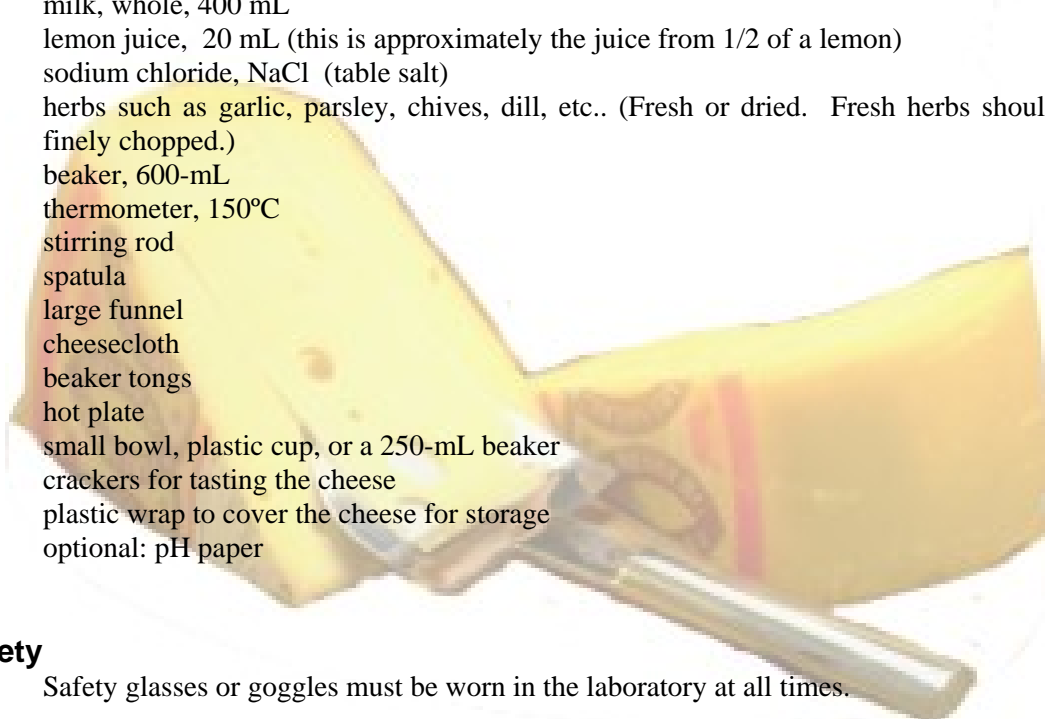


EASY CHEESE

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Materials Needed



milk, whole, 400 mL
lemon juice, 20 mL (this is approximately the juice from 1/2 of a lemon)
sodium chloride, NaCl (table salt)
herbs such as garlic, parsley, chives, dill, etc.. (Fresh or dried. Fresh herbs should be finely chopped.)
beaker, 600-mL
thermometer, 150°C
stirring rod
spatula
large funnel
cheesecloth
beaker tongs
hot plate
small bowl, plastic cup, or a 250-mL beaker
crackers for tasting the cheese
plastic wrap to cover the cheese for storage
optional: pH paper

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. 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. Special glassware and equipment, 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

Place 400 mL of whole milk in a 600-mL beaker. Set the beaker on a hot plate and heat to 74°C (165°F) with constant stirring. Do you observe any changes in the milk? If desired, measure the pH of the milk using pH paper.

When milk reaches 74°C, remove the beaker from the heat. *Do not overheat the milk.* Add 20 mL of lemon juice and stir to mix. Do you observe any changes in the milk mixture? If desired, measure the pH of the mixture using pH paper. Allow the mixture to stand for 15 minutes.

Line a large funnel with a double layer of cheesecloth. Pour the mixture through the cheesecloth. Allow it to stand for 15 minutes or until all dripping stops.

Pick up the cheesecloth by the corners. *Do NOT squeeze any liquid from the curds*, that will make the cheese dry and tough. Use a spatula to scrape the cheese curds off the cheesecloth into a small bowl, beaker, or plastic cup. Dispose of the whey (the liquid).

Add salt and herbs (such as garlic, parsley, chives, dill, etc...) to taste. Mix well. The herb flavors may take about 15 minutes to penetrate through the cheese.

The cheese can be spread on crackers and eaten, or covered and stored in a refrigerator for up to one week.

Explanation

Cheesemaking consists of three steps: the precipitation of casein into curds, the concentration of the curds, and the ripening or aging of the curds.

Normally, bacteria are infused into the warm milk to obtain an adequate acidity for the action of rennet. Rennet is an animal derivative extracted from the fourth stomach of a calf or young goat or an extract obtained from the mold *Mucor miehei*. The active enzyme in rennet is *rennin*. The rennet causes the casein micelles to aggregate, trapping fat globules and whey in the protein network. In this procedure, lemon juice is used to increase the acidity of the milk.

To concentrate the curds, any free whey is drained off and the curds are cut, pressed, cooked, and salted to remove much of the remaining whey. In this procedure, the free whey is removed by draining the curds.

Ripening of the curds is a matter of molecular breakdown caused by enzymes of microbes, both the starter bacteria and special ripening organisms that produce a smooth cheese with a pronounced and complex flavor. In this procedure, there was no ripening of the cheese and the flavor was produced by addition of spices.

References

Baxter, Roberta, *Say Cheese*, **ChemMatters**, 13 (No. 1), 4, February, 1995.

Carroll, Ricki, and Robert Carroll, *Cheesemaking Made Easy*, Garden Way Publishing, Pownal, Vermont, 1996.