar device. Fill and store the product at refrigeration.

20

Table 6-1 Aerated topping

Ingredient	By weight (%)
Cream, 40% butterfat	40-65
Sugar	7.0
Skim milk powder	1.0
Coated alginate*	0.6-1.0
Lactic acid ester of mono & triglycerides	0.5
Vanilla flavor	0.01
Full fat milk	To 100

*Produced according to example 1, 2, 3 or any other process giving a protective coating of fat.

- 5 This process provides a topping with a firm and crisp texture, excellent foam stability in a wide range of temperatures, improved transport and storage stability at elevated temperatures and high overrun capacity.

 While the invention has been described in detail and with reference to specific embodiments thereof, it will be apparent to one skilled in the art that various
10 changes and modifications can be made therein without departing from the spirit and scope thereof.

WHAT IS CLAIMED IS:

1. A milk based product containing an alginate coated with a meltable oil or fat, wherein said milk based product is selected from the group consisting of mousse, pudding, flan, and aerated topping.
2. A product as in claim 1 wherein the oil or fat is a hydrogenated vegetable oil.
3. A product as in claim 2 wherein the hydrogenated vegetable oil is selected from the group consisting of coconut oil, palm oil, palm kernel oil, rapeseed oil, soybean oil, sunflower oil, corn oil, canola oil, cottonseed oil and peanut oil.
4. A product as in claim 3, wherein said hydrogenated vegetable oil is palm oil.
5. A process for producing an alginate coated with a meltable oil or fat comprising adding the alginate to a fluidized bed or Rollo-mixer, said alginate is coated with said meltable oil or fat at a temperature above its melting point and cooled to recover said coated composition.
6. A composition comprising an alginate coated with a meltable oil or fat, wherein said meltable oil or fat is present in an amount of about 60 wt% based on the total weight of the coated alginate particle.
7. Cold milk comprising an alginate coated with a meltable oil or fat.