Low-fat stabilization of peanut butter and vegetable kernel butters

Identification

Key words  
vegetable butters, oil separation, stabilizer, additive, peanut, vegetable kernel

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How does it work?

Primary objective  
Method of producing a reduced fat peanut butter and vegetable kernel butters. Stabilization of natural peanut butter and other seed or nut butters (vegetable kernel butter) against oil separation over an acceptable shelf life time.

Working principle  
If it is stored at room temperature without a suitable stabilizer (conventionally a fat which is solid at room temperature), natural peanut butter and other nut butters are not stable and separate into its component parts. There are some new, low-fat stabilizers used to gravitationally stabilize peanut butter: • Silicon dioxide prevents or retards spontaneous separation of the peanut oil and the ground peanut solids. • The propylene glycol, when added to peanut butter and other nut butters at a concentration ranging between approximately 0.25% and 5% by weight (preferably between 0.4% and 1.5% by weight), can reduce or prevent peanut oil separation and the separation of other vegetable kernel oils from the kernel solids in the butters indefinitely. The mechanism of propylene glycol stabilization of peanut butter and other nut butters remains somewhat of a mystery. • Chitosan to stabilize the oily and proteinaceous phases of peanut butter. The oil phase is blended with the proteinaceous phase and a quantity of water is added to the blend, thereby gravitationally stabilizing the peanut butter such that the oil and proteinaceous phases will not separate even after prolonged standing. • Hydrogenated edible oil and a concentrated monoglyceride is suitable for preventing the separation of oils from peanut butter during storage.

Important process parameters

Additional effects  
Used either alone or in combination with conventional hard fat-based stabilizers of peanut butter and other vegetable kernel butter stabilizers, can modify the texture as well. For propylene glycol, a pleasant slightly sweet after taste can be detected for levels of approximately 0.8% by weight.
**Important product parameters**

<table>
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<tr>
<th>Stabilizer concentration:</th>
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<td><strong>Propylene glycol</strong>: at concentrations above 0.6%-0.7%, the percentage of oil stabilized by the propylene glycol rises drastically to nearly 100%. Microparticulate silica, and in particular, fumed silica: at levels of approximately 2.0% by weight or less, are effective in stabilizing a wide variety of ground seed and nut butters. Chitosan: preferably added to the oil phase to a concentration in the mix of 0.5-3.0%. The fatty acid (oleic, linoleic, palmitic, stearic or linolenic acid) is added to the mix to a preferable final concentration of 0.1-0.6%, by weight. The amount of water that should be added will vary somewhat, depending upon the moisture content of the natural peanut butter starting material; generally, water should be added to a concentration of the added water in the amount 0.2-2.0%, by weight, and most preferably to about 0.4%, by weight. Hydrogenated edible oil (an Iodine Value of less than 10) and a concentrated monoglyceride (Iodine Value between 15 and 70) in a weight ratio between 9:1 and 1:9 can be used to peanut butter (Patent US 6447833, 2002).</td>
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**What can it be used for?**

**Products**
- Natural butters
- Reduced-fat peanut butters
- Foods incorporating peanut butter and other vegetable kernel butters (peanut butter cracker sandwiches, candies, and baked goods)
- Biscoff Spread called “Europe’s alternative to peanut butter”

**Operations**
- Stabilization

**Solutions for short comings**
- Prevent the peanut oils and other vegetable kernel butters from separating from the product.

**What can it NOT be used for?**

**Products**
- Can not be used in organic peanut and other vegetable kernel butters.
  - "Natural" or "Traditional-Style" peanut butters differ primarily because they do not contain a stabilizer, and consumers often refrigerate these types of peanut butter to avoid oil separation.

**Operations**
- Several-pass process can heat up peanut or vegetable kernels paste to excessively high temperatures which destroy flavor notes desired in the ultimate butter product. This high-temperature effect can only be overcome by utilizing elaborate cooling methods.

**Other limitations**
- Peanut butter is defined by different standards in countries.

**Risks or hazards**
- Peanut is a known food allergen (More details can be found on DS:Food allergens reactivity as affected by thermal processing; please check: “Food Allergen Labeling and Consumer Protection Act of 2004”)

**Implementation**

**Maturity**
- Already patents on the local markets

**Modularity**
- Implementation

**Consumer aspects**
- Recent consumer concern over the addition of hydrogenated oils to various products including peanut butter, but some consumers prefer the stabilizers, which help maintain peanut butter freshness.
- A peanut butter based food called “plumpy’nut” is applied to fight malnutrition amongst the populace of countries struck by famine.
Legal aspects

Manufacturers add small quantities (1-2%) of hydrogenated vegetable oils to peanut butter as stabilizers to prevent oil separation during handling and storage. The FDA states that “artificial flavorings, artificial sweeteners, chemical preservatives, added vitamins, and color additives are not suitable ingredients of peanut butter”. Chitosan has been previously used as a food additive and in pharmaceutical preparations to reduce the absorption of lipids.

Environmental aspects

Not known

The manufacturing of peanut butter and other vegetable kernel butters does not cause any pollution and hence does not require any precautionary steps to be taken for pollution control.

Facilities that might be interesting for you

<table>
<thead>
<tr>
<th>Title</th>
<th>Institute/company</th>
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<tr>
<td>HP homogenizer GEA KU Leuven</td>
<td>KU Leuven LFT</td>
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<tr>
<td>UIP1000hd Ultrasonic Processor - TTZ</td>
<td>TTZ</td>
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Further Information

Institutes

The Peanut-Institute

Companies

Unilever, Cargill, Archer-Daniels-Midland Company, Biscoff, The Procter & Gamble, Small Industries Service Institute Kolkata

References

1. [Peanut Institute], 2005
2. www.kraftfoods.com
6. Patent US 5962064

Source: