

OLLI Fall 2019

The Science Behind Cooking

TOPIC FIVE. KITCHEN SAFETY, EFFICIENCY, & CLEANLINESS

Overview

- **BLOCK A. KITCHEN FIRES AND BURNS**
- **BLOCK B. HOW TO USE YOUR REFRIGERATOR**
- **BLOCK C. PREVENTING FOOD SPOILAGE**
- **DEMO: The Vega•Terrarium™**
- **BLOCK D. RIPENING OF FRUIT**
- **Demo: FruitNests™**
- **Block E. Cleaning & Sanitation**
- **DEMO: SURFACE TENSION**
- **DEMO: SUPER JUICE I AND II**
- **BLOCK F. DON'T THROW ANYTHING AWAY**
- **RECIPE ROUNDUP**

BLOCK A. KITCHEN FIRES AND BURNS

Prevention

- No unattended high-heat cooking!
- No paper, towels, or pot holders on stovetop
- No pot handles sticking out inviting a spill or a scald
- Use caution putting moist food items into hot fat.
- Use high-performance oven mitts (The Ove Glove) when handling hot cookware

Suppression

- **Never put water on an oil fire! Smother it.**
- **Fire Extinguisher!** Which kind? **A-B-C** How big? **\$40**. Which brand? **Kidde**.
- Rangehood Cooktop Fire Suppressor (optional)
- **Smoke Alarms** In Kitchen, Stairways

BLOCK B. HOW TO USE YOUR REFRIGERATOR

- Your fridge works the same as your **oven. Blackbody Radiation**. Food radiates its heat to the cold walls and to adjacent colder objects. So put warm food away **scattered among the cold foods** and **close to walls**.
- **Keep it closed**. Cold air pours out the bottom, warm air replaces it at the top; warm kitchen walls radiate heat to contents.

- Know your **zones**. As much as a **12 °F difference**. The door is the **warmest**; at the back of the bottom shelf, the **coldest**. Caution. Food can freeze down there.
- Be aware of the “frost-free” **heater coils** in your freezer; keep sensitive foods toward the center away from heater coils at the front and rear.
- Prevent ‘**freezer burn**’ by proper packaging technique. See attached recipe for details.

BLOCK C. PREVENTING FOOD SPOILAGE

Keep an eye on your stuff. Don't lose track of leftovers or perishable ingredients. Label them with contents, date, and amount.

1. Fruits and Vegetables

Fruits and vegetables are alive and need good care. The supermarket sprays the vegetables with water not to keep them fresh but to accelerate their spoilage in your refrigerator. Dry veggies before storing. Open up bundles of parsley and the like. Let them air dry before storing them. Wrap in a paper towel to absorb any plant water lost by transpiration and reverse osmosis during storage and bag loosely in plastic to maintain a humid atmosphere.

WATER IS THE GREAT DESTROYER

DEMO: The Vega•Terrarium™ Good for storing and preserving moist foods such as hard-cooked eggs, radishes, grapes, cherries, berries, mushrooms. High humidity but **no liquid water**. **Without liquid water, bacteria and fungi can't multiply**. Why you can eat peanut butter out of the jar without spoiling the remainder. No water.

MOIST BUT DRY

2. Cooked Foods

Cooked foods are essentially sterile. To maximize their shelf life, cover tightly while hot, let cool, and then refrigerate. Remember the zones.

Pasteurize leftovers to 165°F to extend shelf life. Mark it with a ‘**Z**’. Digital thermometer helps for this of course.

BLOCK D. RIPENING OF FRUIT

- Select **undamaged** fruit in limited quantities.
- Good **air circulation** to prevent infection by fungi and bacteria by keeping surfaces **dry**.

- **Bananas** help other fruits ripen. Bananas secrete **ethylene gas**, the ripening hormone.
- Tend them.
- Prevent **reverse osmosis** of fruit juices with **FruitNests™**

Demo: FruitNests™

After fruits are picked (usually unripe), two processes are set in motion, **ripening** and **microbial spoilage**. The goal is accelerate the former and retard the latter. The goal is a sweet, juicy peach! I calculate that a fruit sitting on hard surface experiences a squeezing pressure of about 30 psi on its bottom! A FruitNest™ spreads the weight over a wide area to minimize squeezing out fruit juices by reverse osmosis. This prevents spoilage since there is no medium to support growth of spoilage organisms. Also, the open meshwork provides ventilation to also help to keep the fruit dry.

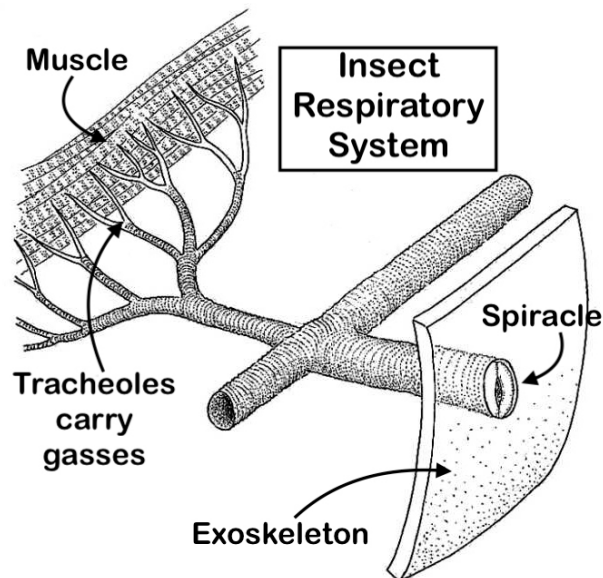
Block E. Cleaning & Sanitation

How do **detergents** work? Two ways. (1) Making water “wetter”, that is, by lowering **surface tension**, and (2) by **emulsifying** fats and oils, including cell membranes.

Demo: Surface tension

Demo: Super Juice I & Super Juice II

Super Juice I is both a homemade general-purpose **surface cleaning spray** and a potent **non-toxic insecticide**. It is simply a **1% Dawn** solution (10 g/liter) in a trigger spray bottle. It kills insects by exploiting the insect respiratory system. By lowering the surface tension, the detergent solution can enter the spiracles and rapidly flood the tiny air-filled tubules through which they breathe.



This process kills insects in two ways: (1) drowning, and (2) killing its cells by emulsifying the cell membranes from within. Super Juice I, deadly to insects within seconds, harmless to us.

To prepare a batch of Super Juice I:

- 1 quart water (about a 1000 ml)
- 2 teaspoons Dawn™ liquid dish detergent (10 g)

Put the water into the trigger sprayer and add the Dawn. Insert trigger cap, tighten, and mix by gentle inversion.

Super Juice II is Super Juice I with **1% Clorox added** to turn it into a potent **sanitizer**. For example, a teaspoon of Clorox in a pint of water adds 250 ppm of free chlorine, which is 5X stronger than what is needed to kill the toughest bugs.

Hint: Run sink strainers, scrubbies, dish rags through the dishwasher every load.

BLOCK F. DON'T THROW ANYTHING AWAY

- Harvest citrus zest with vegetable peeler and freeze in plastic bags.
- Save vegetable & meat trimmings for the stockpot (shrimp shells, fish heads, bones, chicken parts, onion skins, carrot peels).
- Render **chicken fat**. See attached recipe.
- Use the *Birdseye* flash-freeze method to preserve excess fruits in good condition.
- Trim away spoiled parts of vegetables and fruits. Remember, plants don't have a circulation to spread infection.

Recipe: <https://drdaddycooks.blogspot.com/2016/12/schmaltz-rendered-chicken-fat.html>

Schmaltz (Rendered Chicken Fat)

Recorded December, 2016. Fats and oils differ according to their differing contents of fatty acids. This is why various fats are preferred, such as lard in pie crusts or duck fat for frying potatoes. Chicken fat, often discarded when preparing chicken, can be rendered and reserved. Its fatty acid composition is **almost identical to duck fat**. It is especially valuable for making **matzo balls** or pan-roasting potatoes, and as a spread on a bread when dietary laws forbid butter. As you prepare chicken, accumulate and freeze the fatty trimmings until there are enough to do a batch.

8 to 12 oz fat and fatty skin trimmed from chicken

Chop the partially-thawed fat and skin coarsely and transfer to a cold, non-stick 10-inch skillet. Heat over medium until the fat begins to melt and pool. Lower heat to medium-low, and slowly cook uncovered, turning the pieces of cracklings (*gribenes*, in Yiddish) as the fat renders out. Pour off the fat into a container from time to time and continue frying. When it appears that no more fat is being released, remove the cracklings to paper towels and salt lightly. Store fat in a closed container on the bottom shelf in the refrigerator. *Variation:* Fry sliced onions in the fat and use both together in savory dishes.

Recipe <https://drdaddycooks.blogspot.com/2012/04/freezing-abundant-tomatoes.html>

Hint: Freezing Abundant Tomatoes

Recorded April 30, 2012. Circumstances can sometimes provide ripe tomatoes in excess of one's immediate needs. This method preserves most of the nutritional and culinary value with a minimum of effort.

ripe tomatoes (cherry, grape, or globe)

pint-sized (500 ml) plastic freezer bags with zipper closures

Rinse and dry tomatoes. Cut away any blemished areas. On a sanitized plastic cutting board, dice a few tomatoes, and then chop coarsely with a chef's knife. Transfer the chopped tomatoes, including juice and seeds, to a large measuring cup. Continue until all of the tomatoes have been diced and chopped. Fill each bag with 8 oz (250 ml) chopped tomato. Exclude as much air as possible as bag is closed. Lie each bag down flat in metal baking dish, pre-chilled in the freezer. When the dish is full of bags, return to the freezer, until frozen solidly. Use whenever a sauce, stew, soup, or dip would benefit from addition of fresh-frozen tomato product.

Recipe: <https://drdaddycooks.blogspot.com/2018/10/hint-how-to-prevent-freezer-burn.html>

Hint: How to Prevent Freezer Burn

So-called "freezer burn" is the term used to designate the process that turns the outside layer of a frozen food product into a dry, unpalatable residue covered with frost. The cause of the food drying and the accumulation of surface frost is **sublimation**. Sublimation is when water molecules evaporate from ice in much the same way they evaporate from liquid water. This **dehydrates** the food, spoiling it. Some of the released water vapor then re-deposits on the surface in needle-like **frost**.

What is to be done? Two techniques largely eliminate the problem. (1) **Mist** the food with a light layer of **water** using a trigger spray before wrapping. This added layer will act as "**sacrificial water**" that can be lost to sublimation without harming the food but too little to dilute flavor. (2) **Eliminate** as much of the **air space** between the food and the wrap. This denies a space for the water molecules to enter. Make the first wrap layer a thin plastic bag or plastic wrap that can be pulled tight and sealed tightly. Place that package in a larger bag and force the air from it. This outer bag protects the inner bag from puncture or leaks and adds another layer of protection.