

# Peanut Butter

## Description

Peanut butter is a creamy spread, mainly composed of peanut paste and stabilizer. It may also contain sweetener, salt, emulsifier and other ingredients. Government standards (Title 21, 164.150) require that seasoning and stabilizing ingredients must not exceed 10% of the weight of the finished food, and the fat or oil content shall not exceed 55% of the product. The use of artificial flavorings and sweeteners, chemical preservatives, as well as color and vitamin additives are not allowed.

Differences in manufactured peanut butter reflect variations in product formulations and processing conditions. A typical peanut butter would consist of:

90%	peanut paste
1-5%	hydrogenated vegetable oil
1-6%	sweetener
1-1.5%	salt
0.5-1.5%	emulsifier

The peanut paste would contain about one percent moisture. The stabilizers are partially or completely hydrogenated natural fats such as peanut, corn, cottonseed, linseed, palm, rapeseed or marine oils. The sweeteners may be sucrose, dextrose, fructose, honey, molasses or corn syrup. A peanut butter composition may also contain emulsifiers, such as lecithin or fatty monoglycerides, which negate stickiness in the product.

Before the peanuts are ground, the continuous phase consists of carbohydrates, protein and other non-fat components. The fat cells are entrapped in the non-fat components, forming the discontinuous phase.

After the peanuts are ground into paste and the fat cells ruptured, the fat becomes the continuous phase and the non-fat constituents, as small particles, form the discontinuous phase.

Once the peanut paste is formed, the continuous phase or fat (peanut oil) will separate from the non-fat particles. In order to prevent this separation, stabilizers are added to the paste. These hydrogenated oils, unlike natural peanut oil, are crystalline at room temperature and are dispersed into the product, so that they are completely mixed with the natural peanut oil. When the peanut butter is cooled from processing temperatures, the added fat crystallizes throughout the product to entrap the natural oil before separation can occur. Without the addition of stabilizers the oil will separate even after homogenization, because the oil is the continuous phase and is not emulsified in the paste.

**Objective**

The homogenizer would be used in the processing of peanut butter to bring about physical changes in the product. Patent 3,169,207 states that the homogenizer can reduce the particle size of the non-fat portion of the peanut paste. Typical grinding machines, which include colloid mills, attrition mills, disintegrators and hammer mills, will also reduce these particles; but the paste would have to be put through the mill more than once to obtain a fine grind. Several passes through a mill can heat up the peanut paste to excessively high temperatures, which can destroy flavor quality and would require elaborate cooling methods. The homogenizer is capable of producing a fine-grind paste without resorting to multiple passes through a grinder.

**Equipment and Processing**

The preparation of peanut butter involves several steps. First, the shelled peanuts, which may consist of a blend of different types, are dry roasted at about 200°C for 20 to 30 minutes. The roasting removes moisture and affects the color and flavor of the peanut. During roasting the peanut skins can soak up as much as 27% of the peanut oil. After roasting, the peanuts are quickly cooled to 100°F and then blanched; that is, treated with water or heat to separate the product into the testa (red skin), germ (small hearts) and cotyledons (peanut halves or split peanuts).

After blanching, the peanuts are inspected, and the scorched and rotten nuts and foreign material are removed. Next, the peanuts are ground into paste. It is during the grinding process that various ingredients, including melted stabilizers, are added. From this point on, the product is kept under an inert gas, such as nitrogen, to protect it from the deleterious effects of oxygen.

After cooling to 85-110°F in a scraped surface heat exchanger, the peanut butter is packaged and stored at about 50°F. The filled containers are left undisturbed for about 48 hours, so that crystallization throughout the mass is complete. Improper cooling and storage can cause cracking or shrinking of the peanut butter.

Variations in peanut butter can be made by changing the temperature and the duration of roasting, fineness of grind, type(s) of peanuts selected and the amount and kind of added ingredients.

Patent 3,619,207 indicates that high pressure homogenization, after initial grinding, produces a paste that is smoother, glossier, melts more rapidly in the mouth than conventional peanut butter and has acceptable stickiness characteristics. More peanut skins can be incorporated into homogenized peanut butter, because they are reduced to such a degree that they are not readily visible in the final product. However, increasing this quantity may require the use of more sweetener in the formulation, due to the bitter taste normally associated with large amounts of peanut skins. The added ingredients are blended into the peanut paste, either before or after homogenization. It would seem that a preferred method would be to add the stabilizers after homogenization, so that the paste going to the homogenizer would have the lowest possible viscosity. Likewise, the temperature of the paste to the homogenizer should be high enough to reduce viscosity without exceeding acceptable product temperatures. The temperature rise in peanut butter processed in the homogenizer is estimated to be about 6°F per 1000 psi, and this should be considered when setting the temperature of the in-feed paste.

In recent years, peanut butter producers have introduced reduced-fat peanut butter. These reduced-fat peanut spreads provide the consumer with peanut butter containing 25% to 35% less fat. However, reduced-fat peanut butter may be gritty or have increased stickiness. Protocols to reduce grittiness while maintaining fluidity have been investigated. Processing peanut butter to reduce particle size may reduce stickiness and grittiness of the product. "The effect of particle size on the stickiness of the peanut butter relates to how the fat distributes itself around the solid particles." (see reference Lima, et. al.). The homogenizer is a means of affecting the particle size of peanut butter and may enhance reduced-fat peanut butter.

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