

Citrus: Preserve It, Serve It

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Table of Contents

1. Citrus - Safe Handling for Consumers
2. UC ANR Publication #8472: Tried and True or Something New?
Citrus Varieties for the Home Gardener
3. Supreming Citrus
4. UC ANR Publication #8199: Oranges
5. Lemony Facts
6. Making Marmalade
7. Citrus Preservation Recipes
 - Canning
 - Drying
 - Freezing
8. Flavored vinegars
9. Recipes Using Preserved Citrus
10. Core Canning Techniques
11. Boiling Water & Steam Canning Steps

Resources

National Center for Home Food Preservation (nchfp.uga.edu)

Ball (freshpreserving.com)

UC ANR Catalog (<http://anrcatalog.ucanr.edu>)

Saticoy Lemon Association: <http://saticoylemon.com/wp/>

Citrus: Safe Handling Practices for Consumers¹

Amy Simonne and Mark Ritenour²

Fresh citrus is rich in many nutrients and has not been traced to any cases of foodborne illness. However, fresh unpasteurized orange juice has been associated with several outbreaks of foodborne illnesses. This document describes steps you can take to reduce your risk of foodborne illness from fresh citrus and home made citrus juice.



Where You Shop

Buy citrus that is **not** visibly bruised or damaged (cuts, scrapes, etc). Examine the stem end for areas where the peel may have been torn during harvest. Any wounds provide hiding places for microbial contamination.

Be sure freshly squeezed citrus juice is covered and kept cold.

Those who are more susceptible to sicknesses (depressed natural immunity) should consume only pasteurized citrus juice and not unpasteurized juice.

At Home

Refrigerate fresh citrus products within two hours of peeling or cutting.

Leftover cut citrus and freshly squeezed juice should be discarded after two hours at room temperature.

During Preparation

Wash hands with hot soapy water before and after:

- handling raw meat, poultry, or seafood
- using the bathroom
- changing diapers
- handling pets
- handling fresh produce

Wash citrus with cool tap water just before preparing or eating even if the rinds will be removed. **Don't use soap or detergents** (they may contain materials not approved for food contact).

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Scrub citrus fruits with a clean produce brush before making juice or putting slices into tea or other drinks. Rinse fruit well with cool tap water.



Examine fruit and cut away areas with minor wounds (cuts, scrapes, or ripped peel) where microorganisms can hide. Discard fruit with visible decay.

Avoid eating the citrus peel, except on fruits such as kumquats that are eaten whole. It's okay to use citrus peel in baking (the heat kills pathogens).

Wash cutting boards, dishes, utensils, and counter tops often. This prevents cross contamination of clean produce by a dirty surface or utensil. Use hot soapy water and rinse well. Wash and then **sanitize** these items after contact with fresh produce, or raw meat, poultry, or seafood (see below).

Wash and sanitize kitchen sink frequently to prevent a build up of microbes.

If possible, use separate cutting boards for fresh produce and raw meat (beef, poultry, or seafood).

Do not consume ice that has come in contact with raw meat, fresh produce, or other raw products.

Use a cooler with ice or ice gel packs when perishable foods are taken outdoors. This includes cut fresh fruits and vegetables.

To sanitize cutting boards, dishes, utensils

Table 1.

Mix one teaspoon chlorine bleach in one quart water
Pour the mixture onto all surfaces or submerge appropriate items into the above solution and let sit at least one minute.
Rinse surfaces well with hot running water.

Counter tops can be sanitized by using the above solution mix, sanitizing sprays or wipes as an additional safety measure.

Following these steps will help reduce your risk of food-borne illness from fresh citrus.



For more information

Visit the Food and Drug Administration (FDA) website at: <http://www.fda.gov> or call FDA Consumer Inquiries at 1-888-SAFEFOOD (a toll-free number).

How To Supreme Citrus Fruit

<http://www.thejoykitchen.com/ingredients-techniques/how-supreme-citrus-fruits>

1. Cut off both ends of the fruit. You should have something that looks like a truncated sphere.



2. Stand the fruit on end, and, with a sharp paring knife, slice off the peel and pith in large strips. Do not cut straight down, but rather, follow the contours of the fruit to waste as little of it as possible. After cutting off a strip of peel and pith, you should be able to see the bright orange fruit beneath.
3. Rotate the orange and repeat this process until all the peel is removed and you have a juicy, bright orange sphere left.



4. Holding the sphere over a bowl to catch any juices, cut out the citrus segments from in between the strips of membrane surrounding them. Lift out each segment and remove any seeds.
5. When you have segmented the entire fruit, squeeze any remaining juices from the pithy part.



Lemony Facts & Tips

Saticoy Lemon Association: <http://saticoylemon.com/wp/lemon-facts/>

Lemons, one of nature's most versatile fruit, enhance and add flavor to a huge variety of foods, drinks, and condiments, as well as provide health benefits and zesty décor to any important event in your life. Below you'll find everything to do with decorating, juicing, storing, and using nature's most versatile fruit, the lemon.



Did you know?

- One medium sized lemon has 18 calories, 0 fat, 0 cholesterol, only 10 mg of sodium, and supplies 35% of the daily recommendation of Vitamin C.
- Approximately 95% of the fresh lemons produced in the U.S. are grown in California and Arizona.
- Always use non-reactive cookware, such as stainless steel, enamel or plastic, when cooking recipes containing lemons or lemon juice. Uncoated iron, copper and aluminum cookware can discolor food and leave a metallic taste.

The Anatomy of "Citrus Limon"

The lemon, like all citrus fruits, is actually the berry of its tree. The juiciest, tastiest lemons are small and either round or oval. They should be a rich yellow in color and have a thin, smooth-textured skin with a light shine. Too much green on the skin signals that the fruit is not yet ripe. When you pick up a good lemon, it should feel heavy for its size and yield just a little to the touch.

The rind unlike many fruits and vegetables, holds just as much culinary importance as does the fruit. **The zest**, or the yellow portion of the rind without the white pith, holds tiny sacs of essential lemon oil, an extremely flavorful and fragrant oil that can be used in a great number of recipes. It is also used in commercial cleaners, toiletries and perfumes.

The fruit, or pulp, of the lemon holds lemon juice, a fantastically useful juice for lemonade, marinade, marmalade, and so many other culinary delights. **The juice** actually enhances the flavor of many different foods, including fish, chicken and a myriad of vegetables. **The acidity** of lemon juice acts as a meat tenderizer for meat and poultry.

Uses:

- Pierce a whole lemon a number of times with a fork, then place in the cavity of a chicken or turkey before roasting. This will keep the breast meat moist and infuse the whole bird with a delicious flavor.
- Lemon can help remove a stain from white linens. Just rub the affected area with a cut edge of lemon, and then hang item to dry in bright sunlight.
- Freeze fresh lemon slices and water in ice cube trays and serve with your favorite sun tea.
- Freeze freshly made lemonade in ice cube trays for use in lemonade, sun tea or soda.
- Boil thin slices of lemon with sugar to make small candied slices for garnishes. Candied slices are easily frozen in plastic wrap for later use.
- To make the most of lemon as a garnish on a drink, rub the rind of the lemon (the outside) on the edge of the glass. The result is a hint of lemon with each sip!

Lemony Facts & Tips

Saticoy Lemon Association: <http://saticoylemon.com/wp/lemon-facts/>

- Dried lemon slices make a terrific garnish. Just cut unpeeled fruit into 1/8" thick slices, discarding ends. Place on a large wire rack on a baking sheet and dry in a 170-degree oven for 4 hours. Remove from oven to air dry.

Perfect Pairings

Did you know that lemons, due to their acidity, actually tenderize meats and poultry as they flavor them? Their flavor also adds pizzazz to:

- Seafood
- Garden green salads
- Melon & other fresh fruits
- Water
- Honey
- Pastas, rice & other grains
- Sweeter vegetables such as carrots, beets, green beans & peas
- Olive oils
- Breads, such as scones, pound cakes, muffins
- Coleslaw

Juicing Lemons

Always let lemons warm to room temperature before zesting or juicing them; you'll notice a marked difference in yields from a room temperature lemon compared to a lemon out of the crisper.

Roll the lemon gently under your palm on a hard countertop or cutting board for a minute before juicing. This will help break down the pulp and help you harvest every last drop of lemon juice. If you don't have a juicer for citrus fruits, a fork and strong hands work just as well.

In general, lemons yield:

1 medium lemon:	almost 1/4 cup of juice 1 tablespoon grated zest
3 medium lemons:	about 1/2 cup of juice 3 tablespoons grated zest
6 medium lemons:	just over 1 cup of juice 6 tablespoons grated zest

If you're only in need of a few drops of lemon juice, poke the lemon with a sharp toothpick. Squeeze what juice you need, replace the toothpick, and store the lemon in the refrigerator.

Storing

Lemons stored in a sealed plastic bag will keep in a refrigerator for several weeks, or at room temperature for several days. Fresh lemon juice should be used within a day, as it loses much of its kick after a day or two out of its skin. Lemon juice freezes well, as do peeled and sectioned lemon pieces in their own juices. Whole lemons should not be frozen.

Making Marmalade

General Information

Marmalade is often defined as a sweetened citrus preserve that consists of bits of citrus fruit and peel suspended in jelly. However, the term marmalade has evolved to a more modern take on the soft spread to include other non-citrus fruit preserves that contain only a small amount of citrus pulp or peel used to enhance the primary fruit flavor (peach, cherry or other stone fruits). With the addition of other fruit (non-citrus) it is sometimes difficult to differentiate between jams and marmalades. According to one English food writer, “If any recipe calls a thing jam, marmalade, or preserve, I shall follow suit. By that or any other name, ‘twill taste as sweet.” Besides sweet, varying degrees of bitterness is typically one of marmalade’s characteristics, making it good for both sweet and savory uses.

History

Marmalade originated more than two-thousand years ago as a solid-cooked quince paste. The rose-colored paste was rolled and twisted into hearts and knots or flattened and then stamped with flowers and served at the end of banquets along with other elegant sweetmeats and confectionery. It was thought to be a digestive. In the eighteenth century, the Scots began using Seville (bitter) oranges to make their marmalade as many regions of the country were too cold for quince trees to flourish. Techniques for making marmalade were refined over time producing marmalades ranging in color from transparent to deep russet, delicate threads of citrus peel to large chunks, sweet in taste to bitter. All attributes present in today’s marmalades. Scotland’s second significant contribution to the early history of marmalade was to pioneer the switch from marmalade served following an evening meal to being serving as a breakfast or tea-time food. References to marmalade can be found throughout British history, literature, and music. It has been said that “marmalade is to Britain as ketchup (and grape jelly) are to Americans.”

Primary Ingredients

There are two primary ingredients in *traditional* marmalades: citrus and sugar.

Citrus – Citrus fruits are the third most commonly cultivated fruit family in the world, just behind the apple/pear family and the banana/plantain family. Worldwide citrus production includes about 65% sweet and sour oranges, 15% mandarin oranges (including hybrids like tangelos and tangors), 10% lemons and limes, and 10% grapefruit. All of these citrus fruits can be used individually or in combination to make marmalades.

Sugar – Most recipes use granulated white sugar, light or dark brown sugar. Natural cane sugar, which has a slightly cleaner taste than processed white sugar, may be substituted. Light or dark-brown sugar will produce a darker-colored and richer marmalade.

Citrus Sourcing, Selection, and Storage

Common varieties of citrus, such as Navel and Valencia oranges, Meyer, Eureka, and Lisbon lemons, and Persian limes, are available in grocery stores most months of the year. Farmers markets, roadside stands, and local farmers often offer a wider variety of specialty citrus, like Cara Cara navels, Buddha’s Hand, kumquats, and varieties within varieties of Mandarins. The Internet is another option for purchasing high quality common as well as rare varieties of citrus. Choose fruit that is firm and heavy for its size with fine-textured skin and no soft spots. Citrus should be free of cuts or bruises. Scars may develop on the peel where a young fruit has brushed against the tree, but these surface flaws do not affect the quality of the fruit inside. Store fruit in refrigerator, cellar, or basement for up to a month.

Citrus Deconstructed

There are hundreds of citrus varieties ranging in color and flavor, but they all have a similar anatomy. The outer peel or zest is known as the flavedo (that's where the intensely flavorful essential oils and vitamin C tend to concentrate). Just beneath the flavedo lies the inner white peel, or albedo (white pith), which supports the flavedo's essential oil glands and is rich in bitter compounds and pectin. The entire peel encases the pulp, with segments consisting of delicate juice sacs (vesicles) held together by a fibrous membrane. Marmalade recipes range in use of the citrus parts with some utilizing the entire fruit (peel, pith, pulp and pips) while others use only the outer peel.

Making Marmalades

While marmalade can be made with just two ingredients, don't be fooled. It is a slow process that often involves several steps that occur over two or three days. It is not for the fainthearted, who prefer 'quick' or 'speedy' recipes with a limited investment of time. The following information describes some of the terms, techniques, and steps that will often be found in marmalade recipes.

Short-boil vs. long-boil method – There are two basic ways to make soft spreads: the short-boil (added-pectin) method and long-boil method. The two methods yield spreads with significantly different characteristics, including flavor and texture.

- The short-boil or added-pectin method produces spreads with a softer texture and “fresher” taste.
- The long-boil method, sometimes called the traditional method, produces a smaller yield, thicker in texture, deeper in color, and more intense in flavor. The typical ratio of ingredients when using the long-boil method is one part each of citrus, sugar, and liquid. This method requires constant attention and stirring during the long cooking process. The spread is cooked at moderately high heat for a long time and the fruit in the bottom of the pan will scorch if not watched closely giving the entire batch an unpleasant burnt taste. Cooking too long (beyond the gel point) will caramelize the sugar, overly thicken the product, and give it a molasses-like flavor.
- A *traditional* marmalade is made using the long-boil method. However, there are many recipes available using the short-boil method.

Batch size – Small batches of marmalade are easier to work with than large batches. Use a heavy-bottomed pan with a capacity of four times the amount of food to be cooked.

Cleaning the fruit – Wash the fruit carefully before using, even if it is organic. Citrus fruit is often covered in a preservative wax; removing it is essential. To do so, rinse the fruit thoroughly under warm running water to remove surface dirt. Gently scrub the peel with a clean scrub brush; then rinse again under warm water. Dry with a kitchen towel. If any preservative wax remains, fill a basin with boiling water. Plunge the fruit in, remove and rinse under running water.

Whole-fruit vs. cut-rind method – When the whole-fruit method is used the entire fruit is boiled in water before being further processed and combined with sugar and liquid. The cut-rind method separates all parts of the citrus; the peels are removed, sliced, and boiled before being added to the remaining pulp and sugar.

Peeling and hand-cutting vs. zesting – Using a vegetable peeler or sharp paring knife, remove the outer peel leaving only a small amount of the inner white peel or pith, unless your preference is a more bitter-tasting marmalade. Use a sharp knife or kitchen scissors and hand cut the peel to an exact size and thickness (1/8” thin-cut, 1/4” medium-cut, 3/8” thick-cut). Alternatively, a zesting tool (five small holes in a row that cut the outer colored portion of the peel into thin strips) may be used to zest the citrus.

Sectioning or supreming citrus – Section or supreme the citrus by cutting the fruit away from the fibrous membrane that surrounds each section. The white membrane is tough and becomes chewy and even tougher when cooked. Over time the membrane may impart bitterness, detracting from both the flavor and the texture of the marmalade.

Cutting crosswise vs. lengthwise – lengthwise is from the stem-end to blossom-end; crosswise is perpendicular to lengthwise.

Precooking and presoaking citrus peels – Citrus peels are tough if not presoaked and/or precooked long enough before combining with sugar. Many recipes call for precooking the peels and then soaking overnight or longer until the peel is soft to the touch. Other recipes may call for presoaking overnight and then precooking until tender to the touch. In addition to softening the fruit, this pretreatment helps extract the pectin from the peels and pith. Once the sugar is added, the peel will not soften further.

Baking soda – Some recipes call for a scant amount of baking soda to be added to the peel when cooked. The baking soda shortens the amount of time needed to soften the citrus peel.

Prewarming the sugar – Some recipes call for warming the sugar in the oven to reduce the amount of time it takes to dissolve the sugar. This step is optional.

Juicing the fruit – Squeeze the fruit by hand or using a citrus squeezer collecting the juice and seeds for later use.

Cooking with seeds and pith – Pectin is the substance in fruit that combines with sugar and acid to make soft spreads gel. Citrus fruit contains an abundance of natural pectin; it is concentrated in the fruit’s pith and seeds. Some recipes call for enclosing the pith and seeds in a square of cheesecloth or small seasoning bag and boiling them along with the fruit. This maximizes the marmalade’s pectin content.

Preventing fruit float – The primary cause of floating fruit is using chopped fruit rather than crushed fruit when making spreads. Air becomes trapped inside fruit cells and often chopped fruit does not cook long enough to release the air. Secondly, chopped fruit frequently does not absorb enough sugar to keep the pieces from separating from the juice as the spread cools. Whether making a jam or marmalade, cut the fruit into small pieces, then gently crush the pieces with a potato or vegetable masher. This will release the air trapped inside the cells and allows the fruit to absorb more sugar during cooking and become heavier.

Reducing foam – Butter is added to many types of soft spreads to reduce the amount of foaming that develops when the fruit is cooked. Always use unsalted butter, also called “sweet” butter, in soft spreads. Never use salted butter as it can add an unpleasant flavor and develop a rancid flavor during storage.

Syneresis – Soft spreads that contain too much acid will set up too firm and will ooze liquid during storage, a process known as “weeping.”

Tests for proper gelling – A candy or sugar thermometer is essential for precise monitoring of the temperature of boiling marmalade, which will achieve a set at about 220°F. Refer to the *Testing the Accuracy of a Candy Thermometer* section for information on testing the accuracy of your thermometer.

- **Temperature Test** – Use a candy or sugar thermometer and boil until marmalade mixture reaches the following temperatures with altitude adjustments. Use the temperature test as an indicator; follow up with the freezer/wrinkle test. For a softer set, stop cooking just before reaching your altitude’s gel point.

Sea Level	1,000 ft.	2,000 ft.	3,000 ft.	4,000 ft.	5,000 ft.	6,000 ft.
220°F	218°F	216°F	214°F	212°F	211°F	209°F

- **Freezer and Wrinkle Test** – Remove the marmalade mixture from the heat. Pour a small amount of boiling marmalade on a cold plate or spoon and put it in a freezer for a few minutes. Remove it from the freezer and push it with your finger to see if it wrinkles. For a firm set, the wrinkle will stay in place after you have removed your finger. If the mixture gels, it should be done.

Other Flavorings – Spices and herbs can be used to add flavor and flair. Because ground spices may affect the appearance of the final product, whole spices are often tied in a square of cheesecloth to create a spice bag. This

bag is cooked with the fruit and removed prior to canning. Wine, whiskey, brandy, and flavored liqueurs add depth and complexity to marmalade. Add them once the marmalade has reached the gel point.

Standard of Excellence

According to guidelines for county and state fair judging of soft spreads, a high-quality marmalade should exhibit the following attributes. The citrus fruit and peel should be evenly suspended in a shimmering, translucent jelly that will hold its shape and mound up on a spoon. The citrus peel should be tender and of a consistent size and shape; not tough or difficult to chew. The pith, or white portion of the peel, will often give the product a bitter taste and should be removed or kept to a minimum. Likewise, tough membranes, which can also impart a bitter flavor over time, should be separated from the pulp and discarded.

Testing the Accuracy of a Candy Thermometer

Whether making candy or determining the gel point of a soft spread, it is important to test the accuracy of your candy thermometer and make any necessary adjustment to assure your final product is neither over- or under-cooked. Here is a quick and easy method to test the accuracy of your candy thermometer.

1. At sea level, water boils at 212°F. With each 500-foot increase in elevation, the boiling point of water is lowered by just under 1°F. At 2,500 feet, for example, water boils at about 207°F. Determine your elevation and then refer to the chart below to determine the temperature at which water should boil at your elevation. This will be your baseline.
2. Insert your candy thermometer into a pot with at least 2 inches of water and bring the water to a rolling boil. The amount of water needs boil for at least 10 minutes. The bubbles should be constant and vigorous. Leave your thermometer in the water for 10 minutes to give it time to get an accurate reading. Make sure that the bulb of the thermometer is fully immersed in the water the entire time and that it is not touching the bottom or sides of the pot—this can give a false reading.
3. Inspect the temperature on your thermometer making sure that you are eye level with the thermometer and not looking at it from an angle. If it is 212°F (or the corresponding temperature for your elevation shown in the chart, below), your thermometer is accurate!
4. There's a good chance, though, that your thermometer may be off by a few degrees or more. Take this temperature difference into account when doing all future cooking with the thermometer. For instance, if you are at sea level and your thermometer registers 215°F when inserted in boiling water, you know that your thermometer reads temperatures 3° hotter than they actually are. If you have a recipe that calls for a temperature of 220°F, you need to add 3° and reach 223°F on your thermometer to get your marmalade or other soft spread hot enough to gel using the long-boil method. On the other hand, if you are at sea level and your thermometer registers 210°F in boiling water and your recipe calls for a temperature of 220°F, you will need to reduce that temperature by 2° (the difference between the actual reading and the temperature at which water should boil at sea level). Make a note of the inaccuracy so that you can easily remember the "candy thermometer adjustment" required for your elevation.
5. A candy thermometer is most frequently required when determining the gelling point of jams, jellies, and marmalades, which is 220° F at sea level (8° above the boiling point of water). A simpler approach than adjusting for the inaccuracies of your thermometer is to just add 8° (the difference between boiling water at sea level and the gelling point of jams, jellies, and marmalades at sea level) to the boiling point of water at your elevation as determined in Step #3 above. Example: my elevation is 2,500 feet and my candy thermometer reads 209° in boiling water, 2° hotter than it should. I can either make the plus or minus adjustment to correct the inaccuracy of my thermometer or just add 8° to the reading from the boiling water test. In my case, the gelling point for jams, jellies, and marmalades is at 217°F, not 215°F as shown in the table.

6. Perform this test on a regular basis, to ensure that your conversion is still accurate. Make a note of the adjustment that needs to be made either on the thermometer with a Sharpie or record your findings below. If you find that you are regularly getting drastically different results from your calibration that means your thermometer is no longer reliable and it is time to replace it.

Elevation (Feet)	Boiling Point of Water	Gelling Point of Jam
Sea Level	212°F	220°F
500	211°F	219°F
1,000	210°F	218°F
1,500	209°F	217°F
2,000	208°F	216°F
2,500	207°F	215°F
3,000	206°F	214°F
3,500	205°F	213°F
4,000	204°F	212°F
4,500	203°F	212°F
5,000	202°F	211°F
5,500	201°F	210°F
6,000	200°F	209°F
6,500	199°F	208°F
7,000	198°F	207°F
7,500	197°F	206°F

Record Your Findings Below

Your elevation: _____

Boiling water temperature _____ Degrees variance * _____ Date: _____

*Difference between the boiling point of water shown above for your elevation and the actual reading on your candy thermometer.

Adjust recipes as follows:

If your candy thermometer reads higher than the temperature shown in the above table, **add** the difference to the stated temperature in your recipe.

If your candy thermometer reads lower than the temperature shown in the above table, **subtract** the difference from the stated temperature in your recipe.

Sources

- National Center for Home Food Preservation: <http://nchfp.uga.edu/>
- USDA Complete Guide to Home Canning, 2015
- Ball Blue Book Guide to Preserving, 2014
- Preserving with Pomona's Pectin, 2013

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Preserving Citrus: Preservation Recipes

Citrus Marmalade (without added pectin – long-boil method)..... 2

Meyer Lemon Marmalade..... 2

Kumquat Marmalade 3

Simple Classic: Orange Marmalade (low sugar) 4

Spiced Orange Jelly with powdered pectin..... 4

Meyer Lemon Thyme Jelly..... 5

Cranberry Orange Chutney 5

Orange Rhubarb Chutney 6

Grapefruit and Orange Sections 7

Fruit Syrup 7

Honey Orange Slices..... 8

Cinnamon Kumquats 9

Cranberry-Orange Vinegar 9

Canned Lemon Curd..... 10

Dried Citrus..... 12

Citrus Salt 12

Citrus Peel Powder..... 12

Candied Citrus Peel 13

Traditional Preserved Lemons 13

Dried Candied Kumquat Flowers 14

Freezer Orange Marmalade..... 15

Lemon Dill Sauce 15

Freezer Lime or Lemon Curd 16

Marmalades, Jellies & Chutneys

Citrus Marmalade (without added pectin – long-boil method)

Yield: About 3 or 4 half-pint jars

(Note: When peeling citrus fruits for marmalades, be sure to include some of the white membrane found just under the skin. This is where most of the pectin is located.)

3/4 cup grapefruit peel (from grapefruit)	Pulp of 1 grapefruit
3/4 cup orange peel (1 orange)	Pulp of 4 medium-sized oranges
1/3 cup lemon peel (1 lemon)	2 cups boiling water
1 quart cold water	3 cups sugar

1. Sterilize canning jars and prepare two-piece canning lids according to manufacturer's directions.
2. Wash and peel fruit. Cut peel in thin strips into a saucepan. Add cold water and simmer, covered, until tender (about 30 minutes). Drain. Remove seeds and membrane from peeled fruit. Cut fruit into small pieces.
3. Combine peel and fruit in saucepan, add boiling water and sugar. Boil rapidly over high heat, stirring frequently, until the temperature measures 8°F above the boiling point of water (220°F at sea level), about 20 minutes.
4. Remove from heat; skim. Pour hot marmalade into hot, sterile jars, leaving ¼ inch headspace. Wipe rims of jars with a dampened clean paper towel; adjust two-piece metal canning lids.
5. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
6. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: National Center for Home Food Preservation, 2018

Meyer Lemon Marmalade

Yield: about 5 half-pint jars

This recipe is a two-day process as it requires an overnight resting of fruit and juice.

2 pounds Meyer lemons, divided	5 cups sugar
2 regular lemons	1/4 cup fresh lemon juice (about 2 lemons)
6 cups water, divided	

Day 1:

1. Cut 1 pound Meyer lemons and regular lemons lengthwise into quarters, and place in a 6-qt. stainless steel or enameled Dutch oven. Add 3 cups water. Bring to a boil; reduce heat, and simmer, uncovered, 1 hour and 30 minutes or until lemons are very soft and liquid is syrupy, pressing lemons to release juice. Remove from heat, cover, and let stand at room temperature overnight.

Day 2:

2. Sterilize canning jars and prepare two-piece canning lids according to manufacturer's directions.
3. While quartered lemons are simmering, quarter remaining Meyer lemons lengthwise; remove seeds, and cut crosswise into very thin slices. Place in a 6-qt. stainless steel or enameled Dutch oven. Add remaining water (just enough to cover lemon slices). Bring to a boil; reduce heat, and simmer, uncovered, 30 minutes, stirring occasionally. Remove from heat; cover and let stand at room temperature overnight.

4. Pour lemon quarters mixture through a fine-mesh strainer into Dutch oven containing lemon slices, pressing with back of a wooden spoon to extract as much juice as possible. Discard solids. Add sugar and lemon juice to lemon slices. Bring to a rolling boil over high heat; reduce heat to medium, and cook, uncovered, stirring often, 45 minutes or to gelling point.
5. Ladle hot marmalade into a hot jar, leaving 1/4-inch headspace. Remove air bubbles. Wipe jar rim. Center lid on jar. Apply band, and adjust to fingertip-tight. Place jar in boiling- water canner. Repeat until all jars are filled.
6. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
7. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: The All New Ball Book of Canning and Preserving, 2016

Kumquat Marmalade

Yield: about 8 half-pint jars

2 cups thinly sliced kumquats (about 24 medium)
 1-1/2 cups chopped orange pulp (about 2 medium)
 1-1/2 cups sliced orange peel (about 2 medium)
 1/3 cup lemon juice, fresh or bottled
 1-1/2 quarts water
 Sugar

Day 1:

1. Wash kumquats and oranges under cold running water; drain. Thinly slice kumquats crosswise.
2. Cut oranges in half crosswise and remove seeds. Remove pulp from each orange half, reserving peel. Chop orange pulp; measure 1-1/2 cups of chopped orange pulp. Remove white pith from orange peel. Thinly slice orange peel into 1/2-inch pieces; measure 1-1/2 cups sliced peel.
3. Combine all ingredients, except sugar, in a large saucepan. Boil gently for 5 minutes; remove from heat. Cover and let stand in refrigerator for 12 to 18 hours.

Day 2:

4. Sterilize canning jars and prepare two-piece canning lids according to manufacturer's directions.
5. Cook rapidly until peel is tender.
6. Measure the fruit and liquid together. Add 1 cup sugar for each cup fruit mixture, stirring until sugar dissolves.
7. Bring mixture to a boil over medium-high heat, stirring constantly. Cook rapidly over medium-high heat almost to the gelling point (220°F), stirring constantly. Remove from heat. Skim off foam if necessary.
8. Ladle hot marmalade into a hot jar, leaving 1/4-inch headspace. Remove air bubbles. Clean jar rim. Center lid on jar and adjust band to fingertip-tight.
9. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
10. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: Ball Blue Book Guide to Preserving, 2014

Simple Classic: Orange Marmalade (low sugar)

Yield: 6 to 7 half-pint jars

6 medium-size oranges	3 teaspoons calcium water
3 cups water	2-1/2 cups sugar
3 tablespoons lemon juice	4-1/2 teaspoons Pomona's pectin powder

1. Thoroughly wash the oranges. Peel the fruit, and set aside the peels from 2 of the oranges, discarding the remaining peels. Remove and discard any seeds, excess white pith, or especially fibrous parts of the membrane from the flesh of all the oranges. Finely chop the flesh of all the oranges.
2. Using a paring knife, scrape off and discard the inner white part of the peels. Slice the peels into thin strips, about 1-inch long.
3. Combine chopped fruit, peels, and 3 cups of water in large saucepan. Bring mixture to a boil over high heat. Reduce heat, cover and simmer for 20 minutes, stirring occasionally. Remove from heat.
4. Measure 6 cups of the cooked fruit (saving any extra for another use), and return the measured quantity to the saucepan. Add lemon juice and calcium water and mix well.
5. In a separate bowl, combine sugar and pectin powder. Mix thoroughly and set aside.
6. Bring fruit mixture back to a full boil over high heat. Slowly add pectin-sugar mixture, stirring constantly. Continue to stir vigorously for 1 to 2 minutes to dissolve pectin while the marmalade comes back up to a boil. Once the marmalade returns to a full boil, remove it from the heat.
7. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
8. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

*Source: Preserving with Pomona's Pectin, 2013***Spiced Orange Jelly with powdered pectin**

Yield: About 4 half-pint jars

2 cups orange juice (about 5 medium oranges)	1 teaspoon whole allspice
1/3 cup lemon juice (about 2 medium lemons)	1/2 teaspoon whole cloves
2/3 cup water	4 sticks cinnamon, 2 inches long
1 package powdered pectin	3-1/2 cups sugar
2 tablespoons orange peel, finely chopped	

1. Sterilize canning jars and prepare two-piece canning lids according to manufacturer's directions.
2. Mix orange juice, lemon juice, and water in a large saucepan. Stir in pectin.
3. Place orange peel, allspice, cloves, and cinnamon sticks loosely in a clean white cloth; tie with a string and add to fruit mixture.
4. Place on high heat and, stirring constantly, bring to a full rolling boil that cannot be stirred down.
5. Add sugar, continue stirring, and heat again to a full rolling boil.
6. Boil hard for 1 minute. Remove from heat. Remove spice bag and skim off foam quickly.
7. Pour hot jelly immediately into hot, sterile jars, leaving 1/4 inch headspace. Wipe rims of jars with a dampened clean paper towel; adjust two-piece metal canning lids.
8. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
9. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: National Center for Home Food Preservation, 2018

Meyer Lemon Thyme Jelly

Yield: about 4 (8oz) half-pint jars

Meyer lemons are a jewel of winter fruits, offering natural sweet and tart flavor. Here they are combined with fragrant fresh thyme to create this versatile jelly. A terrific addition to a cheese plate, also makes a wonderful lacquer for roast chicken.

2 pounds Meyer lemons (about 12-14 small) to equal 2 cups juice	2 teaspoons fresh thyme leaves, plus four small sprigs
1 cup water	Pinch of salt (1/16 tsp)
1 tablespoon Meyer lemon zest	6 tablespoons Ball Real Fruit Classic Pectin
	3 cups sugar

1. Sterilize canning jars and prepare two-piece canning lids according to manufacturer's directions.
2. Grate zest from 2 lemons, to equal 1 tablespoon, set zest aside. Juice enough of the lemons to equal 2 cups juice. Strain juice through a fine mesh strainer to collect any remaining solids.
3. Combine juice, water, zest, thyme leaves and pinch of salt in a 4 quart stainless saucepan, whisk in pectin. Stirring constantly, bring mixture to a full rolling boil over high heat.
4. Add sugar, stirring to dissolve. Return jelly to a full rolling boil that cannot be stirred down, boil hard for 1 minute. Remove from heat. Skim foam if necessary.
5. Place one sprig of thyme into a hot jar, ladle hot jelly into jar leaving a 1/4 inch headspace. Remove air bubbles. Wipe jar rim. Apply lid and ring.
6. Process in either a boiling water or atmospheric steam canner for 5 minutes between 0-1,000', 10 minutes between 1,001-6,000', and 15 minutes above 6,000'.
7. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: *freshpreserving.com*, 2018

Cranberry Orange Chutney

Yield: About 8 half-pint jars

24 ounces fresh whole cranberries	2 cups white distilled vinegar (5%)
2 cups chopped white onion	1 cup orange juice
2 cups golden raisins	4 teaspoons peeled, grated fresh ginger
1-1/2 cups white sugar	3 sticks cinnamon
1-1/2 cups packed brown sugar	

1. Rinse cranberries well. Combine all ingredients in a large Dutch oven.
2. Bring to a boil over high heat; reduce heat and simmer gently for 15 minutes or until cranberries are tender. Stir often to prevent scorching. Remove cinnamon sticks and discard.
3. Fill the hot chutney into hot half-pint jars leaving 1/2-inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and
4. Process in a boiling water or atmospheric steam canner 10 minutes between 0-1,000', 15 minutes between 1,000 – 6,000', 20 minutes above 6,000'.
5. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Note: Other dried spices can be added to taste (for example, cloves, dry mustard, or cayenne pepper). Add or adjust spices during the simmering period.

Source: *USDA Complete Guide to Home Canning*, 2015

Orange Rhubarb Chutney

Yield: about 6 (8 oz) half pints

The combination of rhubarb and unique Indian spice blend produces a great-tasting condiment that complements vegetable, meat or poultry dishes. Also makes an excellent addition to cheese platters.

10 whole black peppercorns	3-1/2 cups cider vinegar
1 tablespoon mustard seeds	3 cups chopped onion
1 tablespoon Ball® pickling spice	1-1/2 cups raisins
4 tablespoons grated orange zest	2 tablespoons finely chopped garlic
2/3 cup fresh orange juice	2 tablespoons finely chopped gingerroot
6 cups chopped rhubarb	1 tablespoon curry powder
5 cups lightly packed brown sugar	1 tsp ground allspice

1. Tie peppercorns, mustard seeds and pickling spice in a square of cheesecloth, creating a spice bag. Set aside.
2. Combine orange zest and juice, rhubarb, brown sugar, vinegar, onions, raisins, garlic, and ginger in a large stainless steel saucepan. Bring to a boil over medium-high heat, stirring constantly. Reduce heat and boil gently, stirring occasionally for 45 minutes.
3. Add curry powder, allspice, and reserved spice bag; stir well. Boil gently, stirring frequently, until thick enough to mound on spoon, about 30 minutes.
4. Prepare boiling water canner in the meantime. Heat jars in simmering water until ready for use. Do not boil. Wash lids in warm soapy water and set bands aside.
5. Ladle hot chutney into hot jars leaving 1/2 inch headspace. Remove air bubbles. Wipe rim. Apply lid and ring.
6. Process in a boiling water canner for 10 minutes between 0-1,000', 15 minutes between 1,000 – 3,000', 20 minutes between 3,001 – 6,000', 25 minutes between 6,001 – 8,000', and 30 minutes between 8,001 – 10,000'.
7. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: freshpreserving.com, 2018

Canned Citrus

Grapefruit and Orange Sections

Yield: An average of 15 pounds is needed per canner load of 7 quarts; an average of 13 pounds is needed per canner load of 9 pints—an average of about 2 pounds yields 1 quart.

Select firm, mature, sweet fruit of ideal quality for eating fresh. The flavor of orange sections is best if the sections are canned with equal parts of grapefruit. Grapefruit may be canned without oranges. Sections may be packed in your choice of water, citrus juice or syrup.

1. Wash and peel fruit and remove white tissue to prevent a bitter taste.
2. If you use syrup, prepare a very light, light, or medium syrup and bring to boil.
3. Fill hot jars with sections and water, juice or hot syrup, leaving ½ inch headspace.
4. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened clean paper towel. Adjust lids and process both pints and quart jars in a boiling water or atmospheric steam canner for 10 minutes between 0 - 1,000', 15 minutes between 1,001-6,000', and 20 minutes above 6,000'.
5. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: *USDA Complete Guide to Home Canning, Revised 2015*

Fruit Syrup

Adding syrup to canned fruit helps to retain its flavor, color, and shape. It does not prevent spoilage of these foods.

Measures of Water and Sugar

For 9-Pt Load For 7-Qt Load*

Syrup Type	Approx % Sugar	Cups Water	Cups Sugar	Cups Water	Cups Sugar	Fruits commonly packed in syrup**
Very light	10	6-1/2	3/4	10-1/2	1-1/4	Approximates natural sugar level in most fruits and adds the fewest calories.
Light	20	5-3/4	1-1/2	9	2-1/4	Very sweet fruit. Try a small amount the first time to see if your family likes it.

* This amount is also adequate for a 4-quart load.

1. For **raw** packs: Heat water and sugar together. Bring to a boil and pour over raw fruits in jars.
2. For **hot** packs: Bring water and sugar to boil, add fruit, reheat to boil, and fill jars immediately.

Source: *USDA Complete Guide to Home Canning, Revised 2015*

Honey Orange Slices

Yield: about 3 (8 oz) half pints

These make an excellent addition to salad greens, tossed with a raspberry or balsamic vinaigrette and sprinkled with candied walnuts.

3 cinnamon sticks broken into pieces	Water
1-1/2 teaspoons whole cloves	1-1/4 cups granulated sugar
1-1/2 teaspoons whole allspice	1-1/4 cups liquid honey
2-1/2 pounds oranges, halved lengthwise and thinly sliced, ends and seeds discarded (about 8 medium)	3 tablespoons lemon juice

1. Tie cinnamon stick pieces, cloves and allspice in a square of cheesecloth, creating a spice bag. Set aside.
2. Combine oranges with water to cover in a large stainless steel saucepan. Bring to a boil over medium-high heat. Reduce heat and boil gently until peel is tender, about 15 minutes. Drain and set aside.
3. Combine sugar, honey and lemon juice in a clean large stainless steel saucepan. Bring to a boil over medium-high heat, stirring occasionally to dissolve sugar. Add reserved spice bag and oranges. Bring to a boil. Reduce heat and boil gently until orange slices are well glazed, about 40 minutes. Discard spice bag.
4. Pack hot oranges into hot jars, using a slotted spoon, leaving 1/2 inch headspace. Ladle hot syrup into hot jar to cover oranges leaving 1/2 inch headspace. Remove air bubbles. Wipe rim. Center lid on jar. Apply band until fit is fingertip tight.
5. Process jars in a either a boiling water or atmospheric steam canner for 10 minutes between 0-1,000', 15 minutes between 1,000 – 3,000', 20 minutes between 3,001 – 6,000', 25 minutes between 6,001 – 8,000', and 30 minutes between 8,001 – 10,000'.
6. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: Ball Complete Book of Home Preserving, 2012

Cinnamon Kumquats

Yield: about 6 half pints or 3 pints

These sweet morsels can be eaten like candy or used to garnish special desserts. But don't waste the syrup. It makes an excellent dessert sauce and is delicious poured over pancakes.

2-1/2 pounds kumquats, stems completely removed	Boiling water
2 tablespoons baking soda	2 cinnamon sticks, each about 4 inches
	6 cups sugar

1. In a large stainless steel saucepan, combine kumquats and baking soda. Add boiling water to cover and set aside for 5 minutes. Transfer to a colander placed over a sink and drain thoroughly.
2. Rinse three times in cold running water.
3. Prick each kumquat twice with a toothpick to prevent bursting.
4. In a clean large stainless steel sauce pan, combine kumquats, 8 cups water and cinnamon sticks. Bring to a boil over high heat.
5. Reduce heat to low and heat gently for 7 minutes. (Be careful not to boil, as boiling may cause the fruit to burst.)
6. Add sugar and cook over medium-low heat, stirring constantly but gently, until sugar has dissolved and liquid has almost returned to a boil. Discard cinnamon sticks.
7. Using a slotted spoon, pack kumquats loosely into hot jars with within a generous ½ inch of top of jar. Ladle hot syrup into jar to cover kumquats, leaving ½ inch headspace, if necessary, by adding hot syrup. Wipe rim, apply lid and ring.
8. Process both pints and half-pint jars in a boiling water or atmospheric steam canner for 15 minutes between 0-1,000', 20 minutes between 1,000 – 3,000', 25 minutes between 3,001 – 6,000', 30 minutes between 6,001 – 8,000', and 35 minutes between 8,001 – 10,000'.
9. Remove from canner. Let cool, undisturbed, 12-24 hours and check for seals. Clean and label jars. Store sealed jars in a cool, dry, dark location.

Source: Ball Complete Book of Home Preserving, 2012

Cranberry-Orange Vinegar

Yield: about 2 pint jars

1 cup cranberry juice	1 cup sugar
1/2 cup fresh cranberries, rinsed	3 cups white wine vinegar (5% acidity)
4 whole cloves	2 orange slices
2 sticks cinnamon	

1. Put spices in a spice bag or tea ball.
2. Combine cranberry juice, spice bag, and sugar in a large saucepan. Cook over medium heat, stirring until sugar dissolves.
3. Add whole cranberries and white wine vinegar. Bring vinegar mixture to a simmer (180°F) over medium heat; simmer 10 minutes. Remove spice bag.
4. Put one orange slice into a hot jar. Ladle hot vinegar into jar, leaving 1/4-inch headspace. Wipe rim, apply lid and ring.
5. Process in a boiling water or atmospheric steam canner for 10 minutes between 0-1,000', 15 minutes between 1,001 – 3,000', 20 minutes between 3,001 – 6,000', 25 minutes between 6,001 – 8,000', and 30 minutes between 8,001 – 10,000'.

Source: Ball Blue Book, 2014

Canned Lemon Curd

Yield: About 3 to 4 half-pint jars

- 2-1/2 cups superfine sugar*
- 1/2 cup lemon zest (freshly zested), optional
- 1 cup bottled lemon juice**
- 3/4 cup unsalted butter, chilled, cut into approximately 3/4" pieces
- 7 large egg yolks
- 4 large whole eggs

Special Equipment Needed: lemon zester, balloon whisk, 1½ quart double boiler*** (the top double boiler pan should be at least 1½-quart volume), strainer, kitchen thermometer measuring at least up to 180°F, glass or stainless steel medium mixing bowl, silicone spatula or cooking spoon, and equipment for boiling water canning.

1. Wash 4 half-pint canning jars with warm, soapy water. Rinse well; keep hot until ready to fill. Prepare canning lids according to manufacturer's directions.
2. Fill boiling water canner with enough water to cover the filled jars by 1 to 2 inches. Use a thermometer to preheat the water to 180°F by the time filled jars are ready to be added.
Caution: Do not heat the water in the canner to more than 180°F before jars are added. If the water in the canner is too hot when jars are added, the process time will not be long enough. The time it takes for the canner to reach boiling after the jars are added is expected to be 25 to 30 minutes for this product. Process time starts after the water in the canner comes to a full boil over the tops of the jars.
3. Combine the sugar and lemon zest in a small bowl, stir to mix, and set aside about 30 minutes. Pre-measure the lemon juice and prepare the chilled butter pieces.
4. Heat water in the bottom pan of the double boiler until it boils gently. The water should not boil vigorously or touch the bottom of the top double boiler pan or bowl in which the curd is to be cooked. Steam produced will be sufficient for the cooking process to occur.
5. In the top of the double boiler, on the counter top or table, whisk the egg yolks and whole eggs together until thoroughly mixed. Slowly whisk in the sugar and zest, blending until well mixed and smooth. Blend in the lemon juice and then add the butter pieces to the mixture.
6. Place the top of the double boiler over boiling water in the bottom pan. Stir gently but continuously with a silicone spatula or cooking spoon, to prevent the mixture from sticking to the bottom of the pan. Continue cooking until the mixture reaches a temperature of 170°F. Use a food thermometer to monitor the temperature.
7. Remove the double boiler pan from the stove and place on a protected surface, such as a dish cloth or towel on the counter top. Continue to stir gently until the curd thickens (about 5 minutes). Strain curd through a mesh strainer into a glass or stainless steel bowl; discard collected zest.
8. Fill hot strained curd into the clean, hot half-pint jars, leaving ½-inch headspace. Remove air bubbles and adjust headspace if needed. Wipe rims of jars with a dampened, clean paper towel; apply two-piece metal canning lids.
6. Process in the prepared boiling water canner 15 minutes between 0-1,000', 20 minutes between 1,000 – 6,000', 25 minutes above 6,000'.
9. Let cool, undisturbed, for 12 to 24 hours and check for seals.

Canned Lemon Curd (continued)

Shelf Life:

- For best quality, store in a cool, dark place (away from light). Plan to use canned lemon curd within 3 to 4 months. Browning and/or separation may occur with longer storage; discard any time these changes are observed.
- Prepared lemon curd can also be frozen instead of canned for up to 1 year without quality changes when thawed. Package in freezer containers after straining and cooling to room temperature. To thaw, place container in a refrigerator at 40°F or lower for 24 hours before intended use. After thawing, consume within 4 weeks.

Preparation Notes:

*If superfine sugar is not available, run granulated sugar through a grinder or food processor for 1 minute, let settle, and use in place of superfine sugar. Do not use powdered sugar.

**Bottled lemon juice is used to standardize acidity. Fresh lemon juice can vary in acidity and is not recommended.

***If a double boiler is not available, a substitute can be made with a large bowl or saucepan that can fit partway down into a saucepan of a smaller diameter. If the bottom pan has a larger diameter, the top bowl or pan should have a handle(s) that can rest on the rim of the lower pan.

Variation:

- For Lime Curd, use the same recipe but substitute 1 cup bottled lime juice and ¼ cup fresh lime zest for the lemon juice and zest.

Drying Citrus

Dried Citrus

Prep Time: 20 Minutes

Bake Time: 6 Hours

1. Preheat oven to 150°F.
2. Wash the citrus fruit and cut into uniform slices, about 1/8"- 1/4" thick.
3. Arrange on a baking tray over two paper towels to absorb the juices and continue layering the paper towels and fruit in a stack.
4. To bake, arrange the slices in a single layer on a baking sheet lined with parchment paper.
5. After 3 hours, place a sheet of parchment paper over the citrus slices and cover with another baking sheet. Hold both baking sheets together and flip so that the citrus slices bake evenly on both sides.
6. Return to the oven for another 3 hours or until dried; they should be bendable and no juice should come out.

Source: *Sunkist.com, 2018*

Alternate technique: dry the slices in a dehydrator at 130°F for 16-18 hours, flipping several times for an even dry.

Citrus Salt

Yield: about 1-1/4 cups

- 1 cup flake salt or coarse salt
- 3 tablespoons citrus zest (any kind)

1. Mix salt and zest in a bowl; work zest into salt with your fingers to release oils and flavor.
2. Spread on a baking tray. Air-dry until dried completely, 8 hours to overnight.
3. Keep airtight at room temperature for up to 2 months.

Notes:

- Zest's color will fade over time, but this won't affect taste.
- Another drying option is to heat the oven to 200°F, insert the baking tray and turn off the oven. Let the tray sit in the oven overnight. Use a fork to separate any clumps.

Citrus Peel Powder

1. Peels of citron, grapefruit, kumquat, lime, lemon, tangelo and tangerine can be dried. Thick-skinned navel orange peel dries better than thin-skinned Valencia peel.
2. Wash thoroughly. Remove outer 1/6 to 1/8 inch of peel. Avoid white bitter pith.
3. Dry at 140°F in dehydrator for 8-12 hours.
4. Place dried rinds in blender, herb, or coffee grinder and blend until a fine powder.
5. Use powder in a variety of dishes to add citrus flavor without adding liquid.

Candied Citrus Peel

Yield: about 2 pints

Peels, including pith, from 6 oranges or other thick-skinned citrus fruit

1 cup water, plus more for boiling peels

5 cups sugar

1 vanilla bean

1. Cut the peels into 1/4-inch strips. Cover the peels with cold water in a large nonreactive saucepan and bring to a boil, stirring to ensure that all of the peels are heated through. Strain and repeat two more times to remove the bitter flavor from the pith and to soften the peels. After the third round, set aside the peels to drain while you make the syrup.
2. Bring 1 cup water to a boil and gradually add 4 cups of the sugar, stirring to dissolve. Add the peels and the vanilla bean. Return to a boil, and then reduce to a simmer, cooking gently until the peels are translucent and tender, about 1 hour.
3. Using tongs, remove the peels to a drying rack placed over a baking sheet and separate them so they don't touch. Let drain, and then dry for 4 to 5 hours.
4. When quite dry but still tacky, roll the peels in the remaining 1 cup sugar to coat.
5. Peels keep, stored in an airtight container, for up to 1 month.

Source: Put 'em Up!

Traditional Preserved Lemons

Yield: one quart jar

10 lemons, divided

1/2 cup pickling or canning salt, divided

4 bay leaves

4 cinnamon sticks (each about 4 inches)

1 teaspoon whole black peppercorns (optional)

1. Prepare jar and lid. For this recipe, the jar needs to be sterilized prior to packing. Boil jar in water for 10 minutes and keep hot until ready to use.
2. Wash 5 of the lemons in warm water, scrubbing well to remove any dirt and wax, and dry well using paper towels. Cut a thin (1/8 inch) slice off the stem end. From stem end, cut each lemon into quarters, without cutting through the bottom end and leaving it intact. Juice the remaining 5 lemons to measure 1-1/2 cups juice.
3. Sprinkle 1 tablespoon pickling salt over the bottom of sterilized jar. Working over a bowl, pack 1 heaping tablespoon salt into each lemon before placing in the jar, stem end up. When 3 lemons have been salted and packed, slip bay leaves and cinnamon sticks against sides of the jar and add peppercorns, if using. Repeat with remaining lemons and salt. Cover with the remaining salt.
4. Fill jar with lemon juice to within 1/2 inch of top of jar. Center lid on jar. Screw band down until resistance is met, then increase to fingertip-tight.
5. Place jar in a dark, cool cupboard for 2 weeks, shaking every day to distribute the salt. After 2 weeks, the lemons are ready to use. Remove pulp and membrane, using only the peel. Rinse under water to remove excess salt and dry with a paper towel. Store preserved lemons in the refrigerator.
6. Store preserved lemons in a container with an airtight lid. Cover and refrigerate for up to 6 months.

Source: Ball Complete Book of Home Preserving, 2012

Dried Candied Kumquat Flowers

Yield: about 30 candies or 1 pint in syrup

I won't lie, this preparation of these kumquats can be somewhat painstaking, especially if you make a big batch to share with family and friends. (The recipe below is for a fairly manageable one pint of kumquats; you could halve, double, or triple it as you wish.) But I find it's totally worth the effort to make something so lovely and delectable, whether you're celebrating the New Year or simply the existence of these bright and happy fruits.

1 pound kumquats

Water

2 cups sugar

Optional spices:

1 (1-inch) coin ginger

1 cinnamon stick

1 star anise pod

2 cloves

1. Using a sharp paring knife, cut 6 to 8 lengthwise slits in each kumquat. Leave the top and bottom ends of each kumquat intact and be careful not to cut all the way through the fruit.
2. Lightly pinch the top and bottom of each kumquat to form a lantern shape and use a toothpick, skewer, or sharp chopstick to gently remove the seeds. Don't worry if you can't fish out every seed; the seeds will loosen during cooking, and it's important to be gentle with the kumquats so they don't split apart.
3. Fill a saucepan with water and bring to a boil. Add the kumquats and blanch for 1 minute. Remove the kumquats and drain. Repeat this process two more times (three times total), using fresh water each time.
4. Refill the pot with 2 cups of water, sugar, and spices (if using). Bring to a boil, stirring to dissolve the sugar. Add the kumquats and reduce heat to low. Keep the kumquats evenly covered in syrup by periodically spooning syrup over them or gently submerging them with a wooden spoon. Simmer until the peel is translucent, about 45 minutes.
5. Remove from heat, cover the saucepan with a cloth, and let the kumquats steep for 8 hours or overnight.
6. Using a slotted spoon, remove each kumquat from the syrup and gently press down on the top and bottom to flatten it into a flower shape. This is also a good opportunity to press out any remaining seeds.
7. Dry the kumquats on a baking rack, on a parchment-lined baking sheet in an oven at 200°F or below, or in a dehydrator at 135°F. Drying time depends on the method, conditions, and fruit size; in a dehydrator it takes about 8-12 hours.
8. The candies are ready when they are pliable and no longer very sticky to the touch.
9. Store in an airtight container in the refrigerator. Kumquats are best consumed within a week.

Note: Don't toss any leftover syrup! It can be used to flavor sparkling water and cocktails, drizzled on cake, and mixed into dressings and marinades.

Source: Emily Han, 2013

Freezing Citrus

Note: Do not freeze the juice of navel oranges. The juice develops a bitter compound called *Limonin*.

Freezer Orange Marmalade

Yield: 5 cups

2-1/3 cups prepared fruit (buy about 3 medium oranges) 2 tablespoons fresh lemon juice

4-1/4 cups sugar, measured into separate bowl 3/4 cup water

1 box SURE-JELL Fruit Pectin

1. Rinse clean plastic containers and lids with boiling water. Dry thoroughly.
2. Remove colored part of peel from the oranges using a vegetable peeler. Cut the peel into thin slivers, or finely chop. Peel and discard remaining white part of peel from the oranges.
3. Finely chop the fruit, reserving any juice. Mix with the slivered peel along with the lemon juice. Measure 2-1/3 cups of the fruit mixture into large bowl. (If needed, add up to 1/2 cup water for exact measure.) Stir in sugar. Let stand 10 minutes, stirring occasionally.
4. Mix water and pectin in small saucepan. Bring to boil on high heat, stirring constantly. Boil and stir 1 min. Add to fruit mixture; stir 3 min. or until sugar is dissolved and no longer grainy. (A few sugar crystals may remain.)
5. Fill all containers immediately to within 1/2 inch of tops. Wipe off top edges of containers; immediately cover with lids. Let stand at room temperature 24 hours. Marmalade is now ready to use.
6. Store in refrigerator up to 3 weeks or freeze extra containers up to 1 year. Thaw in refrigerator before using.

Source: *Sure Jell, 2018*

Lemon Dill Sauce

Yield: Makes about 2 cups sauce or 9 ice cube sized portions

2 sticks salted butter

1/4 cup olive oil

3/4 cup finely chopped shallot

3/4 cup dry white wine

1/4 cup Dijon mustard

1/4 cup lemon juice

1/4 cup chopped fresh dill

1. Melt butter with olive oil in large skillet and sauté shallot until softened. Add wine and simmer on low heat until reduced by half. Stir in mustard and lemon juice and simmer 2 minutes or until slightly thickened. Remove from heat and stir in dill.
2. Pour sauce into the ice-cube tray, cover until ready to use. Serve with salmon, potatoes, asparagus and/or your favorite seafood and veggies.

Source: *freshpreserving.com, 2018*

Freezer Lime or Lemon Curd

Yield: approximately 3 cups.

4 teaspoons grated lime peel
2/3 cup lime juice (fresh or bottled)
5 eggs
1 cup sugar
½ cup melted butter

1. In a blender, blend the first four ingredients until smooth.
2. With blender motor running at lowest setting, gradually add the melted butter, pouring in a steady stream until just blended.
3. Transfer the mixture to a small, heavy saucepan and cook over medium heat, stirring continuously until mixture bubbles and thickens.
4. Remove from heat. Ladle into hot jars leaving ¼ inch headspace.
5. Cover with cap and ring, cool in refrigerator, then freeze.

Preserving Food: Flavored Vinegars

Vinegars garnished with sprigs of herbs or a layer of berries are a hot "splash" right now. They are favored by chefs for adding excitement to special dishes. Cooking at home is also enlivened by tantalizing tastes from the blending of flavors with vinegar. Flavored vinegars are easy and fairly safe to make at home, provided some simple precautions are followed.

Getting Ready

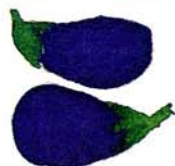
Jars and Bottles - Only glass containers are recommended for your flavored vinegars. Use glass jars or bottles that are free of cracks or nicks and can be sealed with corks, screw-band caps or two-piece canning lids. Wash containers thoroughly in warm, soapy water and rinse well. (A good bottle brush is a big help for narrow containers.) Then sterilize the clean, warm jars or bottles by completely immersing them in water and boiling for 10 minutes. Prepare the sterilizing bath before you wash the jars, or keep the clean jars in warm water until you are ready to put them in for sterilizing.

The best way to prevent breakage is to use a deep pot with a rack in the bottom, such as a boiling water canner. Fill the canner or pot at least half full with warm water. Place the empty, warm jars or bottles upright on the rack and make sure the water level is 1 to 2 inches above the tops of the jars. Bring the water bath to a boil, and continue boiling for 10 minutes. The jars should stay below the boiling water the entire time.

After 10 minutes of boiling, remove the jars or bottles from the water and invert on a clean towel. Use canning jar lifters or tongs that grab the containers without slipping. Fill the jars with your vinegar while they are still warm.

Lids and Caps - If using screw caps, wash in hot soapy water, rinse and scald in boiling water. (To scald, follow manufacturer's directions, or place caps in a saucepan of warm water, heat to just below boiling and then remove from the heat source. Leave caps in the hot water until ready to use.) Use non-corrodible metal or plastic screw caps. If using corks, select new, pre-sterilized corks. Use tongs to dip corks in and out of boiling water 3-4 times. Prepare two-piece metal home canning jar lids according to manufacturer's directions for canning. If using these lids, allow enough headspace between the lid and the vinegar so that there is no contact between them. Plastic storage screw caps that are made for canning jars are also now available and would work well for flavored vinegars.

Herbs - Allow 3 to 4 sprigs per pint (2 cups) of vinegar. Use very fresh herbs, picked before blossoming, for best flavor. It is best to pick fresh herbs soon after the morning dew has dried. Use only the best leaves or stems, discarding discolored, nibbled, crushed or dried out pieces. Wash the fresh herbs gently but thoroughly. Blot dry on clean paper towels. After herbs are washed and dried, dip them in a sanitizing bleach solution of 1 teaspoon of household chlorine bleach in 6 cups of water. Rinse thoroughly under cold water and pat dry with clean paper towels.



Dried herbs may be substituted if necessary; allow 3 tablespoons dried herbs per pint of vinegar.

Fruits, Vegetables and Spices - Favorite fruits for flavoring vinegars are usually raspberries, blackberries, strawberries, peaches, pears and the peel of lemons and oranges. Sometimes they are combined with herbs or spices such as mint or cinnamon. Other popular flavorings include peeled garlic cloves, jalapeno or other peppers, green onions, peppercorns or mustard seed.

Thoroughly wash all fruits and vegetables with clean water; peel if necessary before use. Small fruits and vegetables may be left whole or halved. Larger ones, such as peaches, may need to be sliced or cubed. Allow 1 to 2 cups of fruit per pint of vinegar, or the peel of one orange or lemon per pint of vinegar. Garlic cloves, peppers and chunks of firm fruit may be threaded on clean, thin bamboo skewers for easy insertion and removal.

Vinegar - Several types of vinegar may be used, but not all give the same results. Distilled white vinegar is clear in color and has a sharp acidic taste by itself. It is the best choice for delicately flavored herbs. Apple cider vinegar has a milder taste than distilled white vinegar, but the amber color may not be desirable. Apple cider vinegar blends best with fruits. Wine and champagne vinegars are generally more expensive than distilled and cider vinegars, but are more delicate in flavor. White wine and champagne vinegars work well with delicate herbs and lighter-flavored fruits. Red wine vinegar would work well with spices and strong herbs like rosemary, but will mask the flavor of most herbs. Rice vinegar is a mild, slightly sweet vinegar used occasionally for flavoring. Be aware that wine and rice vinegars contain some protein that provides an excellent medium for bacterial growth, if not handled and stored properly. For added safety, use only commercially produced vinegars.

Flavoring the Vinegar

Place the prepared herbs, fruits and/or spices in the sterilized jars. Avoid overpacking the jars; use 3 to 4 sprigs of fresh herbs, 3 tablespoons of dried herbs, 1 to 2 cups of fruit or vegetables, or the peel of one lemon or orange per pint of vinegar to be flavored. If using basil, 1/2 cup of coarsely chopped leaves may also be used.

Often it is preferred to "lightly bruise" mint leaves or the sprigs of fresh herbs to release the flavors and shorten

the flavoring process a little. If using dried bay leaves, leave whole for easy removal. A small slit may be cut in whole jalapeno peppers or peeled garlic cloves; wear plastic gloves when working with peppers.

Berries may also be "lightly bruised" as they are put in your container. When using orange or lemon peel, thinly cut off only the colored portion, avoiding the thick white underside. Try to cut the peel in a continuous or long spiral for easy removal later on.

Heat the vinegar to just below the boiling point, or at least 190-195° F. Pour over the flavoring ingredients in jars, leaving 1/4 inch headspace. Wipe rims of jars with a clean, damp cloth. Attach lids, corks or screw caps tightly. Let sit to cool undisturbed.

Store in a cool, dark place. Let sit undisturbed for 3 to 4 weeks to develop flavors.* Strain the vinegar through a damp cheesecloth or coffee filter one or more times until the vinegar shows no cloudiness. (Skewers of vegetables may be removed first.) Discard the fruit, vegetables and/or herbs.

Prepare jars and lids as before for final bottling steps. Pour the strained vinegar into clean sterilized jars and cap tightly. A few clean berries or a washed and sanitized sprig of fresh herb may be added to the jars before closing, if desired.

* A Note About Checking Flavors: It takes at least 10 days for most flavors to develop and about 3 to 4 weeks for the greatest flavor to be extracted. However, desired flavors are a matter of personal taste. Crushing, "bruising", or chopping fruits, herbs and vegetables before adding them to jars can shorten the flavoring process by about a week or so. To test for flavor development, place a few drops of the vinegar on plain white bread and taste. If the flavor has developed to a pleasing point for you, strain the vinegar and continue as above. If flavors seem too strong after the standing time and straining, dilute the flavored vinegar with more of the base vinegar that was used in preparing the recipe.

Storing the Vinegar

Store the flavored vinegars in a cool, dark place. Refrigeration is best for retention of freshness and flavors. Date the bottles or jars when they are opened. If properly prepared and bottled, flavored vinegars should keep for up to 3 months in cool storage. Fruit vinegars in particular may start to brown and change flavor noticeably after that. Refrigeration of all flavored vinegars may extend the quality for 6 to 8 months. Always keep vinegar bottles tightly sealed. After six months, even if there is no sign of spoilage, taste the vinegar before using to make sure the flavor

is still good. If a flavored vinegar ever has mold on or in it, or signs of fermentation such as bubbling, cloudiness, or sliminess, throw it away without using any of the vinegar for any purpose.

Herbed and fruited vinegars are often displayed on sunny window sills and shelves as decorative room additions. If stored in this manner for more than a few weeks, these bottles should be considered as permanent decorations and not used in food preparation.

Significance of Safety Concerns

As long as clean and high-quality ingredients (vinegar and herbs, vegetables or fruits) are used, the greatest concern with homemade flavored vinegars should be mold or yeast and then having to throw out your product. If your flavored vinegar starts to mold at any time, or show signs of fermentation such as bubbling, cloudiness or sliminess, discard the product and do not use any of it that is left.

Some harmful bacteria may survive and even multiply slowly in some vinegars. It is important to follow directions carefully, store flavored vinegars in the refrigerator or cool places, and work in a very clean area with sanitary utensils. Also be sure hands are very clean while you work!

References:

- Create A Classic. Making Flavored Vinegars.* 1994. H. J. Heinz Co., Pittsburgh, PA.
Deeming, S. and B. Deeming. *Canning.* 1983. HP Books, Tucson, AZ.
Flavored Vinegars. 1994. In 1995 OSU Master Food Preserver Notebook, ed. By C. Raab. Oregon State University Extension Service, Corvallis, OR. SP 50-736.
Kendall, P. and J. Rausch. *Flavored vinegars and oils.* 1996. Colorado State University Cooperative Extension, Fort Collins, CO. Food and Nutrition Series Factsheet No. 9.34.
Oster, M. *Herbal Vinegar.* 1994. Storey Communications, Inc., Pownal, VT.

Suggested Flavorings

Herbal-Mix Vinegar

For each pint jar of distilled white or wine vinegar to be flavored, make a bouquet from 3 sprigs each of fresh parsley, rosemary and thyme. Lightly crush before placing in jars.

Fresh Tarragon Vinegar

For each pint jar of distilled white or white wine vinegar to be flavored, use 3 (3 inch) sprigs of fresh tarragon, or 1 cup of fresh tarragon leaves and stems. Lightly crush before placing in jars.

Variation: Also add 1/3 cup minced fresh chives to each pint of vinegar, along with the tarragon.

Lemon-Dill-Peppercorn Vinegar

For each pint jar of distilled white vinegar to be flavored, use the spiral peel (colored part only) of 1 lemon, 4 sprigs of fresh dill, and 1/2 teaspoon whole black peppercorns. (This is especially good in marinades for fresh seafoods or salad dressings.)

Spicy Parsley Vinegar

For each pint jar of distilled white vinegar to be flavored, use 3 to 4 sprigs of fresh parsley, 1/2 teaspoon whole mustard seeds, and 1/2 teaspoon whole allspice.

Raspberry Vinegar

Wash 2 cups fresh raspberries gently but thoroughly. Bruise slightly with the back of a spoon or by rolling gently in waxed paper. Place in a sterilized quart glass canning jar. Heat 3 cups of vinegar to just below the boiling point and pour over the raspberries. Cap tightly and allow to stand 2 to 3 weeks in a cool, dark place. Strain vinegar through damp cheesecloth and discard fruit. Pour vinegar into clean, sterilized glass jars or bottles. Seal tightly. Store in the refrigerator for best quality and flavor. (This is especially good in dressings for mixed greens or fruit.)

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Gale A. Buchanan, Dean and Director

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Recipes Using Preserved Citrus

Slow-Cooker Citrus Maple Oatmeal.....	1
Spinach Salad with Tangy Dressing	2
Creamy Orange Chipotle Dressing	2
Quick and Easy Citrus Salsa Chicken Salad.....	2
Orange Marmalade Chicken	3
Citrus Herb Sausage Patties	3
Roasted Fingerlings with Preserved Lemon	4
Greek Lemon Chicken Soup (Avgolemono)	4
Chicken Tagine with Preserved Lemons, Green Olives, & Golden Raisins	5
Lemon Crumb Tart	5
Orange Marmalade Cake	5
Preserved Lemon Ice Cream.....	6

Slow-Cooker Citrus Maple Oatmeal

Yield: 4 servings

Prep Time: 10 minutes

Cook Time: 7-8 hours

- 1 cups orange juice
- 1 cups water
- 1-1/3 cups milk
- 1/3 cups maple syrup
- 1 cups steel cut oats
- 1/3 teaspoon ground cinnamon
- 1/8 teaspoon salt

1. In a large mixing bowl, whisk together orange juice, water, milk, maple syrup, cinnamon and salt.
2. Generously spray inside of a 3-4 quart slow cooker with nonstick cooking spray.
3. Add oats and then pour in liquid mixture; stir.
4. Set slow cooker to low heat and cook for 7–8 hours.

Spinach Salad with Tangy Dressing

Salad

Spinach
2 pints oranges & grapefruit, drained
2-3 green onion, chopped
Toasted pecans or walnuts

Dressing

1/4 cup low-sugar jam
2 tablespoons Thai dipping sauce
1/2 cup white vinegar
3/4 cup olive oil
1 teaspoon lemon juice
1/8 teaspoon black pepper

1. Blend all dressing ingredients in blender until smooth. Refrigerate.
2. Put all salad ingredients in large bowl.
3. Dress the salad just before serving, no earlier. (*This dressing is sweet; do not overdress.*)

Creamy Orange Chipotle Dressing

Yield: 2 servings

3 tablespoons olive oil mayonnaise
Juice of 1 mandarin orange
2-3 teaspoons lemon or lime juice
1/2 teaspoon kosher salt
1/4 teaspoon chipotle powder
1/4 teaspoon garlic powder
Fresh ground pepper

Whisk all ingredients in a small bowl until smooth and pour over salad.

Source: <http://www.chocolatesalad.com>

Quick and Easy Citrus Salsa Chicken Salad

Servings: 4

Prep: 10 minutes

1 lime, zested and juiced
1 Valencia orange, zested and juiced
1/2 cup low fat mayonnaise
1/2 cup chunky salsa
4 cups chopped cooked rotisserie or roasted chicken
4 thinly sliced green onions

1. In a large bowl, mix lime and orange juices, freshly grated zests, mayonnaise, and salsa.
2. Add chicken and green onions and stir gently to combine.

Variation: Add in fresh corn kernels and cilantro for another delicious variation.

Orange Marmalade Chicken

Number of servings: 4

Prep: 5 minutes

Cook: 15 minutes

1 lemon, zested and juiced
1/3 cup orange marmalade
2 boneless and skinless chicken breasts
1/4 teaspoon salt
1/4 teaspoon fresh ground black pepper (or to taste)
2 teaspoons olive oil

1. In a small bowl, combine lemon juice, freshly grated zest and marmalade. Set aside.
2. Cut each chicken breast in half lengthwise and season with salt and fresh pepper.
3. In a medium-sized nonstick sauté pan, heat olive oil on medium-high heat.
4. Add chicken and cook 3 – 4 minutes per side.
5. Add marmalade mixture and bring to a simmer. Reduce heat to medium and cook about 4 – 6 minutes, until chicken is cooked through to an internal temperature of 165°F.

Variations:

- *Top with additional green onions or fresh basil.*
- *To add some spice, add a pinch of red pepper flakes.*

Citrus Herb Sausage Patties

Prep: 10 minutes

Cook: 6-8 minutes

1 Minneola tangelo, zested and juiced
1 lemon, zested and juiced
1 teaspoon salt
1/2 teaspoon fresh ground black pepper
2 teaspoons rubbed dry sage
2 tablespoons minced fresh garlic
1/2 teaspoons red pepper flakes
2 pounds ground pork

1. In a large bowl, combine the freshly squeezed Minneola tangelo and lemon juices, freshly grated zests, salt, pepper, sage, garlic, red pepper flakes, and mix well.
2. Crumble ground pork into the bowl, and mix with clean hands until fully combined.
3. Shape into 12 patties, about 1/2-inch thick.
4. Heat a large skillet over medium-high heat until hot.
5. Cook patties in batches for about 3-4 minutes per side, until no longer pink in center (internal temperature 160°F).

NOTE: Be sure to check the packaging of the ground pork as it often comes pre-seasoned. If it is, omit salt from recipe.

Roasted Fingerlings with Preserved Lemon

Yield: 4 Servings

Preserved lemons add a wonderful salty-sweet hit to these simple potatoes, but if you don't have them on hand, you can use regular lemons instead. Thinly slice the peel of one lemon, then toss with the potatoes before roasting.

2 pounds fingerling potatoes, halved lengthwise
3 tablespoons olive oil
2 teaspoons chopped fresh rosemary
Kosher salt and freshly ground black pepper

1. Preheat oven to 450°F.
2. Toss potatoes, oil, and rosemary on a large rimmed baking sheet; season with salt and pepper.
3. Roast, tossing halfway through, until soft and golden brown, 25–30 minutes.
4. Toss warm potatoes with preserved lemon peel.

Source: bonappetit.com

Greek Lemon Chicken Soup (Avgolemono)

Yield: 4 servings

4 cups chicken stock
1 small carrot, halved
1 stalk celery, halved
1 sprig dill, plus sprigs for garnish
1 shallot, halved
Kosher salt
1 boneless, skinless chicken breast (about 6 ounces)
1/3 rounded cup orzo
2 large eggs
3 tablespoons lemon juice

1. In a large saucepan, combine the chicken stock with 4 cups water, the carrot, celery, dill, shallot and 1/2 teaspoon salt. Bring to a boil over medium-high heat. Add the chicken breast, lower the heat to a bare simmer, and cook, turning occasionally, until just cooked through, 12 to 15 minutes. Transfer the breast to a plate. Remove the carrot, celery, dill and shallot from the broth, and discard.
2. Raise the heat to a brisk simmer. Add the orzo to the broth and simmer until tender, 6 to 8 minutes. Meanwhile, shred the chicken.
3. Whisk the eggs with the lemon juice in a medium bowl. When the orzo is cooked, slowly ladle about 1/2 cup of the hot broth into the egg mixture while whisking constantly. Pour back into the saucepan and cook, whisking occasionally, just until the broth returns to a simmer, about 2 minutes. Turn off the heat, add the shredded chicken, and season with salt.
4. Ladle the soup into bowls and garnish with dill.

Source: Valerie's Home Cooking

Chicken Tagine with Preserved Lemons, Green Olives, & Golden Raisins

1 whole chicken, quartered	8 slices preserved lemon
1 teaspoon each, turmeric, cinnamon, coriander, cumin, dried cilantro	1/2 cup green olives
1/2 cup olive oil	1/2 cup golden raisins
1/2 c lemon juice	2 cup chicken stock

1. Preheat oven to 350 degrees.
2. Mix all of the dry spices together with the olive oil and lemon juice. Toss the chicken in the marinade and let sit refrigerated for at least an hour.
3. On medium-high heat, sear the chicken to create a nice golden crust, approximately 8-10 minutes. Make sure to turn the chicken so that all sides get the color.
4. Scatter lemons, olives and raisins over the tops. Pour in chicken stock and bake for 45 minutes to an hour.

Source: *camillestyles.com*

Lemon Crumb Tart

1 roll sugar cookie dough at room temperature	3/4 cup white baking chips
1 cup all-purpose flour	1 - 2 jars lemon curd

1. Preheat oven to 350°F.
2. Let cookie dough stand at room temperature 10 minutes to soften. In large bowl, mix cookie dough and flour until well blended. Stir in white chips. Reserve 1 cup of the mixture for topping. Press remaining mixture in 10- or 11-inch tart pan with removable bottom.
3. Bake 13 to 18 minutes or until edges just begin to brown. Cool 5 minutes. In small bowl, microwave lemon curd 20-30 seconds or until softened; stir until smooth, then spread to within 1 inch of crust edge. Sprinkle reserved crumb mixture evenly over top of tart.
4. Bake an additional 20 – 30 minutes or until light golden brown. Cool completely. Cut into wedges.

Orange Marmalade Cake

Sift together and set aside:

2 cups flour
1 teaspoon baking soda
1/2 teaspoon salt

Mix: 1/3 cup canola oil
1/2 cup sugar
1 teaspoon orange extract

Add: 2 eggs

Mix together:

1 cup of orange marmalade
3/4 cup of buttermilk or sour milk (1 1/2 teaspoons lemon juice plus enough fresh milk to make 3/4 cup can be substituted for sour milk)

Stir jam mixture into the batter by thirds, alternating with the flour mixture. Spoon into 2 greased and floured 9-inch layer cake tins or a Bundt pan. Bake at 350° for 25 to 30 minutes or when a toothpick inserted into the center comes out clean.

Preserved Lemon Ice Cream

Serve scoops of this sweet and salty treat in elegant little dishes with small pour of fruity olive oil and a sprinkle of sea salt on top for an unexpectedly complex treat.

Yield: about 1 quart

4 large egg yolks
2 cups heavy cream
1 cup whole milk
1 cup granulated sugar
1/4 cup freshly squeezed lemon juice
3 tablespoons finely chopped preserved lemon rind
1/2 teaspoon salt or to taste
1/4 cup olive oil, plus a bit more to serve
Flaky sea salt, optional to serve

1. Whisk the egg yolks together in a glass or stainless steel bowl; set aside. Combine the cream, milk, and sugar in a saucepan. Cook over medium heat, stirring occasionally, until the mixture begins to bubble around the edges. Ladle about 1 cup of the cream mixture into the egg yolks and whisk vigorously to temper. Pour the egg and cream mixture back into the pan and whisk well to combine.
2. Cook the mixture on medium low heat while stirring constantly and being careful not to let the mixture boil, until it thickens enough to coat the back of a spoon, about 7 minutes. Whisk in the lemon juice and preserved lemon rind. Add the salt to taste. Cool the mixture completely, for at least 4 hours or overnight.
3. Just before churning, whisk in the olive oil, then freeze in an ice cream machine according to manufacturer's instructions. Transfer the ice cream to a freezer-safe container, cover, and freeze until firm, about 4 hours or overnight. Serve scoops of ice cream in dishes with a drizzle of fruity olive oil and a sprinkle of salt. Keeps in the freezer for 4 days.

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Core Canning Techniques

Basic Food Safety

Wash Hands Frequently

- Personal cleanliness is a must. Wash your hands thoroughly and frequently. *E. coli* resides in the human nose and intestines. Wash your hands if you rub your nose, or if you wipe your face or skin.
- Bandage any cuts or burns on hands before handling food, or use disposable gloves.

Avoid Cross Contamination

- Rinse all fresh fruits and vegetables well under running water before preparing or eating them. Dry them with a clean cloth or paper towel.
- **ALWAYS** wash your hands, knives, cutting boards, and food preparation surfaces well with soapy water before and after any contact with raw meat, fish, or poultry.
- Use a disinfecting solution of 1½ teaspoon of chlorine bleach to 1 pint of water. Dispense with a spray bottle to disinfect countertops, cutting surfaces, sinks, etc. Let sit one minute then wipe. Make a new solution daily.

When In Doubt, Throw It Out

- Never taste food that looks or smells strange to see if it can still be used.
- Most bacteria that cause foodborne illness are odorless, colorless, and tasteless.

Canning Basics

Get Ready ... Be Prepared!

- Read the recipe thoroughly before you begin.
- Measure out all ingredients.
- Have all of your utensils at hand.
- Wash jars, lids and rings in hot soapy water and rinse well. Check jars for imperfections.
- Place clean jars into the boiling water canner and heat the jars.
- Prepare lids and rings according to the directions on the lid and ring packages. (Newer boxes of lids don't require pre-heating, older ones do. You may still pre-heat newer lids.)
- Do a "dry run" of the recipe to make sure you have all of your materials.

General Canning Supplies

- Standard canning jars, rings, self-sealing one-time use lids ; no paraffin wax as a sealing agent
- Funnel
- Headspace measurer
- De-bubbler
- Jar lifter
- Tray/towel for hot jars
- Lid lifter
- Reputable recipe that follows the USDA recommended canning procedures

Canning Processes

- Use an **atmospheric steam canner** or a **boiling water canner** for high acid foods: fruits, pickled and fermented products, jams and jellies.
- Use a **pressure canner** for low acid foods: meats, vegetables, and mixtures of high and low acid foods

Why two different processes? Low acid foods must be pressure canned because *Clostridium botulinum*, the bacteria that causes botulism, is a spore former. When conditions are not favorable for the organism to grow (high heat, dryness, etc.), the bacterial cell forms a protective structure called a spore. It takes a higher temperature than boiling to destroy the spores: 240° - 250°F. If you do not destroy the spores in low acid foods they will germinate and produce fatal toxins in the food when it is stored on the shelf. High acid foods have enough acidity to destroy spores.

The USDA does not recommend the open kettle method of canning because it does not prevent all risks of spoilage.

Raw-Pack vs. Hot-Pack Methods

Filling jars with raw, unheated food prior to heat processing is called the raw-pack method. The preferred method, filling jars with preheated, hot food prior to heat processing, is called the hot-pack method. Benefits include a tighter pack and, because food expels air when heated, less float.

Jars

Check jars, lids and bands for high quality. Wash jars, lids and bands in hot, soapy water. Rinse well. Dry bands. Heat home canning jars in hot water, not boiling, until ready for use. Fill a large saucepan or stockpot half-way with water. You may also place them in your canner. Place jars in water (filling jars with water from the saucepan will prevent flotation). Bring to a simmer over medium heat. Keep jars hot until ready for use. You may also use a dishwasher to wash and heat jars. Keeping jars hot prevents them from breaking when hot food is added. Leave lids and bands at room temperature for easy handling.

Headspace

Headspace is the completely empty space left in the jar underneath the lid and above the food. Headspace allows for food to expand during canning without being forced out from under the lid during processing. Recommended amounts also allow for good vacuums to be formed for holding lids in place and good food quality to be maintained during storage.

Atmospheric Steam Canning Essentials

Atmospheric Steam Canning Equipment

- Shallow base pan to hold water with a fitted rack that sits on the base, with a high domed cover. The cover has one or more vent holes near the bottom.
- Some models have a temperature sensor that indicates when the steam is at the correct temperature to start timing the process.

Adjusting for Altitude

All recipes are developed using sea level as the criteria for processing times. At sea level, water boils at 212°F. At higher altitudes water boils at a lower temperature. Adjustments have to be made to ensure safe canning. Canning at any altitude higher than 1,000 ft. requires adjusting the processing time, refer to the Altitude Chart for these times.

Altitude Chart	
Altitude in feet	Increase processing time
1000 - 3000	5 minutes
3001 - 6000	10 minutes
6001 - 8000	15 minutes

Using an Atmospheric Steam Canner

- Use a research tested recipe and processing time developed for a **boiling water** canner when using an atmospheric steam canner. An atmospheric steam canner may be used with recipes approved for half-pint, pint, or quart jars.
- Add enough water to the base of the canner to cover the rack. (Follow manufacturer recommendations.)

- Preheat water to 140°F for raw-packed foods and to 180°F for hot-packed foods. Food preparation can begin while this water is preheating. Do not have the water boiling when you add the jars.
- Heat jars prior to filling with hot liquid (raw or hot pack). Do not allow the jars to cool before filling.
- Load filled jars, fitted with lids, onto the canner rack and place the lid on the canner base.
- Turn heat to its highest position to boil the water until a steady column of steam (6-8 inches) appears from the vent hole(s) in the canner lid. Jars must be processed in pure steam environment.
- If using a canner with a temperature sensor, begin processing time when the temperature marker is in the green zone for your altitude. If using a canner without a temperature sensor, begin processing time when a steady stream of steam is visible from the vent hole(s).
- Set the timer for the total minutes required for processing the food, adjusting for altitude. Processing time must be limited to **45 minutes or less, including any modification for elevation**. The processing time is limited by the amount of water in the canner base. When processing food, **do not** open the canner to add water.
- Monitor the temperature sensor and/or steady stream of steam throughout the entire timed process. Regulate heat so that the canner maintains a temperature of 212°F. A canner that is boiling too vigorously can boil dry within 20 minutes. If a canner boils dry, the food is considered under-processed and therefore potentially unsafe.
- At the end of the processing time, turn off the heat and remove the lid, lifting the lid away from you.
- Using a jar lifter, remove the jars without tipping and place them on a towel, leaving at least 1 inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

Boiling Water Canning Essentials

Boiling Water Canning Equipment

- Deep, non-reactive kettle, stainless steel or enamel with a bottom rack.

Adjusting for Altitude

All recipes are developed using sea level as the criteria for processing times. At sea level, water boils at 212°F. At higher altitudes water boils at a lower temperature. Adjustments have to be made to ensure safe canning. Canning at any altitude higher than 1,000 ft. requires adjusting the processing time, refer to the Altitude Chart for these times.

Altitude Chart	
Altitude in feet	Increase processing time
1000 - 3000	5 minutes
3001 - 6000	10 minutes
6001 - 8000	15 minutes

Using a Boiling Water Canner

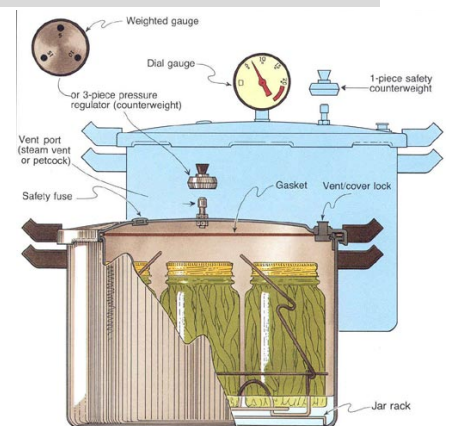
- Before you start preparing your food, fill the canner halfway with clean water. This is approximately the level needed for a canner load of pint jars. For other sizes and numbers of jars, the amount of water in the canner will need to be adjusted so it will be 1 to 2 inches over the top of the filled jars.
- Preheat water to 140°F for raw-packed foods and to 180°F for hot-packed foods. Food preparation can begin while this water is preheating. Do not have the water boiling when you add the jars.
- Load filled jars, fitted with lids, into the canner rack and use the handles to lower the rack into the water; or fill the canner with the rack in the bottom, one jar at a time, using a jar lifter. When using a jar lifter, make sure it is securely positioned below the neck of the jar (below the screw band of the lid). Keep the jar upright at all times. Tilting the jar could cause food to spill into the sealing area of the lid.
- Add boiling water, if needed, so the water level is at least 1 inch above jar tops. Pour the water around the jars, not on them. For process times over 30 minutes, the water level should be at least 2 inches above the tops of the jars.

- Turn heat to its highest position, cover the canner with its lid, and heat until the water in the canner boils vigorously.
- Set the timer for the total minutes required for processing the food, adjusting for altitude.
- Keep the canner covered and maintain a boil throughout the process schedule. The heat setting may be lowered a little as long as a complete boil is maintained for the entire process time. If the water stops boiling at any time during the process, bring the water back to a vigorous boil and begin the timing of the process over, from the beginning.
- Add more boiling water, if needed, to keep the water level above the jars.
- When the jars have boiled for the recommended time, turn off the heat and remove the canner lid. Wait no more than 5 minutes before removing jars.
- Using a jar lifter, remove the jars without tipping and place them on a towel, leaving at least 1 inch spaces between the jars during cooling. Let jars sit undisturbed to cool at room temperature for 12 to 24 hours.

Pressure Canning Essentials

Pressure Canning Equipment

- Pressure canner with the following features:
 - Flat rack in bottom
 - Pressure regulator or indicator
 - ✓ Dial or weighted gauge
 - ✓ Vent pipe (port) for pressurizing
 - Safety valves or overpressure plugs
 - Safety locks when pressurized
 - Flexible gasket/sealing ring in lid or metal to metal seal
 - Optional: jar stacking rack
- Please note that a pressure cooker is NOT a pressure canner, but a pressure canner can be used as a pressure cooker. A pressure cooker must be able to hold **4 quart** jars on a rack to be considered a pressure canner.



Adjusting for Altitude: Pressure Canner

Processing times for all recipes are at sea level. At sea level to 2,000 feet, 11 pounds of steam pressure will produce 240°F. Above 2,000 feet you must increase the steam pressure to reach this temperature. At altitudes above sea level adjust the pressure according to the altitude chart.

Altitude Chart	
Altitude in feet	Required Pressure
Sea Level – 2000ft.	11lb.
2001 – 4000ft.	12lb.
4001 – 6000ft.	13lb.
6001 – 8000ft.	14lb.
8001 – 10,000ft.	15lb.

Using a Pressure Canner

1. Clean lid gaskets and other parts according to the manufacturer's directions; make sure all vent pipes are clear.
2. Put 2 to 3 inches hot water (140°F) into the canner.
3. Place filled jars on the jar rack in the canner, using a jar lifter.
4. Fasten the canner lid securely. Leave the weight off the vent pipe or open the petcock.
5. Turn the heat setting to high; heat until the water boils and steams. **Always** vent for 10 minutes.
6. Place the counterweight or weighted gauge on the vent pipe, or close the petcock.
7. Start timing the process when the pressure reading on the dial gauge indicates that the recommended pressure has been reached, or, for canners without dial gauges, when the weighted gauge begins to jiggle or rock as the manufacturer describes.
8. Regulate the heat under the canner to maintain a steady pressure at, or slightly above, the correct gauge pressure. **IMPORTANT:** If at any time pressure goes below the recommended amount, bring the canner back to pressure and begin the timing of the process over, from the beginning using the total original process time. This is important for the safety of the food.

9. When the timed process is completed, turn off the heat, remove the canner from the heat (electric burner) if possible, and let the canner cool down naturally. Do not force cool the canner. Pints take about 30 minutes to cool; 45 minutes for quarts.
10. After the canner is completely depressurized, remove the weight from the vent pipe or open the petcock. **Wait 10 minutes**; then unfasten the lid away from you to remove.
11. Remove the jars from the canner by lifting them upright and placing them on a rack or folded towel away from drafts.
12. Do not retighten the rings. Leave the ring bands on the jars until they have cooled thoroughly (approximately 24 hours). Do not try to dump or wipe up any water on the lids.
13. Dry the canner, lid and gasket. Take off removable petcocks and safety valves; wash and dry thoroughly. Follow maintenance and storage instructions that come from your canner manufacturer.

Finishing

Removing and Cooling Jars

Be careful when moving and lifting filled jars. Do not tilt. Do not be tempted to try to pour off the water on the top when lifting them out of the canner. The water on top of the hot jars will evaporate very rapidly. If the jars are tilted, food may become lodged between the glass rim and the sealing compound preventing proper sealing. Do not leave the jars in the hot water until cooled as the jars will fail to seal, which will result in spoilage.

The Next Day ...

- After cooling the jars for 12 to 24 hours, remove the screw bands.
- Check each jar for a seal; press the middle of the lid with your finger. If the lid springs up when you release your finger, the lid is unsealed.
- Clean the jars with a damp cloth. Thoroughly dry ring bands may be replaced on the jars, if desired.
- Label the jars with the product name, date, processing method (WB = Boiling Water/Water Bath, PC = pressure canner), and store in a cool, dark, dry area.
- If a jar did not seal, check the jar for flaws. Refrigerate and use the product within a few days, freeze the jar, or reprocess it within 24 hours using a new lid and if necessary, a new jar. Process by the method originally advised for the full length of time.



Resources

Research-Based Sources for Canning and Other Food Preservation:

- National Center for Home Food Preservation (<http://nchfp.uga.edu/>)
- USDA Guide to Home Canning, 2015
- So Easy to Preserve 6th Edition, September 2014 (University of Georgia)
- The Ball Blue Book Guide to Preserving, 2014
- Ball Complete Book of Home Preserving, 2012
- University of California Publications
- Cooperative Extension Offices (all 50 states)
- Package inserts included with name-brand pectins
- For more links: <http://mfp.ucanr.edu>

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UCCE Master Food Preservers of Amador/Calaveras County

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Jackson, CA 95642
(209) 223-6482

<http://cecentralsierra.ucanr.edu>



Freezing Basics

Basic Food Safety

Wash Hands Frequently

- Personal cleanliness is a must. Wash your hands thoroughly and frequently. E. coli resides in the human nose and intestines. Wash your hands if you rub your nose, or if you wipe your face or skin.
- Bandage any cuts or burns on hands before handling food, or use disposable gloves.

Avoid Cross Contamination

- Rinse all fresh fruits and vegetables well under running water before preparing or eating them. Dry them with a clean cloth or paper towel.
- **ALWAYS** wash your hands, knives, cutting boards, and food preparation surfaces well with soapy water before and after any contact with raw meat, fish, or poultry.
- Use a disinfecting solution of 1½ teaspoon of chlorine bleach to 1 pint of water. Dispense with a spray bottle to disinfect countertops, cutting surfaces, sinks, etc. Make a new solution daily.

When In Doubt, Throw It Out

- Never taste food that looks or smells strange to see if it can still be used.
- Most bacteria that cause foodborne illness are odorless, colorless, and tasteless.

Freezing Foods

Retains natural color, flavor and nutritive value of foods and is quick and simple to do. Freezing slows down the enzymes in fruits and vegetables that cause them to ripen and then decay.

Freezing Pointers

- Freeze foods at 0°F or lower. For rapid freezing, set the temperature to -10°F 24 hours in advance.
- Freeze foods as soon as they are packed and sealed.
- Water in food freezes and expands creating ice crystals, which rupture cell walls of fruits and vegetables, making them softer when thawed. Large ice crystals do more damage to food cells and cause softer, mushier textures. Minimize the size of ice crystals by keeping the temperature consistent and freezing the food quickly.
- Do not overload your freezer with unfrozen food. Add only the amount that will freeze within 24 hours, which is usually 2 to 3 pounds of food per cubic foot of storage space. Overloading slows down the freezing rate, and foods that freeze too slowly may lose quality.
- Place packages in contact with refrigerated surfaces in the coldest part of the freezer.
- Leave a little space between new packages so air can circulate freely. Stack after frozen.

Preparing Vegetables for Freezing

Select vegetables that are ripe and free of blemishes and prepare for freezing by blanching in boiling water or steam. See separate handout, Freezing Vegetables, for specific blanching times for each type of vegetable.

Blanching Vegetables

- Blanching (scalding vegetables in boiling water or steam for a short time) is a must for almost all vegetables to be frozen. It stops enzyme actions, which can cause loss of flavor, color and texture.
- Blanching cleanses the surface of dirt and organisms, brightens the color and helps retard loss of vitamins. It also wilts or softens vegetables and makes them easier to pack.
- Blanching time is crucial and varies with the vegetable and size. Underblanching stimulates the activity of enzymes and is worse than no blanching. Overblanching causes loss of flavor, color, vitamins and minerals. Follow recommended blanching times listed on the separate handout, Freezing Fruits and Vegetables.

Water Blanching

- Use one-gallon water per pound of prepared vegetables.
- Put the vegetables in a blanching basket and lower into vigorously boiling water.
- Place a lid on the blancher. The water should return to boiling within 1 minute, or you are using too much vegetable for the amount of boiling water.
- Start counting blanching time as soon as the water returns to a boil. Keep heat high for the time given in the directions for the vegetable you are freezing.

Steam Blanching

Heating in steam is recommended for a few vegetables. For broccoli, pumpkin, sweet potatoes and winter squash, both steaming and boiling are satisfactory methods. Steam blanching takes about 1½ times longer than water blanching.

- Use a pot with a tight lid and a basket that holds the food at least three inches above the bottom of the pot. Put an inch or two of water in the pot and bring the water to a boil.
- Put the vegetables in the basket in a single layer so that steam reaches all parts quickly. Cover the pot and keep heat high. Start counting steaming time as soon as the lid is on.

Microwave Blanching

Microwave blanching may not be effective, since research shows that some enzymes may not be inactivated. This could result in off-flavors and loss of texture and color. Those choosing to run the risk of low quality vegetables by microwave blanching should be sure to work in small quantities, using the directions for their specific microwave oven. Microwave blanching will not save time or energy.

Cooling Vegetables

As soon as blanching is complete, vegetables should be cooled quickly and thoroughly to stop the cooking process.

- Plunge the basket of vegetables immediately into a large quantity of cold water, 60°F or below.
- Change water frequently or use cold running water or ice water. If ice is used, about one pound of ice for each pound of vegetable is needed.
- Cooling vegetables should take the same amount of time as blanching.
- Drain vegetables thoroughly after cooling. Extra moisture can cause a loss of quality when vegetables are frozen.

Preparing Fruits for Freezing

Select premium fruits that are fully ripe and free of bruises and other blemishes. Carefully wash, dry, remove pits, and peel, if desired. Use one of the methods described below to prepare fruit for freezing.

Without sugar

Fruit may be frozen without sugar in a water pack or sugar-free fruit juice, such as citrus or berry juice. Small fruit such as berries, cherries, and grapes may be frozen in a single layer on a cookie sheet before packing in containers.

Syrup pack

Fruit may be frozen in a simple syrup of water and cane or beet sugar. If desired, part of the sugar may be replaced by corn syrup or honey. Allow about 2/3 cup of simple syrup for each pint of fruit; 1-1/3 cup for each quart of fruit. Dissolve sugar in hot water and cool before using.

Sugar pack

Juicy fruits and those that will be used for pies or other cooked products may be packed in sugar. Use about 1 cup of sugar for each 2 to 3 pounds of fruit. Gently mix until the sugar has dissolved in the fruit's juices.

Strength of Syrup	Water (cups)	Sugar (cups)	Yield (cups)
Light	4	1	4 ¾
Medium	4	1 ¾	5
Heavy	4	2 ¾	5 ½

Retarding browning

Ascorbic acid may be used to reduce browning of light-colored fruit. For syrup or liquid packs, add ½ teaspoon ascorbic acid to each quart of cold syrup. For sugar or sugarless dry packs, dissolve ½ teaspoon ascorbic acid in 3 tablespoons cold water and sprinkle over 4 cups of fruit just before adding sugar.

Packaging and Shelf Life

Packaging and Labeling Foods

- Cool all foods and syrup before packaging to speed up freezing and help retain the natural color, flavor and texture of food. (Cool in shallow containers in the refrigerator or ice bath.)
- Pack foods in single meal quantities.
- Follow directions for each individual food (see separate handout, Freezing Fruits and Freezing Vegetables) to determine which can be packed dry and which need added liquid. Some loose foods such as blueberries may be individually "tray packed."
- Pack foods tightly leaving as little air as possible in the package.
- Most foods require headspace between the packed food and closure to allow for expansion of the food as it freezes. Foods that are exceptions and do not need headspace include loose packing vegetables such as asparagus and broccoli, bony pieces of meat, tray packed foods and breads.
- Seal rigid containers carefully. Use a tight lid and keep the sealing edge free from moisture or food to ensure a good closure. Secure loose-fitting covers with freezer tape.
- Meats may be packaged using either the "drugstore wrap" or the "butcher wrap."
- Label each package, including the name of the product, any added ingredients, packaging date, the number of servings and amount of each serving, and the form of the food, such as whole, sliced, etc. Use freezer tape, marking pens or crayons, or gummed labels made especially for freezer use.

Containers: Use proper packaging materials to protect food's flavor, color, moisture content and nutritive value from the dry climate of the freezer. The type of containers depends on the type of food to be frozen, personal preference and what you have at home. Do not freeze fruits and vegetables in containers with a capacity over one-half gallon. Foods in large containers freeze too slowly to result in a satisfactory product.

Best packaging materials:

- Moisture vapor resistant
- Not become brittle and crack at low temperatures
- Resistant to oil, grease or water
- Protect foods from absorption of off flavors or odors
- Durable and leak proof
- Easy to seal and mark

Rigid: Used with liquids or soft foods

- Plastic
- Glass: wide mouth dual purpose jars
- Straight sides (no shoulder)
- Tight fitting covers/freezer tape

Flexible: Used with irregular shapes and liquids

- Flexible freezer bags
- Plastic freezer wrap,
- Freezer paper
- Heavy-weight aluminum foil

Headspace to Allow Between Packed Food and Closure Table

Type of Pack	Container with wide top opening		Container with narrow top opening	
	Pint	Quart	Pint	Quart
Liquid Pack*	½ inch	1 inch	¾ inch	1 ½ inch
Dry Pack**	½ inch	½ inch	½ inch	½ inch
Juices	½ inch	1 inch	1½ inch	1½ inch

*Fruit packed in juice, sugar, syrup or water; crushed or pureed fruit.

**Fruit or vegetable packed without added sugar or liquid.

Freezer Shelf Life

- Freezing cannot improve the flavor or texture of any food, but when properly done it can preserve most of the quality of the fresh product. Knowing how long a particular food can be stored in the freezer is not as simple as it sounds.
- The storage times listed in the following table are approximate months of storage for some food products assuming the food has been prepared and packaged correctly and stored in the freezer at or below 0°F. For best quality use the shorter storage times. After these times, the food should still be safe, just lower in quality.

Freezer Shelf Life Table

Food	Approximate months of storage at 0°F
Fruits and Vegetables	8 – 12 months
Poultry	6 – 9 months
Fish	3 – 6 months
Ground Meat	3 – 4 months
Cured or Processed Meat	1 – 2 months

Refreezing Frozen Foods

Occasionally a home freezer stops running. The time the food will stay frozen depends on the amount of food in the freezer and the temperature of the food. A full load of food will stay for up to 2 days if the freezer is not opened. It is safe to refreeze fruits and vegetables that still have ice crystals in them. If the temperature has warmed above 40° F, foods may not be fit for refreezing.

Resources

National Center for Home Food Preservation [Internet]. University of Georgia [cited 2014 September 4]. Available from: <http://nchfp.uga.edu/>

Complete Guide to Home Canning. 2009. USDA Agricultural Information Bulletin 539. National Institute of Food and Agriculture. Available from: http://nchfp.uga.edu/publications/publications_usda.html Also available in paper copy from Purdue Extension (online store is located at https://mdc.itap.purdue.edu/item.asp?item_number=AIG-539)

Kingry, J., & Devine, L., editors. 2006. Ball Complete Book of Home Preserving. Toronto, Canada: Robert Rose Inc.

So Easy to Preserve Fifth Edition. 2006. Bulletin 989. Cooperative Extension/The University of Georgia/Athens Ball Blue Book Guide to Preserving. 2004. Altrista Consumer Products

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