



HYG-5341-09

Freezing Basics

Freezing is the easiest, most convenient, and least time-consuming method of preserving foods. Freezing does not sterilize foods or destroy the organisms that cause spoilage; the extreme cold simply slows the growth of microorganisms and the chemical changes that affect quality or cause spoilage.

Enzymes are complex proteins, present in all living tissue, that help organisms ripen and mature. During freezing, enzyme action is slowed but not stopped. If not inactivated, these enzymes can cause color and flavor changes and loss of nutrients during freezer storage. Contrary to some publications or folklore, blanching is essential for obtaining top quality frozen vegetables.

Blanching vegetables before freezing inactivates the enzymes. During blanching, the vegetable is exposed to boiling water or steam for a brief period. The vegetable is then rapidly cooled in ice water to prevent cooking. The use of microwave ovens for blanching has become popular. However, microwave blanching produces uneven results because of varied heat patterns within an oven and from one oven to another. Microwave blanching requires working with only small quantities at a time; there is no time saved when working with large quantities of vegetables.

Blanching also helps destroy microorganisms on the surface of the vegetables. When blanched, vegetables such as broccoli and spinach become more compact. Following the recommended times for blanching each vegetable is important. Overblanching results in a cooked product and loss of flavor, color, and nutrients. Underblanching stimulates enzyme activity and is worse than no blanching at all.

Enzymes in fruits can cause browning and loss of Vitamin C. Fruits, however, are not usually blanched. Instead, ascorbic acid (Vitamin C) is used to control enzymes in frozen fruits. Commercial mixtures of ascorbic acid are available for home use. Citric acid or lemon juice also may be used to prevent darkening of fruits, but they are not as effective as ascorbic acid. Packing fruit in sugar or sugar syrup also will control browning, but not as effectively as ascorbic acid.

Another type of change that can occur in frozen products is the development of rancid off flavors. This occurs when fat, such as in meat, is exposed to air over a period of time. It can be controlled by using a wrapping material that does not allow air to reach the product. Therefore, it is always advisable to remove as much air as possible from the freezer bag or container to reduce the amount of air in contact with the product being frozen.

Freezer Storage

To maintain top quality, store frozen fruits and vegetables at 0 degrees Fahrenheit (F) or lower. Storing frozen foods at temperatures higher than 0 degrees F increases the rate of deterioration and shortens the shelf life of foods. Fluctuating freezer temperatures can cause the ice in the foods to thaw slightly and then refreeze. Every time this happens, the smaller ice crystals form larger ones, further damaging cells and creating a mushier product.

Moisture loss, or ice crystals evaporating from the surface of a product, produces freezer burn—a grainy, brownish spot where the tissues become dry and tough. Freezer-burned food is likely to develop off flavors, but it will not cause illness. Packaging in heavyweight, moisture-resistant wrap will prevent freezer burn.

Containers for Freezing

Foods for the freezer must have proper packaging materials to protect their flavor, color, moisture content, and nutritive value. Select packaging materials with these characteristics:

- moisture and vapor resistant
- durable and leakproof
- resistant to oil, grease, and water
- not susceptible to becoming brittle and cracking at low temperatures
- able to protect foods from absorbing other flavors or odors
- easy to seal
- easy to label

Suitable packaging materials include rigid plastic containers with straight sides, glass jars made for freezing and canning, heavy-duty aluminum foil, moisture-vapor resistant bags, and paper.

Containers intended for short-term storage, such as bread wrap; cottage cheese, milk, or ice cream cartons; regular aluminum foil; or waxed paper do not provide effective protection against flavor and moisture loss or freezer burn during long-term storage.

Plastic containers designed for long-term freezer storage may or may not be suitable for direct use in a microwave oven.

Packaging Foods

Cool all foods and syrup before packing. Pack foods in quantities that are usable for a single meal.

Pack cold foods tightly into containers. Because most foods expand on freezing, allow ample headspace (space between food and closure). The amount of space needed will vary depending on the food and size of containers. When packing food in bags, press out excess air before sealing. Label and date each package. It is also helpful to list number of servings on the label.

For quick freezing, spread packages among already frozen foods. Leave a small space between packages and add only the amount of unfrozen food to the freezer that will freeze within 24 hours, about 2 to 3 pounds of food to each cubic foot of freezer capacity.

Freezing Pointers

1. Freeze foods at 0 degrees F or lower. To freeze foods rapidly, set the temperature control at -10 degrees F or lower 24 hours in advance.
2. Keep a thermometer in the freezer to assure proper freezing temperatures are maintained.
3. Freeze foods immediately after they are packaged and sealed.
4. Do not overload your freezer with unfrozen food. Overloading slows down the freezing rate, and foods that freeze too slowly may lose quality.
5. Place packages in contact with refrigerated surfaces in the coldest part of the freezer.
6. Leave a little space between packages so air can circulate freely. Then, when the food is frozen, store the packages close together.

What to Do If Your Freezer Stops

Keep the freezer closed. If it looks like the freezer will be stopped for more than 24 hours, use dry ice (if you can get it) or move the food to another freezer.

Thawed fruits that smell and taste good can be refrozen. Thawed fruits can be used in cooking, baking, or making jams and jellies.

Vegetables containing ice crystals or at 40 degrees F or below can be refrozen. Thawed vegetables should be thrown out.

Examine meats and poultry for color changes or off odors. Only refreeze packages that still contain ice crystals or are cold to touch (40 degrees F or below). Repackage in moisture- and vapor-proof wrap. Discard any thawed meat or poultry. Ground meat cold to touch should be cooked before refreezing.

Recommended Books on Freezing

Ball Blue Book. Ball/Alltrista Corporation. Muncie, Indiana.

Kerr Home Canning and Freezing Guide (1996). Published by Kerr Glass Manufacturing Corporation, P.O. Box 76961, Los Angeles, California 90067.

So Easy to Preserve. (Fifth Ed.) (2006). Cooperative Extension Service. University of Georgia, College of Agriculture, Athens, Georgia.

References

So Easy to Preserve. (Fifth Ed.) (2006). Cooperative Extension Service. University of Georgia, College of Agriculture, Athens, Georgia.

Information Compiled by Ruth Anne Foote, Extension Educator, Family and Consumer Sciences, Ohio State University Extension.
Revised by Pat Shenberger, Ashland County Extension Educator, Family and Consumer Sciences, Ohio State University Extension.
Updated by Barbara Rohrs, Extension Educator, Family and Consumer Sciences, Ohio State University Extension, Defiance County.
Reviewed by Julie Shertzer, Ph.D., R.D., Program Specialist, Ohio State University Extension.

EMPOWERMENT THROUGH EDUCATION

Visit Ohio State University Extension's web site "Ohioline" at: <http://ohioline.osu.edu>

Ohio State University Extension embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to race, color, religion, sex, age, national origin, sexual orientation, gender identity or expression, disability, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Keith L. Smith, Ph.D., Associate Vice President for Agricultural Administration and Director, Ohio State University Extension

TDD No. 800-589-8292 (Ohio only) or 614-292-1868