

PEANUT AND NUT BUTTER

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Probably one of the most popular snacks, if not, in some cases, almost the total diet, of many youngsters and adults is peanut butter. Peanut butter is not only found as a condiment, but is sandwiched in crackers, combined with chocolate, sold as “chips” for cookies, and in numerous other foods including cereals, pancakes, breads, soups, stews, and sauces.

Historically, the Chinese have steamed peanuts or crushed them into sauces, Africans have used them in stews, and American civil war soldiers dined on “peanut porridge”.

George A. Bayle, Jr., encouraged by a St. Louis physician, in 1890, mechanized the physician’s process of grinding peanuts in a hand-cranked meat grinder to create a peanut paste as a substitute for people with poor teeth who could not chew meat. Bayle sold his peanut butter out of barrels. About the same time, Dr. John Harvey Kellogg, in Battle Creek, Michigan, and his brother W. K. Kellogg, used peanut butter as a vegetable source of protein for patients at their Battle Creek Sanitarium in addition to their later famous corn flakes cereal. The Kelloggs’ opened the Sanitas Nut Company which supplied natural foods such as peanut butter. In 1895, they received a patent for the “Process of Preparing Nut Meal”, a pasty “nut butter” made from steamed peanuts.

Peanut butter was introduced to the world at the Universal Exposition of 1904 in St. Louis by C. H. Sumner. In 1908, Crema Products Co., in Columbus, Ohio, began selling peanut butter. Because the peanut butter spoiled quickly, Benton Black, the founder of the company refused to sell his peanut butter outside of Ohio. The first shelf-stable peanut butter was made in 1922 by Joseph L. Rosefield, in California, by churning the peanut butter so that the oil did not separate from the mixture. That process, patented by Rosefield, was adopted by Swift & Company for its E. K. Pond peanut butter, later renamed Peter Pan in 1928. After a dispute with Peter Pan in 1932, Rosefield produced his own brand, Skippy, in 1933 and created the first crunchy style peanut butter in 1935. Proctor & Gamble acquired W. T. Young Foods, of Lexington, Kentucky, in 1955 and renamed their Big Top Peanut Butter to Jif in 1958.

Nut butters are not limited to peanuts and many variations such as almond, cashew, pistachio, and brazil nut butters can be found in stores today.

Materials Needed

- peanuts, raw (Use either whole peanuts in the shell or shelled peanuts)
- oil, vegetable oil or peanut oil
- salt, sodium chloride, NaCl
- Lecithin
- mortar and pestle, porcelain (glass mortar and pestles do not work well for this experiment)
- aluminum foil baking cups or pans (Large enough to hold a measured quantity of peanuts in a single layer. Alternative: make your own pans out of heavy duty aluminum foil.)
- measuring cup (1/4, 1/2, and/or 1 cup quantities)
- measuring spoons (1/8 tsp., 1/2 tsp., 1 tsp., and 1 Tbs.)
- rubber spatula

oven (a toaster oven was used in developing this experiment)
containers to hold the peanut butter (small aluminum foil pans or plastic cups)
optional: blender
optional: peanut butter machine

For tasting and taste comparison:
Bread or crackers
Plastic knives or spreaders
Commercial peanut and/or nut butter

Safety

Safety glasses or goggles must be worn in the laboratory at all times.

CAUTION – HEALTH HAZARD: This procedure involves burning nuts. If you are allergic to nuts, or have any severe food allergies, inform your instructor immediately so that you may be excused from this experiment. Do not stay in the laboratory.

If this experiment is performed in a chemistry laboratory, all work surfaces must be cleaned and free from laboratory chemicals. After cleaning work surfaces, it is advised to cover all work areas with aluminum foil or a food-grade paper covering.

All glassware and apparatus must be clean and free from laboratory chemicals. Use only special glassware and equipment, stored away from all sources of laboratory chemical contamination, and reserved only for food experiments is recommended.

There are no safety hazards associated with the materials used in this experiment.

Disposal

Generally, all waste materials in this experiment can be disposed in the trash or poured down the drain with running water. All disposal must conform to local regulations.

Procedure

It is suggested that students work in teams, each member or group works on a different sample and results are pooled.

Preheat the oven (or toaster oven) to 150°C (300°F) if shelled peanuts are used or 177°C (350°F) if peanuts in the shell are used.

Measure 40 to 45 g (1/4 cup) of shelled peanuts (or 1/2 cup of peanuts in the shell) into a small aluminum foil pan.

Bake the peanuts in the oven. One group should bake the peanuts for 20 minutes, one for 30 minutes, and one for 40 minutes.

After baking, remove the peanuts and allow them to cool for about 5 minutes.

Remove any shells and skins from the peanuts and discard them.

Reserve several peanuts from each baking batch for comparison. Note differences in color, odor, and, lastly, flavor.

Place the peanuts (about 1/4 cup) into a mortar and grind them with the pestle to form a very fine powder. The powder will most probably be sticky due to the peanut oil melting and coating the particles.

Add 1/8 tsp. of vegetable or peanut oil and continue to grind and blend it into the peanut powder. Grind and blend well. Continue to add oil in 1/8 tsp. quantities, grinding and blending well until you obtain a smooth consistency. (You will need a total of 1/2 to 3/4 tsp. of oil. Do not exceed a total of 1tsp. oil without checking with your instructor.) If desired, add salt in small quantities, mixing well after each addition, until the desired level of flavor is achieved.

At least one group will be asked to add 1 g (1/4 tsp) Lecithin to their peanut-oil mixture while grinding it. Do not add any Lecithin unless you are specifically instructed to do so.

Compare the peanut butters from each of the baking batches for color, flavor, and texture.

Compare the color, flavor, and texture of at least one commercial peanut butter.

Spread the peanut butter on bread or crackers and enjoy it.

Nut Butters:

Nut butters can be made from a variety of nuts such as cashews, almonds, and pecans. Seeds, such as sunflower and pumpkin can also be used. Sesame seeds are commonly used to make a nut butter known as tahini.

Use approximately 1/4 cup of nuts (about 50 g).

If the nuts used are raw, bake them in a preheated oven (or toaster oven) at a temperature of 177°C (350°F). If desired, one group can bake the nuts for 20 minutes, one for 30 minutes, and one for 40 minutes. If only one group is performing this procedure, bake the nuts for 30 minutes. (Watch the nuts during the baking process. Take care not to burn the nuts.)

After baking, remove the nuts from the oven and allow them to cool for about 5 minutes.

If several batches of nuts were baked at different temperatures, reserve several nuts from each baking batch for comparison. Note differences in color, odor, and, lastly, flavor.

Place the nuts (about 1/4 cup) into a mortar and grind them with the pestle to form a very fine powder. The powder will most probably be sticky due to the nut oils melting and coating the particles.

After grinding the nuts or seeds into a powder, add oil in small quantities, such as 1/8 tsp., and continue to grind and blend until a smooth butter is obtained. (You will need a total of 1/2 to 3/4 tsp. of oil. Do not exceed a total of 1tsp. oil without checking with

your instructor.) If desired, add salt in small quantities, mixing well after each addition, until the desired level of flavor is achieved.

Compare the nut butters from each of the baking batches for color, flavor, and texture.

Spread the nut butter on bread or crackers and enjoy it.

Blender Nut Butters (Can use a Peanut Butter Machine)

Add 1 cup of peanuts or another nut or seed to a blender jar (Caution: do not use more than 1-1/2 cups of nuts as it may place too much of a strain on the blender and burn it out.)

Cover the blender jar and process the nuts in 10 second pulses until a very fine powder is obtained. If necessary, you may have to turn off the blender and use a rubber spatula to scrape the nut powder off the sides of the jar.

Add 1 tbs. of oil and blend to form a smooth paste. To prevent damage to the blender, do not blend for more than 30 second intervals. If necessary, you may have to turn off the blender and use a rubber spatula to scrape the nut powder or nut butter off the sides of the jar. If a smooth paste does not form, add 1/2 tsp. of oil and continue to process. (If necessary, you may have to add an additional 1/2 tsp. oil to obtain a smooth paste. Be patient, as the heat of blending will release the oil from the nuts.)

Add salt to taste.

Store in a jar with a tight fitting lid.

References

Rupnow, John, Susan Lodor, Joseph Montecalvo, Jr., and Adam Littlefield, "Chemistry in a Nutshell", *The Science Teacher*, **62** (No. 9), 32-35, December 1995.

Hopping, Carol, and the Staff of the Rodale Food Center, *Stocking Up*, 3rd Edition A Fireside Book, Simon and Schuster, New York, 1986.

Institute of Food Technologists, "Effect of Roasting on Color, Flavor, and Texture of Peanut Butter", *Experiments in Food Science*, The Society for Food Science and Technology, Chicago, IL, 1997.

