

FOOD ADDITIVE SLURRY COMPOSITIONS AND POWDER COMPOSITIONS AND FOOD COMPOSITIONS CONTAINING THE SAME

TECHNICAL FIELD

The present invention relates to a food additive slurry composition and food additive powder composition having a high concentration and excellent dispersion stability in liquid, which is effectively utilized by adding to foods such as yogurt, cow's milk, juice and milk powder, instant noodles, biscuits, etc., to enrich calcium and/or magnesium, and a food composition containing the food additive slurry or powder composition.

BACKGROUND ART

Recently, the shortage of ingestion of calcium is often pointed out and this phenomenon is notable in growing children and aged persons. In order to solve the shortage of calcium ingestion, calcium-enriched foods have come to be sold. Even in cow's milk which is generally said to have a high content of calcium, it has been attempted to sell a calcium-enriched cow's milk by further adding calcium. Further, other calcium-enriched products such as juice and milk powder, instant noodles, biscuits, etc., are started to be sold.

For example, in cow's milk and yogurt, a water-soluble inorganic acid form or organic acid form calcium such as calcium lactate and calcium chloride, a water-difficultly soluble inorganic form calcium such as calcium carbonate and calcium phosphate are used.

However, the water-soluble inorganic acid form or organic acid form calcium are liable to damage the stability of proteins contained in cow's milk and yogurt and thus they have a disadvantage that it is difficult to add more than a given level to thus prevent a large amount of use as materials of calcium.

On the other hand, the water-insoluble calcium in an inorganic form does not damage the stability of proteins contained in cow's milk and yogurt due to water-insolubility and thus it can be used in a large amount. The calcium in an inorganic form generally has, however, a high specific gravity of 2.7 or more and thus when said calcium is dispersed in cow's milk, it precipitates in a short time to undesirably lower the beauty in appearance. As a result, it has a disadvantage that it can not be used in a large amount.

Many methods for adding a large amount of calcium to foods have been heretofore proposed. For example, as a method for preparing a slurry of a calcium agent in an inorganic form, Japanese Patent Non-examined publication (Kokai) No. 64-69513 proposes a method for improving dispersibility of calcium carbonate by irradiating supersonic wave to a calcium carbonate slurry which was not subjected to drying and pulverization in the production step or to a mixture of the calcium carbonate slurry and a hydrophilic emulsifier with an HLB of not less than 10.

In Example 2 of this publication, a preparation method of a calcium agent slurry having approximately 8% by weight of a solid content of calcium carbonate by irradiating supersonic wave to a mixture of a 10% by weight of calcium carbonate slurry and an aqueous solution of approximately 6% by weight of sucrose fatty acid ester of the HLB 15.

However, with such a low concentrated calcium carbonate of 8% by weight or so obtained by this method, though a calcium agent having a good dispersibility can be obtained, it is difficult to prepare a calcium agent slurry having an

average particle size of less than 0.3 μm which is excellent in dispersibility and applicable to foods being stored for a long period of time such as long-life cow's milk, and even when prepared, energy cost required for dispersion unavoidably increases. Moreover, not only an increase in energy cost, but circulation costs such as containers of the calcium agent slurry, cold storage equipment, cold storage, and transportation increase and thus it is not a preferable method.

Further, Japanese Patent Non-examined Publication (Kokai) No. 6-127909 discloses a method for preparing a calcium phosphate dispersion by wet-pulverizing a mixture of a sucrose stearic acid ester with the HLB 16 and calcium phosphate under the specific conditions, and Japanese Patent Non-examined Publication (Kokai) No. 6-127939 discloses a method for preparing a calcium carbonate dispersion by wet-pulverizing a mixture of a sucrose stearic acid ester with the HLB 16 and calcium carbonate in the similar manner.

According to these methods, though it is possible to prepare a calcium agent slurry of an average particle size of less than 0.3 μm having a good dispersibility, the solid concentration of a calcium agent slurry proposed is only approximately 10% by weight at highest, and are also included the problems associated with equipment cost and circulation cost, as in the case of the method proposed by the above-mentioned Japanese Patent Non-examined Publication (Kokai) No. 64-69513.

Moreover, Japanese Patent Non-examined Publication (Kokai) No. 9-9919 proposes a method for improving dispersibility by adding to calcium carbonate at least one selected from the group consisting of phospholipid and protein decomposition products, followed by wet-pulverizing. However, the product obtained by this method includes the problems in flavor such as odor and bitterness. Moreover, according to this publication, since the calcium dispersion liquid obtained contains calcium carbonate of an average particle size of 1 to 3 μm , a cow's milk added with calcium obtained by this method is poor in recovery of calcium carbonate in a centrifugal separator such as a clarifier used in the production step, the precipitation tends to take place in foods such as cow's milk and thus it is not suited for foods being stored for a long period of time such as long-life cow's milk.

Furthermore, Japanese Patent Non-examined Publication (Kokai) No. 6-197736 proposes a method for preparing a dried powder by drying by the use of a drying machine such as a spray dryer a calcium agent slurry comprising a mixture of a sucrose stearic acid ester with the HLB 16 and calcium phosphate or calcium carbonate. However, the solid concentration of a calcium agent of a calcium agent slurry as the material to be dried is as low as approximately 10% by weight and thus there are also included the problems to be improved from the viewpoint of a drying energy cost and an investment cost in a drying equipment.

Moreover, WO 98-42210 proposes a highly concentrated food additive slurry composition and/or powder composition which comprises mixing at least one selected from calcium carbonate, calcium phosphate and ferric pyrophosphate, and gum arabic, and further a food composition containing the same. However, the gum arabic used in this method is a natural product and thus its cost had extremely increased, in the past, due to the reduced production caused by a natural disaster. In addition, since it is an imported product, it is often difficult to obtain by an influence of the world situation. Accordingly, there was a problem in respect of a stable supply of cheap products.

In recent years, with a development of containers being stored for a long period of time for cow's milk, yogurt, juice