

BUTTER IN A BOTTLE

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Materials Needed

heavy cream
glass bottle, screw cap preferred, with straight walls
sodium chloride, NaCl, table salt
spatula (a rubber kitchen spatula is preferred)
bowl
container to store butter
ice water
plastic knife or spreader
bread, bagels, or crackers for tasting the butter.

Safety

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

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

Important: The cream must be at room temperature, approximately 15.6°C (60°F), for this procedure to work.

Fill the bottle one-third full with heavy cream.

Cap the bottle tightly. Shake about 10 times. Open the top slightly to relieve the pressure, then reseal.

Shake the bottle about 20 times. Open the top slightly to relieve the pressure, then reseal.

Continue to shake the bottle until all the liquid appears to have solidified. At this point, you may open the bottle and inspect the contents. Use a small spoon to taste a small amount of the contents. Describe the taste and texture of the contents of the bottle.

Close the bottle tightly and continue to shake the bottle until lumps of butter form and the liquid takes on a thin and watery appearance. This process may take about 10 minutes or more.

Open the bottle and carefully pour off the buttermilk. Add fresh, cold water until the bottle is about one-third full. Replace the lid and shake about 5 times. Pour off the wash water and repeat the washing until the water pours off clean.

Place the lumps of butter in a bowl. Using a spatula, *press* the butter against the side of the bowl to work out any remaining liquid. Note: It is important that the butter be pressed against the side of the bowl and not spread out. Otherwise the butter gets too greasy.

If desired, add a small amount of salt (sodium chloride) to the butter and mix it in using the spatula.

The butter can be spread on bread or crackers and eaten.

Cover the butter with plastic wrap and store it in a refrigerator.

Activity

Compare the butter with a commercial butter, margarine, and a butter blend such as *I Can't Believe It's Not Butter*®

Explanation

Although the exact process of churning butter is not known, the current theory is when air is mixed into the liquid, bubbles form, and fat globules collect in the bubble walls. If the cream is cold and the churning action is stopped when an airy foam is obtained, then whipped cream is formed. If the cream is warm, the fat globules liquefy to some degree. Further agitation breaks down the protective membrane around the fat globules and causes them to knock together. The liquefied fat helps to cement the exposed droplets together into butter. The final product is about 80% milk fat, 18% water, and 2% milk solids. The remaining liquid is buttermilk.

References

Hopping, Carol and the staff of the Rodale Food Center, *Stocking Up*, 3rd Ed., Simon & Schuster, 1986.

McGee, Harold, *On Food and Cooking*, Charles Scribner's Sons, 1984.