While this document contains many links to websites and other files for your learning pleasure, ***all of the answers to the reappointment quiz are in this study guide – use only this document as your reference for the questions.*** *Allow yourself 2 hours of continuing education to study and take the quiz.*

Contents

The Science Behind Washing Hands

https://www.cdc.gov/handwashing/show-me-the-science.html

Keeping hands clean is one of the most important steps we can take to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean, running water. CDC recommends cleaning hands in a specific way to avoid getting sick and spreading germs to others. The guidance for effective handwashing and use of hand sanitizer was developed based on data from a number of studies.

Show Me the Science - Why Wash Your Hands?

How germs get onto hands and make people sick
Feces (poop) from people or animals is an important source of germs like *Salmonella, E. coli O157,* and norovirus that cause diarrhea, and it can spread some respiratory infections like adenovirus and hand-foot-mouth disease. These kinds of germs can get onto hands after people use the toilet or change a diaper, but also in less obvious ways, like after handling raw meats that have invisible amounts of animal poop on them. A single gram of human feces—which is about the weight of a paper clip—can contain one trillion germs [1]. Germs can also get onto hands if people touch any object that has germs on it because someone coughed or sneezed on it or was touched by some other contaminated object. When these germs get onto hands and are not washed off, they can be passed from person to person and make people sick.

Washing hands prevents illnesses and spread of infections to others
Handwashing with soap removes germs from hands. This helps prevent infections because:

- People frequently touch their eyes, nose, and mouth without even realizing it. Germs can get into the body through the eyes, nose and mouth and make us sick.
- Germs from unwashed hands can get into foods and drinks while people prepare or consume them. Germs can multiply in some types of foods or drinks, under certain conditions, and make people sick.
- Germs from unwashed hands can be transferred to other objects, like handrails, table tops, or toys, and then transferred to another person's hands.
- Removing germs through handwashing therefore helps prevent diarrhea and respiratory infections and may even help prevent skin and eye infections.

Teaching people about handwashing helps them and their communities stay healthy. Handwashing education in the community:

- Reduces the number of people who get sick with diarrhea by 23-40%
- Reduces diarrheal illness in people with weakened immune systems by 58%
- Reduces respiratory illnesses, like colds, in the general population by 16-21%
- Reduces absenteeism due to gastrointestinal illness in schoolchildren by 29-57%

Not washing hands harms children around the world

About 1.8 million children under the age of 5 die each year from diarrheal diseases and pneumonia, the top two killers of young children around the world.

- Handwashing with soap could protect about 1 out of every 3 young children who get sick with diarrhea and almost 1 out of 5 young children with respiratory infections like pneumonia.
- Although people around the world clean their hands with water, very few use soap to wash their hands. Washing hands with soap removes germs much more effectively.
- Handwashing education and access to soap in schools can help improve attendance.
- Good handwashing early in life may help improve child development in some settings.
- Estimated global rates of handwashing after using the toilet are only 19%.

Handwashing helps battle the rise in antibiotic resistance

Preventing sickness reduces the amount of antibiotics people use and the likelihood that antibiotic resistance will develop. Handwashing can prevent about 30% of diarrhea-related sicknesses and about 20% of respiratory infections (e.g., colds). Antibiotics often are prescribed unnecessarily for these health issues. Reducing the number of these infections by washing hands frequently helps prevent the overuse of antibiotics—the single most important factor leading to antibiotic resistance around the world. Handwashing can also prevent people from getting sick with germs that are already resistant to antibiotics and that can be difficult to treat.

Show Me the Science - How to Wash Your Hands

Wet your hands with clean, running water (warm or cold), turn off the tap, and apply soap.

Why? Because hands could become recontaminated if placed in a basin of standing water that has been contaminated through previous use, clean running water should be used. However, washing with non-potable water when necessary may still improve health [3]. The temperature of the water does not appear to affect microbe removal; however, warmer water may cause more skin irritation and is more environmentally costly. Turning off the faucet after wetting hands saves water, and there are few data to prove whether significant numbers of germs are transferred between hands and the faucet.

Using soap to wash hands is more effective than using water alone because the surfactants in soap lift soil and microbes from skin, and people tend to scrub hands more thoroughly when using soap, which further removes germs.

To date, studies have shown that there is no added health benefit for consumers (this does not include professionals in the healthcare setting) using soaps containing antibacterial ingredients compared with using plain soap. As a result, FDA issued a final rule in September 2016 that 19 ingredients in common "antibacterial" soaps, including triclosan, were no more effective than non-antibacterial soap and water and thus these products are no longer able to be marketed to the general public. This rule does not affect hand sanitizers, wipes, or antibacterial products used in healthcare settings.

Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
Why? Lathering and scrubbing hands creates friction, which helps lift dirt, grease, and microbes from skin. Microbes are present on all surfaces of the hand, often in particularly high concentration under the nails, so the entire hand should be scrubbed.

Scrub your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
Why? Determining the optimal length of time for handwashing is difficult because few studies about the health impacts of altering handwashing times have been done. Of those that exist, nearly all have measured reductions in overall numbers of microbes, only a small proportion of which can cause illness, and have not measured impacts on health. Solely reducing numbers of microbes on hands is not necessarily linked to better health. The optimal length of time for handwashing is also likely to depend on many factors, including the type and amount of soil on the hands and the setting of the person washing hands. For example, surgeons are likely to come into contact with disease-causing germs and risk spreading serious infections to vulnerable patients, so they may need to wash hands longer than a woman before she prepares her own lunch at home. Nonetheless, evidence suggests that washing hands for about 15-30 seconds removes more germs from hands than washing for shorter periods.

Accordingly, many countries and global organizations have adopted recommendations to wash hands for about 20 seconds (some recommend an additional 20-30 seconds for drying):

- The Benefits of Hand Washing
- New Zealand. Step-by-Step Guide to Hand Washing
- The Global Public-Private Partnership for Handwashing. Why Handwashing?
- World Health Organization. Guidelines on Hygiene in Health Care: A Summary

Rinse your hands well under clean, running water.
Why? Soap and friction help lift dirt, grease, and microbes—including disease-causing germs—from skin so they can then be rinsed off of hands. Rinsing the soap away also minimizes skin irritation. Because hands could become recontaminated if rinsed in a basin of standing water that has been contaminated through previous use, clean running water should be used. While some recommendations include using a paper towel to turn off the faucet after hands have been rinsed, this

practice leads to increased use of water and paper towels, and there are no studies to show that it improves health.

Dry your hands using a clean towel or air dry them.
Why? Germs can be transferred more easily to and from wet hands; therefore, hands should be dried after washing. However, the best way to dry hands remains unclear because few studies about hand drying exist, and the results of these studies conflict. Additionally, most of these studies compare overall concentrations of microbes, not just disease-causing germs, on hands following different hand-drying methods. It has not been shown that removing microbes from hands is linked to better health. Nonetheless, studies suggest that using a clean towel or air drying hands are best.

Show Me the Science – When & How to Use Hand Sanitizer in Community Settings

Alcohol-based hand sanitizers can quickly reduce the number of microbes on hands in some situations, but sanitizers do not *eliminate all types of germs.*
Why? Soap and water are more effective than hand sanitizers at removing certain kinds of germs, like *Cryptosporidium*, norovirus, and *Clostridium difficile*. Although alcohol-based hand sanitizers can inactivate many types of microbes very effectively when used correctly, people may not use a large enough volume of the sanitizers or may wipe it off before it has dried.

Hand sanitizers may not be as effective when hands are visibly dirty or greasy.
Why? Many studies show that hand sanitizers work well in clinical settings like hospitals, where hands come into contact with germs but generally are not heavily soiled or greasy. Some data also show that hand sanitizers may work well against certain types of germs on slightly soiled hands. However, hands may become very greasy or soiled in community settings, such as after people handle food, play sports, work in the garden, or go camping or fishing. When hands are heavily soiled or greasy, hand sanitizers may not work well. Handwashing with soap and water is recommended in such circumstances.

Hand sanitizers might not remove harmful chemicals, like pesticides and heavy metals, from hands.
Why? Although few studies have been conducted, hand sanitizers probably cannot remove or inactivate many types of harmful chemicals. In one study, people who reported using hand sanitizer to clean hands had increased levels of pesticides in their bodies. If hands have touched harmful chemicals, wash carefully with soap and water (or as directed by a poison control center).

If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol.
Why? Many studies have found that sanitizers with an alcohol concentration between 60–95% are more effective at killing germs than those with a lower alcohol concentration or non-alcohol-based hand sanitizers. Hand sanitizers without 60-95% alcohol 1) may not work equally well for many types of germs; and 2) merely reduce the growth of germs rather than kill them outright.

When using hand sanitizer, apply the product to the palm of one hand (read the label to learn the correct amount) and rub the product all over the surfaces of your hands until your hands are dry.
Why? The steps for hand sanitizer use are based on a simplified procedure recommended by CDC. Instructing people to cover all surfaces of both hands with hand sanitizer has been found to provide similar disinfection effectiveness as providing detailed steps for rubbing-in hand sanitizer.

Swallowing alcohol-based hand sanitizers can cause alcohol poisoning.
Why? Ethyl alcohol (ethanol)-based hand sanitizers are safe when used as directed, but they can cause alcohol poisoning if a person swallows more than a couple of mouthfuls.

From 2011 – 2015, U.S. poison control centers received nearly 85,000 calls about hand sanitizer exposures among children. Children may be particularly likely to swallow hand sanitizers that are scented, brightly colored, or attractively packaged. Hand sanitizers should be stored out of the reach of young children and should be used with adult supervision. Child-resistant caps could also help reduce hand sanitizer-related poisonings among young children. Older children and adults might purposefully swallow hand sanitizers to become drunk.

Safety Note # 151 Preventing The Spread Of Communicable Diseases

http://safety.ucanr.edu/Master_Food_Preserver_Safety/MFP_Safety_Notes/

Each year in the United States, on average, more than 200,000 people are hospitalized and 36,000 people die from seasonal influenza (flu) complications. You can help keep yourself, your family, and your co-workers healthy and prevent the spread of seasonal colds, flu, and other communicable diseases by practicing some simple measures at home and in the workplace. Over the past few years, novel influenza viruses have emerged, including H1N1 (also known as swine flu) and H5N1 (also known as avian influenza). The precautions to protect yourself and others from these novel influenza viruses are the same as those recommended for seasonal flu or other common communicable illnesses.

The Centers for Disease Control and Prevention (CDC) urges you to take the following actions to protect yourself and others from the flu:

Take time to get vaccinated for seasonal influenza

- CDC recommends a yearly seasonal flu vaccine as the first and most important step in protecting against seasonal influenza. While there are many different flu viruses, the seasonal flu vaccine protects against the three seasonal viruses that research suggests will be most common.
- Vaccination is especially important for people at high risk of serious flu complications, including young children, pregnant women, people with chronic health conditions like asthma, diabetes or heart and lung disease, and people 65 years and older. Seasonal flu vaccine is also important for health care workers, and other people who live with or care for high risk people to prevent giving the flu to those at high risk.
- People who have ever had a severe allergic reaction to eggs may be advised not to get vaccinated. People who have had a mild reaction to egg—that is, one which only involved hives—may receive a flu shot with additional precautions. Make sure your health care provider knows about any allergic reactions.

Take everyday preventive actions

- Cover your nose and mouth with a tissue when you cough or sneeze. Throw the tissue in the trash after you use it. If a tissue is not available, cough or sneeze into your sleeve. An informative and amusing video on covering your sneeze can be viewed at: http://www.coughsafe.com/
- Wash your hands often with soap and water, especially after you cough or sneeze. Alcohol-based hand cleaners are also effective.
- Avoid touching your eyes, nose, or mouth. Germs spread this way.
- Try to avoid close contact with sick people.
- If you are sick with flu-like illness, try to avoid infecting others. Most healthy adults may be able to infect others beginning 1 day before symptoms develop and up to 5 to 7 days after becoming sick. CDC recommends that you stay home for at least 24 hours after your fever is gone except to get medical care or for other necessities. (Your fever should be gone without the use of a fever-reducing medicine.)
- Visit the CDC website (http://www.cdc.gov/flu/index.htm) to find out what to do if you get sick with the flu and how to care for someone at home who is sick with the flu.

Stay Informed In addition to the precautions above, it is important that you stay informed, especially during the annual flu season. Health officials will provide additional information as it becomes available. UC ANR Risk & Safety Services has links on our website at http://safety.ucanr.edu/safety_notes that lead to up-to-date information from CDC and other agencies. When new diseases emerge, we will keep this site current with national, state, and local guidance about influenza or other communicable disease. Follow public health advice regarding school closures, avoiding crowds, and other social distancing measures.

Safety Note #181 Guidance for Food Preparation and Managing Employee Illness

http://safety.ucanr.edu/Master_Food_Preserver_Safety/MFP_Safety_Notes/

Supervisors should discuss the following symptoms and restrictions with employees or volunteers who prepare or handle food as part of their duties. Employees or volunteers who have food handling duties must report these symptoms or illnesses to their supervisor and supervisors must take steps to ensure that food safety practices are maintained.

If an employee or volunteer has:	Action:	Return to work:
Flu-like symptoms (cough, sore throat, fever, or runny nose), or has been diagnosed with any type of influenza; and the symptoms cannot be controlled by medication	The employee or volunteer is restricted from contact with exposed food, linens, utensils, or food-related supplies and equipment	When employee or volunteer has been asymptomatic for at least 24 hours
Vomiting, diarrhea or other gastrointestinal illness symptoms		
Open or infected wounds/sores on the hands or arms that are not covered by a dry, durable, tightfitting bandage		When wounds/sores are covered with waterproof bandage or healed
Been diagnosed with one of the following illnesses: E.coli 0157:H7 (or shiga-toxin producing E.coli), Salmonella typhi, Salmonella	The employee or volunteer is excluded from the	When medically cleared by physician

spp., Shigella spp., Hepatitis A virus, Norovirus, Entamoeba histolytica, Or any other illness that may be transmittable through food.	food facility or preparation area	

If an employee is restricted or excluded from handling food due to illness, they may use sick leave, or if the symptoms do not pose a threat of spreading illness to other persons in the workplace, the individual may be re-assigned to work that does not require handling of food. When an individual has been restricted or excluded from food handling duties due to illness, they should not return to food handling duties until they have been asymptomatic for at least 24 hours, or cleared by a physician, depending on the illness, as noted in the chart above.

For more information, see the California Department of Public Health (CDPH) fact sheet, "Illness Reporting Requirements for Foodservice Workers and Persons-in-Charge" for more information. https://www.cdph.ca.gov/pubsforms/Documents/fdbRFgde08.pdf.

A comprehensive ANR Food Safety Guide, For Recipe Demonstrations and Food Tastings is available to Advisors, Supervisors, and Educators that work in Nutrition Education programs.

This Safety Note is compiled based on guidance from the US Food & Drug Administration, California Department of Public Health, and the California Retail Food Code.

Testing Jelly without Added Pectin

Three methods of testing for doneness in jelly made without added pectin are given below. Of these, the temperature test is most dependable.

Temperature Test – Take the temperature of the jelly with a candy or jelly thermometer. When done, the temperature of the jelly should be 220°F, 8°F above the boiling point of water, if you are at sea level. **NOTE**: For each 1000 feet of altitude above sea level, subtract 2 degrees F. For instance, at 1,000 feet of altitude, the jelly is done at 218°F; at 2,000 feet, 216°F, etc. See Table 1 below.

For an accurate thermometer reading, place the thermometer in a vertical position and read at eye level. The bulb of the thermometer must be completely covered with the jelly but must not touch the bottom of the saucepot. (Remember to test the accuracy of the thermometer by placing it in boiling water.)

Table 1. Temperature Test – Use a jelly or candy thermometer and boil until mixture reaches the following temperatures at altitudes of:

Sea Level	1,000 ft	2,000 ft	3,000 ft	4,000 ft	5,000 ft	6,000 ft	7,000 ft	8,000 ft
220°F	218°F	216°F	214°F	212°F	211°F	209°F	207°F	205°F

Spoon or Sheet Test – Dip a cool metal spoon into the boiling jelly mixture and lift the spoon out of the steam so the syrup runs off the side. When the mixture first starts to boil, the drops will be light and syrupy. As the syrup continues to boil, the drops will become heavier and will drop off the spoon two at a time. When the two drops form together and "sheet" off the spoon, the jellying point has been reached.

Refrigerator/Freezer Test - Pour a small amount of boiling jelly on a plate, and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it should be done. During this test, the rest of the jelly mixture should be removed from the heat.

Developed at The University of Georgia, Athens. Released by Elizabeth L. Andress, Ph.D., Department of Foods and Nutrition, College of Family and Consumer Sciences. April 2018.

Using and Calibrating a Dial Stem Food Thermometer

https://foodsafety.wisc.edu/assets/pdf_Files/Calibration_thermo.pdf

Just like any other kitchen tool, it's important that a food thermometer properly registers temperature. Following you will find instructions for using, and recalibrating, a dial stem thermometer.

Using a dial stem thermometer.

- Remove the thermometer from the plastic sleeve.
- Place the metal stem 2 to 2 ½ inches deep into the thickest part of the food with the pointed end first.
- The pointer on the dial will move up to the internal temperature of the food.
- A dial stem thermometer can easily be used in roasts, casseroles, and soups. It must be inserted sideways into thin foods like burgers, steaks, or chops.
- Use a thermometer to check the internal temperature of a food at, or near, the end of cooking time.
- Do not place the thermometer in food during cooking or grilling, the thermometer will melt.
- After checking the temperature, clean the metal stem with soap and water - do not put the entire thermometer in water – then dry and store in the plastic sheath.

Calibrating a dial stem thermometer. Sometimes a dial stem thermometer loses calibration (it no longer registers temperature correctly). You can recalibrate most dial stem thermometers using ice water and boiling water.

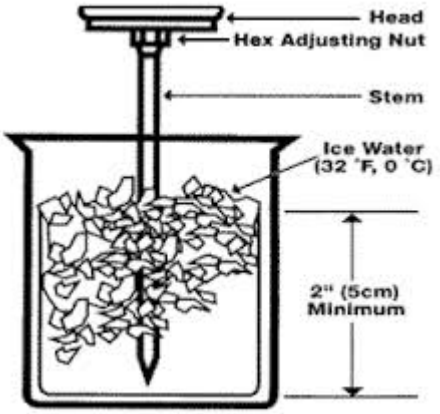
To recalibrate a UWEX thermometer supplied with a white sheath with UWEX imprinted:

1. Hold the thermometer head in one hand with the stem pointing away from you.
2. Remove the white sheath (if necessary) and slide the metal stem into the top loop of the metal pocket clip.
3. Slide the sheath up the thermometer stem until the pocket clip touches the rear of the thermometer case.
4. Turn the sheath so that the pocket clip catches and turns the adjusting lug, which will in turn move the pointer.
5. Immerse the stem at least 2 inches into either ice water or boiling water (see below) and allow the temperature to stabilize (at least 30 seconds). The pointer should read 32-33°F while the stem is immersed into a vessel filled with crushed ice and water. The pointer should read 210-212°F when the stem is immersed into a vessel filled with boiling water.

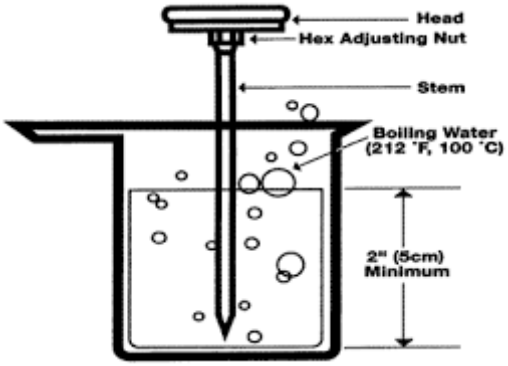
6. Adjust the pointer as necessary and recheck your readings to ensure calibration.

To recalibrate a dial thermometer with a hex nut under the dial: The USDA offers these instructions for calibrating a dial stem thermometer with a hex nut under the dial.

Ice Water. To use the ice water method, fill a large glass with finely crushed ice. Add clean tap water to the top of the ice and stir well. Immerse the food thermometer stem a minimum of 2 inches into the mixture, touching neither the sides nor the bottom of the glass. Wait a minimum of 30 seconds before adjusting. (For ease in handling, the stem of the food thermometer can be placed through the clip section of the stem sheath and, holding the sheath horizontally, lowered into the water.) Without removing the stem from the ice, hold the adjusting nut under the head of the thermometer with a suitable tool and turn the head so the pointer reads 32 °F.



Boiling Water. To use the boiling water method, bring a pot of clean tap water to a full rolling boil. Immerse the stem of a food thermometer in boiling water a minimum of 2 inches and wait at least 30 seconds. (For ease in handling, the stem of the food thermometer can be placed through the clip section of the stem sheath and, holding the sheath horizontally, lowered into the boiling water.) Without removing the stem from the pan, hold the adjusting nut under the head of the food thermometer with a suitable tool and turn the head so the thermometer reads 212 °F.



Editor's Note: For more information, watch this video from Penn State Extension: https://extension.psu.edu/thermometer-use-and-calibration

Fruit Jellies

Extracted from https://ucanr.edu/sites/cottagefoods/files/199766.pdf

Editor's note: while this document's targeted audience is Cottage Food Operators, it contains great information we all can incorporate into our teaching knowledge bank.

This publication provides definitions for standard products, gives help in calculating amounts of ingredients required for successful manufacture and provides suggestions for ensuring product quality.

Jellies, jams, fruit butters and marmalades often are produced by entrepreneurs who encounter quality problems or do not meet the legal standards for these products. A person selling a product to the public must understand the scientific basis for producing a superior product and have the necessary equipment (pH meter and refractometer) to assure the quality of the product. More advanced help is available from the University of Nebraska-Lincoln Food Processing Center and extension educators.

Preservation – Why Fruit Jellies are Stable

Jelly, jam, fruit butters, marmalades and preserves are products that are stable because they are high in solids (sugar) and high in acids. A food substrate concentrated to 65 percent or more soluble solids (sugar) and which contains substantial acid may be preserved with relatively minor heat treatment provided that food product is protected from air. The high fruit solids and the pectin bind or tie-up the moisture sufficiently to lower the water activity (A_w) to a level where only molds can grow. Hermetic sealing protects the product from moisture loss, mold growth and oxidation.

- *Jelly:* Jelly is strictly defined in the United States as: That semisolid food made from not less than 45 parts by weight of fruit juice ingredient to each 55 parts by weight of sugar. This mixture is concentrated to not less than 65 percent soluble solids. Pectin and acid may be added to overcome the deficiencies that occur in the fruit itself. Flavoring and coloring agents may also be added. The name of the fruit used in making the jelly must be stated with the other ingredients, in order of declining by weights, on the label of such products offered for sale in the United States.
- *Jam:* A jam is similar to a jelly except that the crushed or pulped fruit ingredient is used rather than the fruit juice. Concentration is carried to at least 65 percent for all jams, with some requiring up to 68 percent solids to achieve the desired qualities. Not less than 45 parts of fruit are permitted for each 55 parts of sugar.
- *Fruit butter:* Fruit butter is the smooth, semisolid food prepared from a mixture containing not less than five parts of weight of fruit ingredient to each two parts of sugar.
- *Marmalade:* Marmalade usually is made from citrus fruit, may contain a citrus peel ingredient, and is a jelly-like product made from properly prepared juice.

Manufacturing Procedure for Fruit Jelly Products

Four substances are necessary for the preparation of fruit gels. These are pectin, acid, sugar and water. Successful manufacture of fruit jellies requires the combination of these components within rather narrow limits. The continuity of the gel structure is determined by the concentration of pectin, which may range from 0.5 percent to 1.5 percent by weight depending upon the type of pectin utilized. This percentage of pectin is pure pectin as supplied for commercial jelly manufacture. Home use pectins

usually contain up to 18 parts of sugar for each part of pectin. The rigidity of the gel is defined by the sugar concentration and the acidity. Most common pectins will form a weak gel at 63 percent to 64 percent solids. The optimum gel will form between 65 percent and 68 percent soluble solids. A hard gel will result as the solids level surpasses 70 percent. Optimum gel sets are normally obtained in a pH range of 3.1 to 3.3. A pH above 3.5 often results in poor gel formation, while a pH below 3.0 often results in hard gels subject to synergesis or "weeping."

Pectin

One should always assume that juices will be deficient in pectin and supplement the jelly with commercial pectins. Pectin is a group of substances derived from the cell walls of fruit. These pectins form gels when dissolved in water under suitable conditions.

Adding dry pectin (without blending the pectin with sugar) to water results in the formation of paste-like lumps that are nearly impossible to dissolve. Solution is greatly facilitated by heating the water or juice, then adding a pectin and sugar mixture. Pectin that has been thoroughly mixed with 10 times its weight in sugar will readily go into solution in hot water forming a nearly clear solution.

For the preserving trade various pectins are produced that may be classified as rapid-set, slow-set or by the pounds of finished jelly one pound of pure pectin will gel during cool-down. Rapid-set forms gels at higher temperature than does slow-set. Rapid-set is preferred for jams and preserves because it reduces the likelihood that the fruit component will rise to the surface before the gel is set. For jelly making a slow-set pectin often is preferred because after the jelly as firmly but not finally set, handling of the jars is less apt to damage the jelly's texture and firmness. The grade value of pectin refers to the pounds of sugar which one pound of pectin will gel. The most common commercial pectin is 150-grade pectin, meaning that with water, sugar to give 65 percent solids, and acid to give the optimum pH, one pound of pectin will give a perfect jelly with 150 pounds of sugar. Pectin of 100 grade is also popular.

Low-methoxyl pectins

The low-methoxyl pectins differ from normal pectin in that they will form gels at low sugar concentrations or in the absence of sugar and over a wide range of acidity or pH values. Calcium ions are necessary for gel formation with low-methoxyl pectins. Calcium bridges crosslinking pectins form a matrix able to hold moisture and support the gel.

The Role of Acid in Jelly Making

Gel firmness is dependent upon the jelly pH. Optimum firmness is achieved within definite pH ranges for the particular pectin utilized. Pectins are increasingly identified by their degree of methylation (DM) although the terms slow-set and rapid-set still are widely used in the trade. Slow-set refers to a pectin within the 60 to 65 DM range, while rapid-set refers to pectins within the 68 to 75 DM range. Slow-set pectins often are used in commercial jelly manufacture and attain a maximum firmness at pH 3.0 to pH 3.15. Rapid-set pectins are used for jams and preserves because they set at a higher temperature before fruit components float to the top of the jar and attain maximum firmness at pH 3.30 to 3.05. The upper limits for successful gel set are pH 3.4 and pH 3.6 for slow set and rapid set pectins respectively.

pH also is critical in determining the temperature at which jellies set. With rapid set pectins the setting temperature can be raised by approximately 25°F by lowering the pH (making more acid) from pH 3.3

to pH 3.1. Slow-set pectin generally gels 50° to 60°F lower than rapid set pectin in the pH 3.0 to 3.25 range. Acidifying a slow-set pectin jelly from pH 3.25 to pH 3.0 lowers the setting temperature by approximately 50°F.

Resources for Home Preserving Onions

https://nchfp.uga.edu/tips/summer/onions.html

Hannah K. Wilson, Ph.D. student, Dietetic intern at the National Center for Home Food Preservation Department of Foods and Nutrition, University of Georgia, April 2018

Onions provide a unique and pungent flavor to a variety of dishes. There are numerous varieties of onions – yellow, white, red, Vidalia (famous for their great flavor and Georgia roots), and others. Preserving onions creates unique, flavorful condiments that can be added to a variety of dishes. Preserving onions when they are in season can also enable you to have your favorite onion variety available to use throughout the entire year. Onions can be preserved by drying, freezing, or canning; and preserved onions can be used in a variety of dishes!

Drying

Drying onions is easier than it may initially sound. Simply wash the onions, and peel off the outer "paper" layers. Cut off the ends of the onions, and slice into 1/8- to 1/4-inch slices. No blanching is required before drying. If using an electric dehydrator, allow onions to dry for an estimated 3-9 hours. If using a conventional oven to dry, the drying time may be up to two times longer than in an electric dehydrator. Since onions have such a strong odor, be sure to not dry them with other items at the same time to prevent the other foods from absorbing the onion odor. Lastly, foods dry much faster toward the end of the drying period; so watch them closely at the end of the drying period to avoid scorching.

Freezing

While freezing is not the best preservation method for onions, it is one of the easier methods. Onions can be frozen by simply dicing them and then allowing them to freeze in a dry pack or on a tray, no blanching required! Package up the frozen onions, making sure to eliminate as much of the air from the package as possible when storing in the freezer. Frozen onions are best if used within a few months. They are great in any cooked dishes such as soups, stews, casseroles, or sautéed vegetables for a stir-fry or other festive food!

Canning

Onions require pressure canning as a low-acid vegetable. Step-by-step directions for small onions (1 inch in diameter or smaller) are available in the University of Georgia *So Easy to Preserve* book which is available for sale. Follow all pressure canning safety procedures, including packing and filling the jars, venting the canner before pressurizing, and cooling. Read Preserving Food: Using Pressure Canners to learn more about pressure canning procedures and safety. To learn more about the principles behind canning, read Guide 1: Principles of Home Canning from the USDA *Complete Guide to Home Canning*.

Relishes and Recipes

The University of Georgia has several onion relish recipes (Vidalia Onion Relish, Oscar Relish) found in its Canning Relishes factsheet. Many relishes contain onions even though they may not be the primary

vegetable ingredients. Additional recipes can be found in *So Easy to Preserve* available for sale.

The National Center for Home Food Preservation also has a great Summer Squash Relish that includes onions and is suitable for canning!

Preserving Those Unripe Tomatoes

Some of us have planned purposes for green, unripe tomatoes early in the season – like my mother's delish green tomato relish recipe! – while others are grabbing end of season unripe tomatoes off the vines before the frost hits. Now you have a lot of these green tomatoes, what to do with them?

Unripe tomatoes may be canned like ripe tomatoes, following the same directions including acidification. Even though unripe tomatoes should have a lower pH (higher acid content) than their ripe counterparts, we do not know if even in the unripe stage your variety and growing situation may mean they are still above pH 4.6. So follow the USDA directions for canning tomato and tomato products, including the acidification. See the acidification advice even for green tomatoes here: https://nchfp.uga.edu/how/can_03/tomato_intro.html and the available canning procedures for tomatoes here: https://nchfp.uga.edu/how/can3_tomato.html.

How about that prized relish in our family? That and other relishes calling for green tomatoes include:

Pickled Green Tomato Relish: https://nchfp.uga.edu/how/can_06/green_tomato_relish.html

Piccalilli: https://nchfp.uga.edu/how/can_06/piccalilli.html

Fall Garden Relish: https://nchfp.uga.edu/how/can_06/fall_garden_relish.html

And Rummage Relish: https://nchfp.uga.edu/how/can_06/rummage_relish.html

And, even though it doesn't call for green, unripe tomatoes, I might throw in the more unusual, very tasty Oscar Relish to help use up those red tomatoes being grabbed off vines before the frost, also: https://nchfp.uga.edu/how/can_06/oscar_relish.html.

Another option for something a bit different (and not a relish), is the Green Tomato Pie Filling: https://nchfp.uga.edu/how/can_02/can_pie/green_tomato_filling.html.This will give you a great headstart for something to have handy during winter holidays (or really anytime).

Some look forward to the summer treat of fried green tomato slices; you can freeze your raw slices and have them for frying later in the year, also:

Freezing green tomato slices: https://nchfp.uga.edu/how/freeze/tomato_green.html

Preparing Safer Jerky

https://nchfp.uga.edu/how/dry/jerky.html

Jerky is a lightweight, dried meat product that is a handy food for backpackers, campers and outdoor sports enthusiasts. It requires no refrigeration. Jerky can be made from almost any lean meat, including beef, pork, venison or smoked turkey breast. (Raw poultry is generally not recommended for use in making jerky because of the texture and flavor of the finished product.)

Raw meats can be contaminated with microorganisms that cause disease. These harmful bacteria can easily multiply in moist, high protein foods like meat and poultry and can cause illness if the products

are not handled correctly. If pork or wild game is used to make jerky, the meat should be treated to kill the *Trichinella* parasite before it is sliced and marinated. This parasite causes the disease, trichinosis. To treat the meat, freeze a portion that is 6 inches or less thick at 5°F or below for at least 20 days. Freezing will not eliminate bacteria from the meat.

General Tips For Safe Food Handling

The following general tips for safe handling are based on USDA Meat and Poultry Hotline recommendations.

- Always wash hands thoroughly with soap and running water for at least 20 seconds before and after handling raw meats.
- Use clean equipment and utensils.
- Keep meat and poultry refrigerated at 40° F or below. Use ground beef and poultry within 2 days, red meats within 3 to 5 days or freeze for later use.
- Thaw frozen meat in the refrigerator, not on the kitchen counter.
- Marinate meat in the refrigerator. Do not save and re-use marinade.

When preparing jerky from wild game, it is important to remember that the wound location and skill of the hunter can affect the safety of the meat. If the animal is wounded in such a way that the contents of its gut come in contact with the meat or the hunter's hands while dressing the meat, fecal bacteria can contaminate the meat. It is best to avoid making jerky from this meat and use it only in ways that it will be thoroughly cooked. Deer carcasses should be rapidly chilled to avoid bacterial growth. The risk of foodborne illness from home-dried jerky can be decreased by allowing the internal temperature of the meat to reach 160°F, but in such a way as to prevent case hardening. Two methods can be used: heating meat strips in marinade before drying or heating the dried jerky strips in an oven after the drying process is completed. Directions for both methods will be presented here. When the strips are heated in a marinade before drying, drying times will be reduced. Color and texture will differ from traditional jerky.

Preparing the Meat

Partially freeze meat to make slicing easier. The thickness of the meat strips will make a difference in the safety of the methods recommended in this book. Slice meat no thicker than ¼-inch. Trim and discard all fat from meat because it becomes rancid quickly. If a chewy jerky is desired, slice with the grain. Slice across the grain if a more tender, brittle jerky is preferred. A tenderizer can be used according to package directions, if desired. The meat can be marinated for flavor and tenderness. Marinade recipes may include oil, salt, spices and acid ingredients such as vinegar, lemon juice, teriyaki, soy sauce or wine.

Jerky Marinade*

¼ cup soy sauce
1 tablespoon Worcestershire sauce
¼ teaspoon each of pepper and garlic powder
½ teaspoon onion powder
1 teaspoon hickory smoke-flavored salt

* (for 1½ to 2 pounds of lean meat (beef, pork or venison)

Combine all ingredients. Place strips of meat in a shallow pan and cover with marinade. Cover and refrigerate 1 to 2 hours or overnight. Products marinated for several hours may be more salty than some people prefer. If you choose to heat the meat prior to drying to decrease the risk of foodborne illness, do so at the end of the marination time. To heat, bring the strips and marinade to a boil and boil 5 minutes before draining and drying. If strips are more than ¼ inch thick, the length of time may need to be increased. If possible, check the temperature of several strips with a metal stem-type thermometer to determine that 160°F has been reached.

Drying the Meat

Remove meat strips from the marinade and drain on clean, absorbent towels. Arrange strips on dehydrator trays or cake racks placed on baking sheets for oven drying. Place the slices close together, but not touching or overlapping. Place the racks in a dehydrator or oven preheated to 140°F Dry until a test piece cracks but does not break when it is bent (10 to 24 hours for samples not heated in marinade). Samples heated in marinade will dry faster. Begin checking samples after 3 hours. Once drying is completed, pat off any beads of oil with clean, absorbent towels and cool. Remove strips from the racks. Cool. Package in glass jars or heavy plastic food storage bags.

If the strips were not heated in marinade prior to drying, they can be heated in an oven after drying as an added safety measure. Place strips on a baking sheet, close together, but not touching or overlapping. For strips originally cut ¼ inch thick or less, heat 10 minutes in an oven preheated to 275°F. (Thicker strips may require longer heating to reach 160°F.)

Making Jerky From Ground Meat

Jerky can be made from ground meat using special presses to form or shape the product. Disease-causing microorganisms are more difficult to eliminate in ground meat than in whole meat strips. If ground meat is used, follow the general tips for safe handling tips listed previously. Be sure to follow the dehydrator manufacturer's directions carefully when heating the product at the end of drying time. Again, an internal temperature of 160°F is necessary to eliminate disease-causing bacteria such as *E. coli* O157:H7, if present.

Storing the Jerky

Properly dried jerky will keep at room temperature 2 weeks in a sealed container. For best results, to increase shelf life and maintain best flavor and quality, refrigerate or freeze jerky.

Canning Dry Beans: It Matters How They Go in the Jar

https://preservingfoodathome.com/2019/05/10/canning-dry-beans-it-matters-how-they-go-in-the-jar/

As a low-acid food, all beans require the use of a pressure canner for preservation by home canning, unless they are sufficiently pickled (acidified) to bring them out of the low-acid food category. But pressure canning isn't a magic bullet if you don't know the safe way to prepare food and carry out the right process for each food type and style. If you are new to pressure canning or could use a refresher of the basic how-to, then please read Using Pressure Canners before beginning. If this is your first time canning, then also read Principles of Home Canning from the USDA *Complete Guide to Home Canning.*

The USDA recommended processes in the *Complete Guide to Home Canning* for home canning dried beans require a hydration step prior to filling jars:
https://nchfp.uga.edu/how/can_04/beans_peas_shelled.html.

The options are to (1) place sorted (for stones or other contaminants) dried beans or peas in a large pot and cover with water. Soak the beans 12 to 18 hours in a cool place. Then drain off the soaking water and do not use it in canning the beans. The other option is, to more quickly hydrate the beans (2) cover the sorted and washed beans with boiling water in a saucepan. Boil them 2 minutes, remove them from the heat, soak them 1 hour and then drain. That cooking water is also not used in canning the beans.

The procedure then calls for covering drained beans hydrated by either method with fresh water and boil 30 minutes. The USDA canning process recommendation is for a hot pack prepared this way only: hot beans boiled 30 minutes then filled quickly into jars while still hot. (But of course being careful not to burn yourself, as with all canning steps.) Optional salt can be added to the beans in the jars if desired (½ teaspoon of salt per pint or 1 teaspoon per quart jar). The jars with cooked beans (and salt if added) then get filled with the hot cooking water, leaving 1-inch headspace. As with all jars packed this way, water should cover the food pieces for expected heat distribution during processing and best quality in storage of the canned beans. See the link above for full instructions and the processing times and temperatures (pressures) for pints vs quarts, and for various altitudes.

According to inquiries I get, and what I read elsewhere on the Internet, it is popular practice to put dry beans in the jars, cover them with water and put them into the pressure canner that way. Unfortunately, I have never found or been shown research for home canning that has determined what the process time should be for dry beans filled into jars in this manner. A safe process time is partially dependent on jar size and type of food, yes, but it is also partially dependent on the texture of the food, the temperature of the food and liquid, and the weight of the food filled into jars. Dry beans sitting in water at the start of the process time will not heat up at the same rate as beans prepared as described in the research-based method described above and in the USDA materials. The final sterilization of the jar contents achieved by the end of the process will not be the same as when the process is applied to jars filled as described in the recommended methods. People canning their dry beans by other methods, and especially by starting with dry beans in the jars, are taking a big risk on food spoilage and possibly botulism food poisoning. Those doing this and getting away with it have just been lucky – so far.

I guess part of my message is do not expect me to endorse or support this method of filling jars for home canning of dry beans. If you choose to do it, you are taking a chance by your own decision.

There are also different processes for different types of beans and dry bean recipes for home canning. For canning dry beans, there are research-based processes in the USDA database for Baked Beans, prepared as described in the process directions, and Dry Beans with Tomato or Molasses Sauce versions provided.

If you have fresh beans of the Lima variety, then follow these directions for Fresh, Shelled, Lima Beans. Follow these similar procedures, but slightly different directions for Snap and Italian Green and Wax Beans. As you're deciding whether to prepare a hot pack or raw pack, remember that hot packs are often considered to produce the highest quality final product, and you can often fit more beans into one jar, even though raw packs do cut down on the prep time.

The home canning processes which we can recommend for these various bean products can be found at the National Center for Home Food Preservation website at this menu: https://nchfp.uga.edu/how/can4_vegetable.html.

Please be safe in your home canning choices. The research-based processes available may seem very limiting and traditional but there has been little public funding for researching new recommendations in a long time and there are few labs set up and staffed to do home canning research. You can flavor or combine your home canned vegetables with other ingredients after opening them, at the time of serving, rather than risk botulism or losing money from spoiled food from making up a process for your own recipes. This solution doesn't address choosing an easier way to fill jars than has been tested such as with dry beans, but is something to consider for other food choices.

Adding Grape Leaves to Jars of Pickles

https://nchfp.uga.edu/questions/FAQ_pickle.html

I have an old recipe that calls for adding a grape leaf to each jar of pickles. Why?
Grape leaves contain a substance that inhibits the enzymes that make pickles soft. However, removing the blossom ends (the source of undesirable enzymes) will make the addition of grape leaves unnecessary.

Testing pH at Home

Fundamentals of Consumer Food Safety and Preservation Master Handbook

The pH of a food is measured under laboratory conditions, using a pH meter. The pH meter is a highly specialized electronic device, with a glass electrode connected to an electronic meter. Home canners sometimes ask about testing pH at home. Extension does not advise testing pH at home for several reasons:

1. pH alone cannot give you a processing time. It can help determine which method to use (boiling water canner or pressure canner), but that is all it can tell you. A variety of factors influence heat penetration. Even though most fruits have a pH value below 4.6, the processing times range from 15 to 40 minutes.
2. Measuring the pH of food can be complicated, requiring expert knowledge. For example, in salsa you have to check acidification of the vegetable pieces by separating them from the liquid phase, rinsing and blending, and then checking to see how fast the actual pieces of low-acid food get below 4.6.
3. Measurement of pH is precise work, best conducted in the controlled environment of a laboratory. The pH meter must be calibrated before each use, using fresh buffers as standards.
4. Litmus paper is not a substitute for a pH meter. Litmus paper does not have the precision necessary for measuring food products.

Pickled Eggs

https://nchfp.uga.edu/how/can_06/pickled_eggs.html

There are no home canning directions for pickled eggs. All of the following pickled egg recipes are for storage in the refrigerator. Pickled eggs should never be at room temperature except for serving time, when they should be limited to no more than 2 hours in the temperature danger zone of 40 to 140 degrees F.

Caution: Home pickled eggs stored at room temperature have caused botulism. For the report from the Centers for Disease Control and Prevention (CDC), see http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4934a2.htm. The Editorial Note in this report cautions against room temperature pickling and storage, also. The CDC further cautions that to reduce the risk for botulism when pickling, food items should be washed and cooked adequately, and utensils, containers, and other surfaces in contact with food, including cutting boards and hands, should be cleaned thoroughly with soap and warm water. Containers (e.g., jars and lids) in which pickling will occur should be sterilized (e.g., placed in boiling water for a prescribed period).

PICKLING TIPS

Pickled eggs are peeled, hard-cooked eggs in a solution consisting basically of vinegar, salt, spices, and perhaps other seasonings. Pickling solutions are heated to boiling, simmered for 5 minutes, and poured over the peeled eggs. Egg whites tend to be more tender if a boiling solution is used instead of room temperature solutions.

Eggs used for pickling should have clean, sound shells. Small or medium eggs are usually a good choice for pickling so the seasoning can penetrate into the egg. Fresh eggs are the best to use for pickling to ensure the highest quality possible since the eggs will be stored over a relatively long period of time. However, eggs at least a few days old will peel better after boiling.

Cooking and Peeling Eggs

According to the Georgia Egg Commission, the following method of hard-cooking facilitates peeling of ultra fresh eggs. Make a pinhole in the large end of the egg, place the eggs in a single layer in a saucepan, and cover with cold water to an inch above the layer of eggs. Place a lid on the pan and bring eggs to a boil. Remove the pan of eggs from the burner, leaving the cover in place, and allow to sit for 15-18 minutes, adjusting time up or down 3 minutes for larger or smaller eggs. Immediately remove eggs from the pan of hot water with a slotted spoon to a bowl of ice water for one minute. In the meantime, bring hot water to simmering. After one minute in ice water remove eggs back to the simmering water for ten seconds. The ten second interval is important because this allows the shell to expand without expanding the rest of the egg. Peel immediately by cracking the shells of the egg all over. Roll each egg gently between hands to loosen the shell. Peel, starting at the large end of the egg. The peeling may take place under cold running water to help wash the shell off the egg and to minimize the shell breaking into the white.

Another cooking method when you are less concerned about peeling of ultra-fresh eggs is to make a pinhole in the large end of the egg, place the eggs in a single layer in a saucepan, and cover with cold water to an inch above the layer of eggs. Place a lid on the pan and bring eggs to a boil. Turn down the heat and simmer for 15 minutes. Place the eggs in cold water and when cool, remove shells. Crack the shell of the egg all over. Peel, starting at the large end of the egg. The peeling may take place under cold running water to help wash the shell off the egg.

Containers for the Eggs

The container used for the eggs should be one that can be closed or sealed tightly; glass canning jars work well. The eggs are to be completely covered with the pickling solution during storage. A quart-size canning jar will hold about one dozen medium sized eggs. For sterilizing glass jars, see Sterilization of Empty Jars.

Storing Eggs

After making the eggs, the eggs require some time to season (i.e., pick up the flavors from the pickling brine). Keep them refrigerated at all times. If small eggs are used, 1 to 2 weeks are usually allowed for seasoning to occur. Medium or large eggs may require 2 to 4 weeks to become well seasoned. Use the eggs within 3 to 4 months for best quality.

RECIPES

Each of these recipes uses 12 peeled, hard-cooked eggs. The directions for each recipe are to bring all the ingredients except the eggs to a boil, reduce the heat and simmer for 5 minutes. Pack no more than one dozen peeled, hard-cooked eggs loosely into a warm, pre-sterilized quart jar (or other similar size container which can be closed tightly). There needs to be plenty of pickling solution, and enough to completely cover the eggs. Pour the hot pickling solution over the eggs in the jar, cover, and refrigerate immediately.

RED BEET EGGS

1 cup red beet juice (from canned beets)
1½ cups cider vinegar
1 teaspoon brown sugar
a few canned whole tiny red beets (or several slices of beets can be used)

SWEET AND SOUR EGGS

1½ cups pasteurized apple cider
½ cup cider vinegar
1 package (about 12 oz.) red cinnamon candy
1 tablespoon mixed pickling spice
2 tablespoons salt
1 teaspoon garlic salt

DARK AND SPICY EGGS

1½ cups cider vinegar
½ cup water
1 tablespoon dark brown sugar
2 teaspoons granulated sugar
1 teaspoon mixed pickling spice
¼ teaspoon liquid smoke or hickory smoke salt
2 teaspoons salt

CIDERED EGGS

1½ cups pasteurized sweet apple cider or apple juice
½ cup white vinegar
6 thin slices of onion
1½ teaspoons salt
1 teaspoon whole pickling spice
1 peeled garlic clove

DILLED EGGS

1½ cups white vinegar
1 cup water
¾ teaspoon dill weed
¼ teaspoon white pepper
3 teaspoons salt
¼ teaspoon mustard seed
½ teaspoon onion juice or minced onion
½ teaspoon minced garlic or 1 peeled garlic clove

PINEAPPLE PICKLED EGGS

1 can (12 oz.) unsweetened pineapple juice*
1½ cups white vinegar
2 medium onions, peeled and sliced
¼ cup sugar
1 teaspoon salt
1 teaspoon whole pickling spice
*If sweetened pineapple juice is used, omit sugar

Acknowledgements

Recipes adapted and used with permission from:
Peter Piper Picked A Peck of Pickled Eggs, Georgia Egg Commission (undated).
Original Acknowledgements on the Georgia Egg Commission publication: Dr. James C. Acton, Department of Food Science, Clemson University; Dr. Walter M. Britton, Department of Poultry Science, University of Georgia; The American Egg Board, Park Ridge, Illinois; and *Preserving and Pickling Eggs at Home,* Cooperative Extension Service, University of Wisconsin.