

Canning Tomatoes and Tomato Products

Fact Sheet No. 9.341

Food and Nutrition Series | Preservation

by P. Kendall*

Tomatoes are the most widely home-canned product in the United States. They also are one of the most commonly spoiled home-canned products. The canning processes recommended in this fact sheet are the result of USDA research on safe home-canning procedures for tomatoes and tomato products.

Tomato Acidity

Although tomatoes are considered a high-acid food (pH below 4.6), certain conditions and varieties can produce tomatoes and tomato products with pH values above 4.6. When this happens, the product must be canned in a pressure canner as a low-acid product or acidified to a pH of 4.6 or lower with lemon juice or citric acid.

Research has found several conditions that can reduce the acidity of tomatoes. These include decay or damage caused by bruises, cracks, blossom end rot or insects, and overripening. Tomatoes grown in the shade, ripened in shorter hours of daylight, or ripened off the vine tend to be lower in acidity than those ripened in direct sunlight on the vine. Also, tomatoes attached to dead vines at harvest are considerably less acidic than tomatoes harvested from healthy vines. Decayed and damaged tomatoes and those harvested from frost-killed or dead vines should **not** be home canned.

To ensure safe acidity in whole, crushed or juiced tomatoes, add lemon juice or citric acid when processing in a boiling water bath. Add 2 tablespoons of bottled lemon juice or 1/2 teaspoon of citric acid per quart of tomatoes. For pints, use 1 tablespoon bottled lemon juice or 1/4 teaspoon citric acid. Acid can

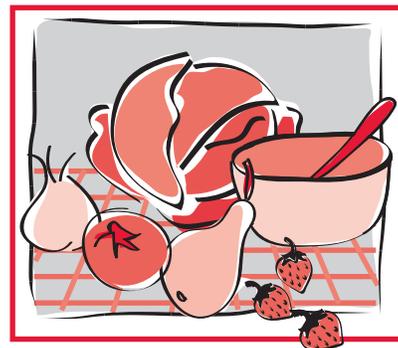
be added directly to the jars before filling with product. Add sugar to offset the taste, if desired. Four tablespoons of a 5 percent acidity vinegar per quart can be used instead of lemon juice or citric acid. However, vinegar may cause undesirable flavor changes.

Process Carefully to Avoid Spoilage

The most common reasons for spoilage in home-canned tomato products are underprocessing and incomplete seals. Tomatoes that have not been processed long enough to destroy molds and heat-resistant bacteria may spoil during storage. One of the common spoilage organisms, *Bacillus coagulans*, is very heat resistant and causes flat-sour spoilage. The jar lid may still be sealed and the product may appear normal, but the tomatoes will smell sour because of lactic acid produced by the growth of *B. coagulans* in the product. Never use tomatoes or tomato juices with off-odors.

Molds can grow on the surface of improperly processed tomato products and may eventually reduce the acidity to a point where botulism-producing spores can grow and produce a deadly toxin. Because even minute amounts of botulism toxin can cause fatal illness, discard without tasting any canned products that show mold growth on the surface. Discard them where they cannot be eaten by other people or animals.

The processing times in this fact sheet are designed to ensure sufficient destruction of bacteria and molds. Where appropriate, processing recommendations for both water bath and pressure canning are given. In general, a pressure canner results in higher quality and more nutritious canned tomato products.



Quick Facts

- Select disease-free, preferably vine-ripened, firm tomatoes for canning. Avoid overripe tomatoes.
- To ensure safe acidity in whole, crushed or juiced tomatoes, add 2 tablespoons of bottled lemon juice or 1/2 teaspoon of citric acid per quart of tomatoes. For pints, add 1 tablespoon bottled lemon juice or 1/4 teaspoon citric acid.
- Freezing is a safe, easy alternative to home canning. Frozen tomatoes and tomato products do not need added acid.

*P. Kendall, Ph.D., R.D., Colorado State University, associate dean of research, food science and human nutrition. 5/2012



Yield Information

One bushel of fresh tomatoes weighs 53 pounds and yields approximately 18 quarts of canned tomatoes or 15 to 18 quarts of juice. Approximately 2 1/2 to 3 1/2 pounds of fresh tomatoes makes 1 quart of canned tomatoes.

Prepare Jars and Equipment

Standard mason jars are recommended for home canning. Be sure all jars and closures are perfect. Discard any with cracks, chips, dents or rust. Defects prevent airtight seals.

Wash jars in hot, soapy water and rinse well before using. Prepare metal lids as manufacturer directs.

Pressure canner. Make sure your pressure canner has a tight-fitting cover, clean exhaust vent (or petcock) and safety valve, and an accurate pressure gauge. There are two types of pressure gauges: weighted and dial gauges. Weighted gauges need only to be cleaned before using. Dial gauges need to be checked for accuracy. Check them each season before use, more frequently if used often. Ask your Colorado State University Extension county office where to have your gauge checked.

Use a pressure canner that holds at least 4 quart jars. Smaller pressure canner-saucepans are not recommended for home canning as they heat up and cool down too quickly to ensure adequate heat penetration using the processing schedules specified in this fact sheet.

Water bath canner. Any big metal container may be used as a boiling water bath canner if it is deep enough and has a tight-fitting cover and a wire or wooden rack. Rack dividers prevent jars from touching each other or falling against the side of the canner. Be sure the container is at least 4 to 5 inches deeper than the height of jars used to allow adequate space for the rack and briskly boiling water. For pint jars, you need a container at least 10 inches deep. For quart jars, the container should be at least 12 inches deep.

A deep pressure canner may be used as a boiling water bath. Cover but do not fasten the lid. Also, leave the petcock wide open so steam can escape and pressure does not build up inside the canner.

Prepare Tomatoes

Select fresh, firm, ripe tomatoes. **Do not can** soft, overripe, moldy or decayed tomatoes or tomatoes harvested from dead or frost-killed vines. Green tomatoes are more acidic than ripened tomatoes and can be canned safely with any of the following recommendations.

Wash tomatoes well and drain. Dip in boiling water for 30 to 60 seconds or until the skins split. Then dip in cold water. Use a sharp knife to cut out the stem and all of the white core beneath the stem. Peel off the skin. Trim off any bruised or discolored portions.

Fill Jars and Process

Fill jars according to the pack method described for each product on the following pages. Remove trapped air bubbles by inserting a nonmetallic spatula or knife between the food and the jar. Slowly turn the jar and move the spatula up and down to allow air bubbles to escape. Add more liquid if necessary to obtain the proper headspace (see recipes in Table 1). Wipe the jar rim with a clean, damp paper towel to remove any food particles. Place pretreated lid on the jar. Turn the screwband fingertip tight.

The jars are now ready to process in a boiling water bath or pressure canner as described in Table 1.

After processing, carefully remove jars from canner and place on rack, dry towel or newspaper. Allow jars to cool untouched, away from drafts, for 12 to 24 hours before testing seals. To test jar seals, press flat metal lids at the center of lid. They should be slightly concave and not move. Remove screwbands. Label sealed jars with contents, canning method and date. Store in a clean, cool, dry, dark place.

Reprocessing

Jars of tomatoes or tomato products that do not seal can be safely reprocessed within 24 hours of the initial processing. However, if the jar sealed at first and then unsealed a few days later, spoilage is indicated. Do not reprocess such jars; destroy the contents.

To reprocess, remove lids and empty the food and liquid into a pan. Heat to boiling and pack into clean, hot jars. Put on new pretreated lids. Process again for the full time.

The quality of twice-processed foods may be lower, with textural changes and additional loss of heat-sensitive nutrients such as vitamin C and B-complex.

Reference

USDA Complete Guide to Home Canning. Agriculture Information Bulletin No. 539. U.S. Department of Agriculture, National Institute of Food and Agriculture. 2009. Available at: http://nchfp.uga.edu/publications/publications_usda.html

Table 1. Directions for canning tomatoes and tomato products in a boiling water bath and/or pressure canner.

General directions: Wash, skin and trim tomatoes as described in the Prepare Tomatoes section. Fill jars according to the raw or hot pack method described for each product. Release air bubbles and close jars as described in the Fill Jars and Process section. Process in a boiling water bath or pressure canner as directed for your altitude. Begin timing when water returns to boiling or when canner reaches correct pressure.						
		Processing Time (in minutes)				Pressure canner*
		Boiling water bath at altitudes of:				
Product and Procedure	Jar size	1,001-3,000 ft.	3,001-6,000 ft.	6,001-8,000 ft.	8,001-10,000 ft.	
Tomato Juice	pints	40	45	50	55	15
	quarts	45	50	55	60	15
Wash and trim tomatoes. To prevent juice from separating, quickly quarter 1 pound of tomatoes into a large saucepan. Heat immediately to boiling while crushing. Continue to slowly add freshly cut tomato quarters to the boiling mixture and crush. Simmer 5 minutes after all pieces are added. Press juice through a foodmill or sieve to remove skins and seeds. Add 2 tablespoons bottled lemon juice or 1/2 teaspoon citric acid to quart jars. Use half this amount for pints. Add 1 teaspoon salt per quart to jars, if desired. Heat juice again to boiling. Fill jars with hot juice, leaving 1/2-inch headspace. Close jars and process.						
Tomato and Vegetable Juice Blend	pints	40	45	50	55	15
	quarts	45	50	55	60	15
Crush and simmer tomatoes as for making tomato juice (above). Add no more than 3 cups of any combination of finely chopped celery, onions, carrots and peppers for each 22 pounds of tomatoes used. Simmer mixture 20 minutes. Press mixture through a foodmill or sieve and continue as described above, also adding lemon juice or citric acid.						
Crushed Tomatoes (with no added liquid)	pints	40	45	50	55	15
	quarts	50	55	60	65	15
Prepare and quarter tomatoes. Bring 1/6 of quarters quickly to a boil in a large pot, crushing and stirring to exude the juice. Gradually add remaining quarters, stirring constantly. Boil gently 5 minutes. Add 2 tablespoons bottled lemon juice or 1/2 teaspoon citric acid to quart jars. Use half this amount for pints. Add 1 teaspoon salt per quart to jars, if desired. Fill jars immediately with hot tomatoes, leaving 1/2-inch headspace. Close jars and process.						
Standard Tomato Sauce	pints	40	45	50	55	15
	quarts	45	50	55	60	15
Prepare and press tomatoes as for making tomato juice. Simmer in large kettle until sauce reaches desired consistency (volume is reduced by one-third for thin sauce or by one-half for thick sauce). Add 2 tablespoons bottled lemon juice or 1/2 teaspoon citric acid to quart jars. Use half this amount for pints. Add 1 teaspoon salt per quart to jars, if desired. Fill jars with hot sauce, leaving 1/4-inch headspace. Close jars and process.						
Whole or Halved Tomatoes (packed in water)	pints	45	50	55	60	10
	quarts	50	55	60	65	10
Wash and peel tomatoes. Leave whole or cut in half. Add 2 tablespoons bottled lemon juice or 1/2 teaspoon citric acid to quart jars. Use half this amount for pints. Add 1 teaspoon salt per quart to jars, if desired. Hot Pack – Place tomatoes in large saucepan and add enough water to cover. Boil gently for 5 minutes. Fill jars with hot tomatoes and cooking liquid, leaving 1/2-inch headspace. Close jars and process. Raw Pack – Fill prepared jars with raw tomatoes to 1/2 inch of jar tops. Add hot water, adjusting headspace to 1/2 inch. Close jars and process. Processing time is the same for hot and raw pack.						
Whole or Halved Tomatoes (packed in tomato juice or without added liquid)	pints	90	95	100	105	25
	quarts	90	95	100	105	25
Wash and peel tomatoes; leave whole or cut in half. Add 2 tablespoons bottled lemon juice or 1/2 teaspoon citric acid to quart jars. Use half this amount for pints. Add 1 teaspoon salt per quart to jars, if desired. Hot Pack — Place tomatoes in large saucepan; add enough tomato juice to cover. Boil gently 5 minutes. Fill jars with hot tomatoes to 1/2 inch of jar tops. Cover tomatoes with hot tomato juice, leaving 1/2-inch headspace. Raw Pack – Fill jars with raw tomatoes to 1/2 inch of jar tops. Cover tomatoes with hot tomato juice or press tomatoes in jars until spaces fill with juice. Leave 1/2-inch headspace. Close jars and process all pack styles for the length of time specified above.						
Tomatoes with Zucchini or Okra	pints	not recommended for boiling water bath				30
	quarts	not recommended for boiling water bath				35
Use up to 1 pound of zucchini or okra for every 3 pounds of tomatoes. Wash, peel and quarter tomatoes. Wash vegetables and slice or cube. Bring tomatoes to a boil and simmer 10 minutes. Add vegetables and boil gently 5 minutes. Add 1 teaspoon of salt per quart to jars, if desired. Fill jars with mixture. Leave 1-inch headspace. Close jars and process. For variation, add 4 or 5 pearl onions or 2 onion slices to each jar.						
*Pressure canner: Dial gauge: 11 lb @ 0-2,000 ft.; 12 lb @ 2001-4000 ft.; 13 lb @ 4,001-6000 ft.; 14 lb @ 6,001-8,000 ft.; 15 lb @ 8,001-10,000 ft. elevation. Weighted gauge: 15 lb @ 1,000-10,000 ft. elevation.						

Table 1, continued. Directions for canning tomatoes and tomato products in a boiling water bath and/or pressure canner.

General directions: Wash, skin and trim tomatoes as described in the Prepare Tomatoes section. Fill jars according to the raw or hot pack method described for each product. Release air bubbles and fill jars as described in the Fill Jars and Process section. Process in a boiling water bath or pressure canner as directed for your altitude. Begin timing when water returns to boiling or when canner reaches correct pressure.						
		Processing Time (in minutes)				
		Boiling water bath at altitudes of:				Pressure canner*
Product and Procedure	Jar Size	1,001-3,000 ft.	3,001-6,000 ft.	6,001-8,000 ft.	8,001-10,000 ft.	
Spaghetti Sauce (with or without meat) 30 lbs tomatoes, peeled, quartered 2 1/2 lbs ground beef or sausage (recipe with meat) 1 cup onions, chopped 5 cloves garlic, minced 1 cup celery or green pepper, chopped 1 lb fresh mushrooms, sliced 4 1/2 teaspoons salt 2 tablespoons oregano 4 tablespoons parsley, minced 2 teaspoons black pepper 1/4 cup brown sugar 1/4 cup vegetable oil (recipe without meat)	pints	not recommended				60
	quarts	not recommended				70
	With meat – Prepare tomatoes and boil 20 minutes, uncovered, in large saucepan. Put through a food mill or sieve. Saute meat until brown. Add onions, garlic, celery, green peppers and mushrooms (if desired). Cook until vegetables are tender. Combine with tomato pulp in large saucepan. Add salt, oregano, parsley, pepper and brown sugar. Bring to a boil. Simmer, uncovered, until initial volume is reduced by nearly one-half. Stir frequently to avoid burning. Fill jars, leaving 1-inch headspace. Close jars and process for times above. Yields 10 pints.					
	pints	not recommended for boiling water bath				20
	quarts	not recommended for boiling water bath				25
Without meat – Follow the above directions, omit the meat and saute the vegetables in 1/4 cup vegetable oil until tender. Yields 9 pints. Caution! Do not increase the portions of onions, peppers or mushrooms.						
Mexican Tomato Sauce 2 1/2 to 3 lbs chili peppers, peeled and chopped 18 lbs tomatoes, peeled, chopped 3 cups onions, chopped 1 tablespoon salt 1 tablespoon oregano 1/2 cup vinegar	pints	not recommended for boiling water bath				20
	quarts	not recommended for boiling water bath				25
Wash and dry chilies. Make a small slit in side of pepper for steam to escape. Place in a hot oven or broiler (400 degrees) for 6-8 minutes, turning frequently until skins blister and crack. Place in a pan and cover with a damp cloth for several minutes to cool. Peel off skin starting at stem end and peeling downward. Discard seeds and chop peppers. Wash, peel and coarsely chop tomatoes. Combine with chopped peppers and remaining ingredients in large saucepan. Bring to a boil, cover and simmer 10 minutes. Fill jars, leaving 1-inch headspace. Close jars and process. Yields about 7 quarts. Caution! Wear rubber gloves while handling chilies or wash hands thoroughly with soap and water before touching your face.						
Tomato Ketchup 24 lbs ripe tomatoes, peeled, quartered 3 cups onions, chopped 3/4 teaspoon ground red pepper 4 teaspoons whole cloves 3 sticks cinnamon, crushed 1 1/2 teaspoons whole allspice 3 tablespoons celery seeds 3 cups cider vinegar (5%) 1 1/2 cups sugar 1/4 cup salt	pints and half pints	20	20	25	25	
	Wash, peel and quarter tomatoes. Combine with chopped onions and red pepper in a 4-gallon stockpot or large kettle. Bring to a boil and simmer 20 minutes. Meanwhile, combine spices in a spice bag. Place with vinegar in a 2-quart saucepan. Bring to a boil and turn off heat. Let stand 20 minutes. Remove spice bag and combine vinegar and tomato mixture. Boil mixture 30 minutes. Press boiled mixture through a food mill or sieve. Return to pot. Add sugar and salt. Boil gently, stirring frequently, until volume is reduced by one-half or mixture rounds up on a spoon without separation. Fill jars, leaving 1/4-inch headspace. Close jars and process. Yields 6 to 7 pints.					
Chili Salsa (hot tomato-pepper sauce) 5 lbs tomatoes, peeled, chopped 2 lbs chili peppers, peeled, chopped 1 lb onions, chopped 1 cup vinegar (5%) 3 teaspoons salt 1/2 teaspoon pepper	pints and half pints	20	20	25	25	
	Combine prepared tomatoes, peppers, onions, vinegar, salt and pepper in a large saucepan. (See Mexican tomato sauce for information on peeling chili peppers.) Heat to a boil and simmer 10 minutes. Fill jars, leaving 1/2-inch headspace. Close jars and process. Yields 6 to 8 pints. Caution! Wear rubber gloves while handling chilies or wash hands thoroughly with soap and water before touching your face.					

*Pressure canner: Dial gauge: 11 lb @ 0-2,000 ft.; 12 lb @ 2001-4000 ft.; 13 lb @ 4,001-6000 ft.; 14 lb @ 6,001-8,000 ft.; 15 lb @ 8,001-10,000 ft. elevation. Weighted gauge: 15 lb @ 1,000-10,000 ft. elevation.