

A READY-TO-EAT HEALTH SNACK FOOD AND A PROCESS FOR THE PREPARATION THEREOF

Field of the invention

The present invention relates to a ready to eat health snack food and to a process for the preparation thereof.

Background of the invention

Inadequate intake of nutritionally balanced foods due to various socio-economic reasons make individuals especially children vulnerable to various infectious diseases which often results in morbidity and mortality. Major nutritional problems prevalent in most of the developing countries are protein – calorie malnutrition, vitamin A deficiency, iron deficiency and iodine deficiency. Providing health foods fortified with critical vitamins and minerals reduces risk of malnutrition, especially in children.

Snack foods are popular food items which are easily consumed and can be either in liquid or solid form. Snack foods also have potential to provide high-energy and high-protein and can play the role of a health food in providing physical and mental well being to the consumer.

Snack foods have not been regarded as true foods and their nutritive value has been scarcely emphasized. However, there is a trend towards producing natural snacks with good fiber, calorie and protein supply. The tendency to consume more nutritious foods has led food industry to look for new types of product appearances, such as chocolate covered cereal bars or with the incorporation of different fruits and nuts (Estevez, A.M., Escobar, B., Vasquez, M., Castillo, E., Araya, E. and Zacarias, I. 1995, Cereal and Plant Foods for Human Nutrition, Cereal and nut bars, nutritional quality and storage stability. 47:309-317).

Most of the snack-bars, in order to meet their energy and protein requirements use sources such as walnuts (Estevez, A.M., Escobar, B., Vasquez, M., Castillo, E., Araya, E. and Zacarias, I. 1995. Cereal and Plant Foods for Human Nutrition. Cereal and nut bars, nutritional quality and storage stability. 47:309-317); egg proteins (Jan M. Wiker and Franklin E. Cunningham. 1983. US Patent No. 4421770); whey protein (Henry J. Huelskamp, John J. Collins, and James E. Devero. 1975. US Patent No. 3911142), and meat, poultry and fish proteins (Paul W. Hait, 1978. US Patent No. 4126705). These food materials are used to make the snack food rich in proteins only and might not necessarily provide other nutrients such as vitamins and minerals in adequate amounts.

Apart from the above sources a health snack food can also acquire its protein from other vegetable sources such as soy bean flour, peanuts, sesame seed and wheat germ.

Soybean is one of the richest sources of protein with defatted flour containing about 55% protein of high nutritional value. The world soybean production is about 159 million metric tons while its production in India is around 6.1 million metric tonnes (2000 Soya and Oilseed Blue Book. Ed: Peter Golbitz. Published by Soyatech, Inc. USA). One of the promising uses of soybeans is the fortification of cereal-based products, because the profile of essential amino acids in soybean is complementary to that in most cereals and supplies all the essential amino acids (Riaz, M.N. 1999. Healthy Baking with Soy Ingredients. Cereal Foods World. 44:136-139).

Peanuts are one of the world's leading oilseed crops. It is the world's third most important sources of vegetable proteins (Lucas, E.W. 1979. Food uses of Peanut protein (Journal of the American Oil Chemists' Society. Vol. 56, 425 – 430). The world production of peanuts is approximately 31 million metric tonnes for the 1998, out of which India produced 8.3 million metric tonnes. This accounts for nearly 25% of the entire world production of peanuts (FAO Quarterly Bulletin of Statistics. Vol. II, No.3, 1998. Food and Agricultural Organisation of United Nations, Rome, Italy, PP.56-72; The Hindu Survey of Indian Agriculture, 1999. Publisher: Rangarajan, Chennai, Editor: N. Ravi, Chennai). Protein content of peanut is in the range of 20 to 35%.

Sesame seed is another tropical oilseed, which is uniquely grown in India. The world production of sesame seed is about 3.7 million metric tonnes for the year 1997. India is a major producer of sesame in the world with nearly 1.5 million metric tonnes. Protein content of sesame seeds range from 20 – 30%. The sesame protein is a rich source of the essential amino acid methionine.

Wheat germ is a by-product of the roller flour milling industry. Wheat germ, which constitutes 2.5 to 3.0% of the grain, can be separated in a fairly pure form. In India about 180,000 tons of germ can be obtained annually. Wheat germ contains about 30% proteins of excellent quality. Appropriate heat treatments of the wheat germ improves its nutritive value considerably (Kumar, G.V., Emilia Verghese, T., Haridas Rao, P., and Shurpalekar, S.R. 1980. Effect of heat treatment on the nutritive value of wheat germ. Journal of Food Science and Technology. Vol. 17: 256 – 258). Such processed germ can be used with advantage for the protein enrichment of processed foods.

Reference is made to Jan M. Wiker and Franklin E. Cunningham (US Patent 4421770) wherein a high protein snack food is prepared from egg protein. The drawback is the use of egg protein which not being of vegetable origin may not be suitable for all stratum of the population.

Reference is made to Jane E. Michnowski (US Patent 4543262) wherein a high protein nutritional bar fortified with vitamin and mineral was prepared. The product is extruded. The drawback of the product is its low shelf life.

Reference is made to Paul W. Hait (US Patent 4126705) wherein a dehydrated protein snack food using raw meat, poultry, fish and vegetable protein is prepared. The drawback of this disclosure is the use of meat as source of protein which might not be suitable for all stratum of the population. Reference is made to Susan E. Linscott (US Patent 4871557) wherein the granola bar contains ingredients selected from the group consisting of grains, fruits, and nuts. The drawback of the product is that it is extruded.

Reference is made to Estevez, A.M., Escobar, B., Vasquez, M., Castillo, E., Araya, E. and Zacarias, I. (1995. Cereal and Plant Foods for Human Nutrition. Cereal and nut bars, nutritional quality and storage stability. 47:309-317), wherein cereal and nut bars were made using oat, wheat germ, walnut and amaranth seed. The drawback of the product is that it is limiting in the essential amino acids lysine and tryptophan.

Objects of the invention

The main object of the present invention is to provide a composition for ready to eat health snack food and a process for the preparation thereof.

Another object of the present invention is to use a combination of vegetable protein sources such as whole wheat flour, defatted soy flour, sesame seeds, peanuts, and wheat germ along with non fat dry milk in the formulation.

Yet another object of the present invention is to use a balanced mixture of several vitamins and minerals to enhance the nutritional value of the final product.

Brief description of the accompanying drawings

Figure 1 is a flow chart of the process of the invention.

Summary of the invention

Accordingly the present invention provides a composition for ready – to- eat health snack food comprising:

- (i) Whole wheat flour (from roasted wheat) 25 to 30 wt %
- (ii) Roasted (defatted) Soy flour 8 – 13 wt %
- (iii) Peanut grits (from roasted peanuts) 8 – 12 wt %
- (iv) Roasted sesame seeds 3 – 6 wt %
- (v) Roasted wheat germ 3 – 6 wt %
- (vi) Binder 26.6 – 37.5 wt %
- (vii) Fat (M.P. 40°C) 1.5 - 5.0 wt %

- (viii) Non fat dry milk (fat content <1%) 1.0 - 4.0 wt %
- (ix) Vitamin – A 140 - 150 µg wt %
- (x) Vitamin - D 140 - 150 I.U. wt %
- (xi) Vitamin – E 0.25 - 0.35 mg wt %
- (xii) Vitamin – K 0.30 - 0.45 mg wt %
- (xiii) Thiamine (B1) 0.25 - 0.35 mg wt %
- (xiv) Riboflavin (B2) 0.28 - 0.34 mg wt %
- (xv) Nicotinic acid 2.50 - 3.50 mg wt %
- (xvi) Pyridoxine 0.30 - 0.40 mg wt %
- (xvii) Folic acid 9.00 - 11.00 µg wt %
- (xviii) Pantothenic acid 0.30 - 0.40 µg wt %
- (ixx) Vitamin – C 12.00 - 15.00 mg wt %
- (xx) Biotin 0.10 - 0.20 mg wt %
- (xxi) Inositol 0.50 - 0.70 gm wt %
- (xxii) Choline bitartrate 1.25 - 1.35 mg wt %
- (xxiii) Vitamin B12 0.30 - 0.40 µg wt %
- (xxiv) Iron 3.5 - 4.5 mg wt %
- (xxv) Zinc 7.5 - 9.5 mg wt %
- (xxvi) Copper 0.25 - 0.35 mg wt %
- (xxvii) Iodine 0.10 - 0.15 mg wt %
- (xxviii) Magnesium 0.48 - 0.58 wt %
- (xxix) Butylated Hydroxy Anisole (BHA) 10 - 15 mg wt %

(xxx) one or more additives selected from colouring agents and flavoring agents or a mixture thereof.

In one embodiment of the invention, the colour comprises sunset yellow FCF (Food grade) 10 - 12 mg wt %

In a further embodiment of the invention, the flavoring agent is present in an amount of 0.30 – 0.6 wt %

The invention also relates to a process for the preparation of a ready to eat health snack food said process comprising (i) roasting of wheat kernels in an electric roaster for a period of 10 to 20 minutes at a temperature ranging between 280 - 320°C, (ii) powdering of roasted wheat kernels in a disc mill resulting in whole wheat flour to pass through 9xx – 12xx (110µ - 140 µ) sieve, (iii) roasting of defatted soy flour in an electric roaster for a period of 5 - 12 minutes at 200 - 220°C, (iv) roasting of peanuts, sesame seeds and wheat germ,

individually, in an electric roaster for a period of 5 – 15 minutes at 280 – 320°C, (v) dehulling of roasted peanuts in a brush finisher, (vi) breaking of roasted peanuts into grits in a drum roll crusher with a gap adjustment of 2 – 5 mm, (vii) mixing fat and butylated hydroxy anisole (BHA) for a period of 5 – 10 minutes, (viii) homogenous mixing of vitamins, namely, vitamin A, vitamin D, Vitamin E, Vitamin K, Vitamin B1 (thiamine), Vitamin B2 (riboflavin), nicotinic acid, pyridoxine, folic acid, pantothenic acid, vitamin C, biotin, inositol, choline bitartrate, and vitamin B12; and minerals, namely, iron, zinc, copper, iodine and magnesium; and non fat dry milk, along with 200 – 300 g of whole wheat flour from roasted wheat for a period of 5 – 10 minutes to form vitamin and mineral premix, (ix) mixing the vitamin and mineral premix, whole wheat flour from roasted wheat, roasted soy flour, peanut grits from roasted peanuts, roasted sesame seeds, roasted wheat germ, fat-BHA blend, sunset yellow colour, and flavour for a period of 10 – 20 minutes, (x) adding a binder to the mixture obtained in step (ix) and mixing for 5 – 15 minutes to get crumbly powder, (xi) feeding the above mixture to the granulator, (xii) tableting the granulated material to get the final product, and (xiii) allowing the tablets to set for about 30 – 60 minutes.

In one embodiment of the invention commercially available soft white wheat used is with 9.3 - 10.1% moisture, 1.2 – 1.5% ash, and 9.2 to 10.0% protein content.

In yet another embodiment of the invention 3.5 – 6.5 kg wheat is roasted in an electric roaster of 10 kg capacity maintained at 290 - 310°C for 8 - 16 minutes.

In yet another embodiment of the invention roasted wheat is processed into flour in a disc mill to pass through 9xx – 12xx (110 -140 μ) sieve.

In yet another embodiment of the invention defatted soy flour is roasted in an electric roaster at 205 - 210° C for 6 – 10 minutes.

In yet another embodiment of the invention peanuts, sesame seed, and wheat germ are roasted, individually, in an electric roaster maintained at 290 - 310°C for 7 - 13 minutes.

In yet another embodiment of the invention roasted peanuts are dehulled in a brush finisher and broken into grits using a drum roll crusher with gap adjustment of 3.5 - 4.5 mm.

In yet another embodiment of the invention fat and butylated hydroxy anisole (BHA) are creamed for 6 – 9 minutes so as to thoroughly blend the components.

In still another embodiment of the invention the vitamins, namely, vitamin A, vitamin D, vitamin E, vitamin K, vitamin B1 (thiamine), vitamin B2 (riboflavin), nicotinic acid, pyridoxine, folic acid, pantothenic acid, vitamin C, biotin, inositol, choline bitartrate, vitamin B12; and minerals, namely, iron, zinc, copper, iodine and magnesium; and non fat

dry milk were mixed homogenously with 210 – 280 g whole wheat flour from roasted wheat to form vitamin – mineral premix.

In still another embodiment of the invention vitamin - mineral premix, whole wheat flour from roasted wheat, roasted soy flour, peanut grits from roasted peanuts, roasted sesame seeds, roasted wheat germ, fat-BHA blend, sunset yellow colour, and flavour are thoroughly mixed for about 12 – 18 minutes into a homogenous mixture.

In still another embodiment of the invention the binder is added to the above dry mix and mixed thoroughly for 8 – 12 minutes into a crumbly powder.

Detailed description of the invention

The feed mixture is fed to the granulator which contains a stainless steel wire mesh at the bottom. This operation results in the conversion of non uniform material to a more uniform granular substance. The granular powdery material is fed to the tableting machine. The final product obtained is in the form of tablets. Each tablet measures 4 - 6 cm squares and has a height of 0.8 - 1.2cm and weighs 23 – 27g.

The tablets are allowed to set for about 45 – 55 minutes and then packed into polypropylene pouches.

The following formulation in the range with alterations wherever required was used for the preparation of a ready to eat health snack food.

<u>Material</u>	<u>Quantity (Kg)</u>
Whole wheat flour (from roasted wheat)	25 -30
Roasted (defatted) Soy flour	8 - 13
Peanut grits (from roasted peanuts)	8 - 12
Roasted sesame seeds	3 - 6
Roasted wheat germ	3 - 6
Binder	26.6 – 37.5
(Patent support)	
Fat (M.P. 40°C)	1.5 - 5.0
Non fat dry milk (fat content <1%)	1.0 - 4.0
<u>Minerals (per 100g product)</u>	<u>mg</u>
Iron	3.5 - 4.5
Zinc	7.5 - 9.5
Copper	0.25 - 0.35
Iodine	0.10 - 0.15
Magnesium	0.48 - 0.58

Vitamin: (per 100g product)

Vitamin – A	140 - 150 µg
Vitamin -D	140 - 150 I.U.
Vitamin – E	0.25 - 0.35 mg
Vitamin – K	0.30 - 0.45 mg
Thiamine (B1)	0.25 - 0.35 mg
Riboflavin (B2)	0.28 - 0.34 mg
Nicotinic acid	2.50 - 3.50 mg
Pyridoxine	0.30 - 0.40 mg
Folic acid	9.00 - 11.00 µg
Pantothenic acid	0.30 - 0.40 µg
Vitamin – C	12.00 - 15.00 mg
Biotin	0.10 - 0.20 mg
Inositol	0.50 - 0.70 gm
Choline bitartrate	1.25 - 1.35 mg
Vitamin B12	0.30 - 0.40 µg

Antioxidant:

Butylated Hydroxy Anisole (BHA)	10 - 15 mg
Color - sunset yellow FCF (Food grade)	10 - 12 mg
Flavoring agents	as permitted under the relevant law
Production loss	0.5 - 1.0%
Yield of product per 100 kg material -	99.0 - 99.5 kg.

The different unit operations and conditions involved in the preparation of ready-to-eat health snack food using different protein sources, namely, wheat flour, soy flour, peanut grits, sesame seed, wheat germ and non fat dry milk are given in the flow chart accompanying this specification.

The binder composition comprises Jaggery - 30.0 to 35.0 wt %; crystalline citric acid - 0.015 to 0.030 wt %; Liquid glucose 0.60 to 1.20 wt %; Liquid sorbitol 1.10 to 2.10 wt %; and water 30 to 40 wt %. The binder composition and the preparation thereof are described in our copending Singapore patent application no. 200101973-6.

The following examples are given by way of illustration of the present invention and therefore should not be construed to limit the scope of the present invention.

EXAMPLE 1

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

Subjective evaluation of the product showed that it had dry mouth feel and relatively harder biting characteristics. The product had dry and dull appearance. Objective evaluation of the product showed that it had a breaking strength of 2.5 kg.

EXAMPLE 2

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Fat	3.68
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

Subjective evaluation showed that presence of fat in the formulation had imparted lubricant properties to the product while eating. The product had smoother bite and relatively soft. The product had a bright appearance. Objective evaluation showed that it had a breaking strength of 1.7 kg.

EXAMPLE 3

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Fat	3.68
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

The present experiment was conducted with out a binder in the formulation. All the formula ingredients were mixed to form a homogenous mixture but with out a binder it was not possible to get the mixed formula ingredients in tablet form.

EXAMPLE 4

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Fat	3.68
Non fat dry milk	2.10

Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

In the present experiment binder (as described in copending Singapore patent application no. 200101973-6

was included in the formulation. Binder was added to the health snack food premix and mixed to required duration of time and passed through the granulator and then to the tableting machine. During this operation the health snack food premix containing the *binder* was converted to a compact tablet form having a smooth bright surface. The tablet had a breaking strength of 1.7 kg.

EXAMPLE 5

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Fat	3.68
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardamom flavour	0.478

Experiments were conducted to determine the optimum duration of mixing time that was required to produce a homogenous mixture of the ingredients that facilitated the tableting process such that the resultant tablets had optimum surface characteristics and texture.

In the first experiment a binder prepared according to the process described in our copending Singapore patent application no. 200101973-6 was transferred to the mixer bowl containing rest of the formula ingredients. Mixing was carried out until a homogenous mass was formed. This

mass was removed from the mixer bowl and allowed to dry partially. The dried mixture was passed through the granulator and then to the tableting machine.

Subjective evaluation showed that the tablets obtained had a rough surface with dry appearance. The tablets were fragile and easily broken. The objective evaluation showed that the tablets had a breaking strength of 1.2 kg

In the second experiment the formula ingredients, after the addition of the binder, were mixed for a longer time or until a uniform mixture having a fine discrete particle size was obtained. At this stage mixing was stopped. The mixture was removed from the mixer bowl and allowed to dry partially. When the mixture was semidry it was fed to the tableting machine. The tablets obtained were compact with a smooth and bright surface. Objective evaluation showed that they had a breaking strength of 1.7 kg.

EXAMPLE 6

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Fat	3.68
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

Experiments were conducted to convert the mixed ingredients in to a more homogenous mixture prior to feeding to the tableting machine. In the first experiment the mixed ingredients were directly fed to the tableting machine without passing it through the granulator. Due to the presence of non uniform lumps in the mixture, resulting tablets were fragile. The surface finish of these tablets were dull and rough. Objective evaluation showed that they had a breaking strength of 1.2 kg.

In the second experiment the mixed ingredients were fed to the granulator. The granulator helped in breaking the lumps present in the mixed formulation. In the granulator the material was passed through a stainless steel wire mesh of suitable size situated at the bottom of the granulating roll. The above operation resulted in the conversion of a non uniform material having bigger lumps to the one having smaller and uniform granules. The tablets produced from this material were uniform in their weight and dimensions and surface finish. The objective evaluation showed that they had a breaking strength of 1.7 kg.

EXAMPLE 7

Ingredients and the quantity used in the following example are given below.

<u>Ingredient</u>	<u>Quantity (g)</u>
Whole wheat flour (from roasted wheat)	27.32
Roasted (defatted) soybean flour	11.56
Roasted peanut (as grits)	10.51
Roasted sesame seeds	4.20
Roasted wheat germ	4.20
Binder (patent support)	35.85
Fat	3.68
Non fat dry milk	2.10
Mineral mix	0.013
Vitamin mix	0.086
Sunset yellow FCF	0.003
Butylated hydroxy anisole	0.012
Cardomom flavour	0.478

Experiments were conducted to convert the powdery formulation mix into the final tablet form. In order to facilitate this, the homogenous mix obtained from the granulator was fed into the hopper portion of the tableting machine. This machine is fit with a set of punch and die assembly. The punch set has two punches of identical shape and dimension and moves to and fro inside the die. Among the two punches, one is fit into the end of ram of the machine and other to the ejector link operated by cam assembly. The operating clearance between the punch and the die is adjusted to facilitate easy flow of the material continuously for the large scale production of the tablets.

In the first experiment the formula ingredients after passing through the granulator were fed to the tableting machine. The tableting machine was fit with a set of stainless steel punch and die assembly. With the use of stainless steel punch and die set, tablet formation was

possible for the initial 5 – 10 minutes after which the material started sticking to the punch and die resulting in the production of non uniform and broken tablets. Therefore, with the above setup a continuous production of tablets was not possible.

In the second experiment the stainless steel punch and die were replaced with specially fabricated nylon punch and die set. The sample from the granulator was fed to the above machine. With the use of nylon punch and die, the ingredient mixture did not stick to the machine at any time. This facilitated a continuous large scale production of tablets which were compact and were of uniform dimension and weight and smooth surface characteristics. Further trials were conducted by feeding the formula mix to the tableting machine with nylon punch and die set.

Ready-to-eat health snack food thus prepared using specific vegetable proteins, and well balanced vitamins and minerals in the formulation has the following advantages.

1. Provides a ready-to-eat health snack food.
2. The health snack food contains proteins from vegetable sources only.
3. The health snack food provides 15g protein and 450 calories per 100 g snack food on dry weight basis.
4. The health snack food provides a well balanced mixture of fat and water soluble vitamins.
5. The health snack food provides a well balanced mixture of some of the minerals.
6. Preparation of health snack food does not require any sophisticated equipments.
7. Preparation of health snack food does not follow any cumbersome procedures.
8. Preparation of health snack food is easy and simple.

CLAIMS

1. A composition for ready to eat health snack food said composition comprising:

- (i) Whole wheat flour (from roasted wheat) 25 to 30 wt %
- (ii) Roasted (defatted) Soy flour 8 – 13 wt %
- (iii) Peanut grits (from roasted peanuts) 8 – 12 wt %
- (iv) Roasted sesame seeds 3 – 6 wt %
- (v) Roasted wheat germ 3 – 6 wt %
- (vi) Binder 26.6 – 37.5 wt %
- (vii) Fat (M.P. 40°C) 1.5 - 5.0 wt %
- (viii) Non fat dry milk (fat content <1%) 1.0 - 4.0 wt %
- (ix) Vitamin – A 140 - 150 µg wt %
- (x) Vitamin - D 140 - 150 I.U. wt %
- (xi) Vitamin – E 0.25 - 0.35 mg wt %
- (xii) Vitamin – K 0.30 - 0.45 mg wt %
- (xiii) Thiamine (B1) 0.25 - 0.35 mg wt %
- (xiv) Riboflavin (B2) 0.28 - 0.34 mg wt %
- (xv) Nicotinic acid 2.50 - 3.50 mg wt %
- (xvi) Pyridoxine 0.30 - 0.40 mg wt %
- (xvii) Folic acid 9.00 - 11.00 µg wt %
- (xviii) Pantothenic acid 0.30 - 0.40 µg wt %
- (ixx) Vitamin – C 12.00 - 15.00 mg wt %
- (xx) Biotin 0.10 - 0.20 mg wt %
- (xxi) Inositol 0.50 - 0.70 gm wt %
- (xxii) Choline bitartrate 1.25 - 1.35 mg wt %
- (xxiii) Vitamin B12 0.30 - 0.40 µg wt %
- (xxiv) Iron 3.5 - 4.5 mg wt %
- (xxv) Zinc 7.5 - 9.5 mg wt %
- (xxvi) Copper 0.25 - 0.35 mg wt %
- (xxvii) Iodine 0.10 - 0.15 mg wt %
- (xxviii) Magnesium 0.48 - 0.58 wt %
- (xxix) Butylated Hydroxy Anisole (BHA) 10 - 15 mg wt %
- (xxx) one or more additives selected from colouring agents and flavoring agents or a mixture thereof.

2. A composition as claimed in claim 1 wherein the colouring agent comprises sunset yellow FCF (Food grade) 10 - 12 mg wt %
3. A composition as claimed in claim 1 or 2 wherein the flavouring agent is present in an amount of 0.30 - 0.6 wt %.
4. A process for the preparation of ready to eat health snack food which comprises, (i) roasting of wheat kernels in an electric roaster for a period of 10 to 20 minutes at a temperature ranging between 280 - 320°C, (ii) powdering of roasted wheat kernels in a disc mill resulting in whole wheat flour to pass through 9xx - 12xx (110µ- 140 µ) sieve, (iii) roasting of defatted soy flour in an electric roaster for a period of 5 - 12 minutes at 200 - 220°C, (iv) roasting of peanuts, sesame seeds and wheat germ, individually, in an electric roaster for a period of 5 - 15 minutes at 280 - 320°C, (v) dehulling of roasted peanuts in a brush finisher, (vi) breaking of roasted peanuts into grits in a drum roll crusher with a gap adjustment of 2 - 5 mm, (vii) mixing fat and butylated hydroxy anisole (BHA) for a period of 5 - 10 minutes, (viii) homogenous mixing of vitamins, namely, vitamin A, vitamin D, Vitamin E, Vitamin K, Vitamin B1 (thiamine), Vitamin B2 (riboflavin), nicotinic acid, pyridoxine, folic acid, pantothenic acid, vitamin C, biotin, inositol, choline bitartrate, and vitamin B12; and minerals, namely, iron, zinc, copper, iodine and magnesium; and non fat dry milk, along with 200 - 300 g of whole wheat flour from roasted wheat for a period of 5 - 10 minutes to form vitamin and mineral premix, (ix) mixing the vitamin and mineral premix, whole wheat flour from roasted wheat, roasted soy flour, peanut grits from roasted peanuts, roasted sesame seeds, roasted wheat germ, fat-BHA blend, sunset yellow colour, and flavour for a period of 10 - 20 minutes, (x) adding a binder to the mixture obtained in step (ix) and mixing for 5 - 15 minutes to get crumbly powder, (xi) feeding the above mixture to the granulator, (xii) "tableting" the granulated material using a tableting machine to get the final product, (xiii) allowing the "tablets" to set for about 30 - 60 minutes' (xiv) packing the "tablets" in polypropylene pouches.
5. A process as claimed in claim 4 wherein commercially available soft white wheat used is with 9.3 - 10.1% moisture, 1.2 - 1.5% ash, and 9.2 to 10.0% protein content.
6. A process as claimed in claim 4 or 5 wherein 3.5 - 6.5 kg wheat is roasted in an electric roaster of 10 kg capacity maintained at 290 - 310°C for 8-16 minutes.
7. A process as claimed in any one of claims 4 to 6 wherein defatted soy flour is roasted in an electric roaster at 205 - 210°C for 6 - 10 minutes.

8. A process as claimed in any one of claims 4 to 7 wherein peanuts, sesame seed, and wheat germ are roasted, individually, in an electric roaster maintained at 290 – 310°C for 7 – 13 minutes.
9. A process as claimed in any one of claims 4 to 8 wherein roasted peanuts are dehulled in a brush finisher and broken into grits using a drum roll crusher with a gap adjustment of 3.5 – 4.5 mm.
10. A process as claimed in any one of claims 4 to 9 wherein fat and butylated hydroxy anisole (BHA) are creamed for 6 – 9 minutes so as to thoroughly blend the components.
11. A process as claimed in any one of claims 4 to 10 wherein the vitamins comprising vitamin A, vitamin D, vitamin E, vitamin K, vitamin B1 (thiamine), vitamin B2 (riboflavin), nicotinic acid, pyridoxine, folic acid, pantothenic acid, vitamin C, biotin, inositol, choline bitartrate, vitamin B12; and minerals, namely, iron, zinc, copper, iodine and magnesium; and non fat dry milk were mixed homogenously with 210 – 280g whole wheat flour from roasted wheat to form vitamin – mineral premix.
12. A process as claimed in any one of claims 4 to 11 wherein vitamin – mineral premix, whole wheat flour from roasted wheat, roasted soy flour, peanut grits from roasted peanuts, roasted sesame seeds, roasted wheat germ, fat-BHA blend, sunset yellow colour, and flavour are thoroughly mixed for about 12 – 18 minutes into a homogenous mixture.
13. A process as claimed in any one of claims 4 to 12 wherein the binder is added to the above dry mix and mixed thoroughly for 8 – 12 minutes into a crumbly powder.
14. A ready to eat health snack food prepared in accordance with a process of any one of claims 4 to 13.
15. A ready to eat health snack food including a composition according to any one of claims 1 to 3.

A READY-TO-EAT HEALTH SNACK FOOD AND A PROCESS FOR THE PREPARATION THEREOF

ABSTRACT

The present invention provides a composition for ready to eat health snack food comprising (i) Whole wheat flour (from roasted wheat) 25 to 30 wt %; (ii) Roasted (defatted) Soy flour 8 – 13 wt %; (iii) Peanut grits (from roasted peanuts) 8 – 12 wt %; (iv) Roasted sesame seeds 3 – 6 wt %; (v) Roasted wheat germ 3 – 6 wt %; (vi) Binder 26.6 – 37.5 wt %; (vii) Fat (M.P. 40°C) 1.5 – 5.0 wt %; (viii) Non fat dry milk (fat content <1%) 1.0 – 4.0 wt %; (ix) Vitamin – A 140 – 150 µg wt %; (x) Vitamin – D 140 – 150 I.U. wt %; (xi) Vitamin – E 0.25 – 0.35 mg wt %; (xii) Vitamin – K 0.30 – 0.45 mg wt %; (xiii) Thiamine (B1) 0.25 – 0.35 mg wt %; (xiv) Riboflavin (B2) 0.28 – 0.34 mg wt %; (xv) Nicotinic acid 2.50 – 3.50 mg wt %; (xvi) Pyridoxine 0.30 – 0.40 mg wt %; (xvii) Folic acid 9.00 – 11.00 µg wt %; (xviii) Pantothenic acid 0.30 – 0.40 µg wt %; (ixx) Vitamin – C 12.00 – 15.00 mg wt %; (xx) Biotin 0.10 – 0.20 mg wt %; (xxi) Inositol 0.50 – 0.70 gm wt %; (xxii) Choline bitartrate 1.25 – 1.35 mg wt %; (xxiii) Vitamin B12 0.30 – 0.40 µg wt %; (xxiv) Iron 3.5 – 4.5 mg wt %; (xxv) Zinc 7.5 – 9.5 mg wt %; (xxvi) Copper 0.25 – 0.35 mg wt %; (xxvii) Iodine 0.10 – 0.15 mg wt %; (xxviii) Magnesium 0.48 – 0.58 wt %; (xxix) Butylated Hydroxy Anisole (BHA) 10 – 15 mg wt %; (xxx) one or more additives selected from colouring agents and flavoring agents or a mixture thereof.

Figure 1