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(30) Priority Data <table border="1"> <thead> <tr> <th>(33) Country</th> <th>(31) Number</th> <th>(32) Date</th> </tr> </thead> <tbody> <tr> <td>IN</td> <td>617/BOM/99</td> <td>06/09/1999</td> </tr> </tbody> </table>	(33) Country	(31) Number	(32) Date	IN	617/BOM/99	06/09/1999	(72) Inventors KULKARNI Sadguru, Manmohan Hindustan Lever Limited, Hindustan Lever House, 165/166 Backbay Reclamation, 400 020 Mumbai, Maharashtra, India. PRAMANIK Amitava, Hindustan Lever Limited, Hindustan Lever House, 165/166 Backbay Reclamation, 400 020 Mumbai, Maharashtra, India.
(33) Country	(31) Number	(32) Date					
IN	617/BOM/99	06/09/1999					
(84) Designated State KE TZ ZW	(74) Representative FISHER CORMACK & BOTHA, P O Box 74, Blantyre, MALAWI						

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(54) Title

Improved process for maintaining the stability of the fortification.

(57) Abstract

A food component, in particular sodium chloride, fortified with iodine. Loss of the iodine during cooking and/or storage is reduced by entrapping it in a matrix of inorganic salts such as carbonates and/or silicates of bipoisitive and tripositive metal ions.

(56) Documents Cited :

GB 77 44444 A US 5 707 670 A CN 117 2608 A

IMPROVED PROCESS FOR MAINTAINING THE STABILITY OF THE FORTIFICATION

Technical Field:

The present invention relates to a synergistically fortified food components, particularly but not exclusively, sodium chloride or common salt. The present invention also relates to a process of making a bioabsorbable form of iodine relatively cold or hot water insoluble and temperature stable while minimising its volatile loss during storage.

Background and Prior art:

Sodium Chloride or common salt is an ingredient generally used in cooking and approximately 5 million tons is the annual human consumption in India. Iodine is one of the three most essential but normally deficient micro-nutrients and the easiest and most inexpensive method of delivery of the same through food was found to be iodization of common salt. Hence, iodization of salt is a statutory requirement for all edible salt manufactured in India. This requirement is mainly to control the iodine deficiency disorders. Salt is iodized by spraying potassium iodate solution on salt. However, this process does not ensure the stability of iodine. During manufacture, storage and especially cooking the loss of iodine is very high.

Fortification of sodium chloride with iodine is known and such fortified salt is available in the market. However, the stability of iodine in such fortified salt during cooking and storage is not completely eliminated and hence the loss of iodine is quite significant.

It is the basic object of the present invention to provide synergistically fortified food components with material which is bioabsorbable and stable under cooking such as sodium chloride composition comprising 0.15 to 30% entrapped iodine.

Another object of the present invention to provide a process of preparing a source of iodine that is temperature and storage stable. It is soluble only under highly acidic conditions and where volatile iodine loss is minimised.

It is another object of the present invention to fortify food components such as sodium chloride with an iodine rich material that is bioabsorbable and stable under cooking conditions.

Thus according to the basic object of the present invention there is provided a synergistically fortified food component entrapped in a matrix of inorganic salts selected from carbonates and/or silicates of bipoisitive and tripositive metal ions with or without other alkali metal carbonates and/or silicates.

The invention thus provides for iodine entrapped in a matrix of inorganic salts such as carbonates and/or silicates of bipoisitive and tripositive metal ions such that the iodine is protected during cooking and storage but is bioabsorbable.

The present invention thus further provides a fortified food component for e.g. sodium chloride composition comprising 0.15 to 30% entrapped iodine.

According to another aspect of the present invention there is provided a process of obtaining iodine entrapped in a matrix comprising:

- i. mixing carbonates and/or silicates of at least one bipoisitive metal ion and at least one tripositive metal ion in presence of water and optionally other alkali metal carbonates and/or silicates;

- ii. drying or heating the said mixture at a temperature range of 300 to 700°C;
- iii. mixing the dried mixture of step (ii) at least once with solution of an iodine salt, such that the ratio of Iodine to mixture of step (ii) is 3 to 450%.

According to a preferred aspect of the present invention there is provided a process of obtaining iodine entrapped in a matrix comprising:

- i. mixing carbonates and/or silicates of at least one bipoisitive metal ion selected from magnesium and/or zinc and at least one tripositive metal ion selected from aluminum and/or iron in presence of water and optionally other alkali metal carbonates and/or silicates;
- ii. drying or heating the said mixture at a temperature range of 300 to 700°C and cooling it to a temperature below 200°C;
- iii. mixing the dried mixture of step (ii) at least once with solution of an iodine salt, such that the ratio of Iodine to mixture of step (ii) is 15 to 300%
- iv. separation of the solid from the slurry and optionally washing and drying the material to a moisture level < 5%.

Detailed description of the invention:

The invention essentially utilizes a process of entrapping iodine in a matrix of inorganic salts commonly used in salt as flow aids, such that the iodine is protected during cooking and storage but is bioabsorbable.

The iodine salt may be selected from alkali and alkaline earth metal iodides, iodates, periodates or a mixture thereof. Examples of such compounds are sodium, potassium, calcium, magnesium or aluminum salts of iodides, iodates or periodates. The most preferred compounds are potassium iodide or potassium iodate. The iodine salt is

preferably introduced as an aqueous solution. It is preferred to mix the treated layered double hydroxides into the solution of the iodine salt.

The preferred ratio between the dried inorganic salt matrix and the iodine salt is 0.3 to 3.0.

After the mixing of the dried mixture of inorganic salts into the solution of the iodine salt, the solid is separated from the slurry preferably by filtration or centrifugation. The wet cake is washed well with cold or hot water and the material is dried to a moisture level < 5%.

It is generally preferable to fortify salt by this material and the level at which it is fortified ranges from 0.01 to 2%. The incorporation of the material into salt is done preferably by sequential dilution to ensure homogeneous mixing.

The invention will now be demonstrated with reference to the following non-limiting examples.

EXAMPLES:

Example 1:

Process for entrapping iodine:

A freshly prepared aqueous slurry mixture of 8 g of magnesium carbonate and 2 g of aluminum silicate was dried at 450°C for 2 hours. This material was mixed with 100 ml of 8% potassium iodate solution and mixed at 25°C for 8 hours. The solid material was filtered and washed repeatedly with distilled water and dried at 110°C for 4 hours. The

material thus obtained has entrapped Iodate (EI) and the presence of Iodate was determined by iodometric titration with standard thiosulphate solution.

Properties of the Material:

1. Cold or Hot water stability:

100 mg of the material (EI) was slurried in water at a temperature of 25 °C and 100 °C for 30 minutes. The solid was separated by filtration and tested for the presence of Iodate which was determined by iodometric titration with standard thiosulphate solution. A replicated test was conducted and the data analysed statistically.

Table 1

	Initial	25 °C	100 °C
% Iodate in solid	20	19.8	18.0

The data presented in Table 1 shows that there is no significant change in the level of iodate in the solid even after cold or hot water treatment. The conventional iodate salt used to fortify sodium chloride i.e potassium iodate of corresponding amount (100 mg) would be fully soluble in both cold and hot water.

2. Acid solubility:

Hydrochloric acid solution at different pH in the range 7 to 3 was prepared by taking required amounts of the acid in water. 100 mg of the material (EI) was slurried in 100 ml of the pH solutions and stirred for 30 minutes. The solution was analysed for iodate release in the solution by iodometric titration with standard thiosulphate solution.

Table 2

PH of the solution	% Release of iodate from EI
7.0	1.5
6.0	8.0
5.0	28.0
4.0	65.0
3.0	100.0

The data presented in table 2 shows that the iodine is released significantly only when the material is treated with low pH solutions even when the material was under stirring.

3. Storage stability:

Non-iodised common salt or Sodium chloride was fortified with the material (EI) to obtain 30 ppm iodine in salt. The material was stored at 30 °C and 75% relative humidity for upto 3 months. 20g of the sample was periodically tested at an interval of 1 month. The salt was dissolved in 100 ml water and iodate in the solution was determined by iodometric titration with standard thiosulphate solution. It was seen that there was no loss of iodine upto 3 months.

CLAIMS

1. Iodine entrapped in a matrix of carbonates and/or silicates of bipoisitive and tripositive metal ions.
2. Food component fortified by 0.01 to 30%, preferably 0.15-2%, entrapped iodine, wherein the iodine is entrapped according to claim 1.
3. Food component according to claim 2, wherein the food component comprises salt, sugar, flour, or mixtures thereof.
4. Process for obtaining iodine entrapped in a matrix comprising:
 - a. mixing carbonates and/or silicates of at least one bipoisitive metal ion and at least one tripositive metal ion in presence of water and optionally other alkali metal carbonates and/or silicates;
 - b. drying or heating the mixture obtained under (a) at a temperature of 300° to 700°C;
 - c. mixing the dried mixture of step (b) at least once with solution of an iodine salt, such that the ratio of iodine to mixture of step (b) is 3 to 450%.
5. Process for obtaining iodine entrapped in a matrix comprising:
 - a. mixing carbonates and/or silicates of at least one bipoisitive metal ion selected from magnesium and/or zinc and at least one tripositive metal ion selected from aluminium and/or iron in presence of water and optionally other alkali metal carbonates and/or silicates;
 - b. drying or heating the mixture obtained under (a) at a temperature of 300° to 700°C and cooling it to a temperature below 200°C;
 - c. mixing the dried mixture of step (b) at least once with solution of an iodine salt, such that the ratio of iodine to mixture of step (b) is 15 to 300%;
 - d. separation of the solid from the slurry and optionally washing and drying the material to a moisture level of <5%.
6. Process according to claim 4 or 5, wherein the iodine salt is selected from the group of alkali and alkaline earth metal iodides, iodates, periodates, and mixtures thereof.
7. Process according to claim 6, wherein the iodine salt comprises potassium iodide or potassium iodate.
8. Process according to claim 4-7, wherein the ratio between the dried inorganic salt and the iodine salt is 0.3 to 3.0.

ABSTRACT

A food component, in particular sodium chloride, fortified with iodine. Loss of the iodine during cooking and/or storage is reduced by entrapping it in a matrix of inorganic salts such as carbonates and/or silicates of bipoisitive and tripositive metal ions.