

Processing and Manufacturing • Lesson 12

Convenience Foods and The Role of Preservatives

Class periods: One to three 30-min. class periods

Supplement Section: Processing and Manufacturing PA PAS for FCS: 9.3.3 A, 9.3.3 B, 9.3.6 B, 9.3.9 A, 9.3.9 B, 9.3.12 B

National Education Standards: FCS 8.2.1, 8.2.3, 8.2.4, 8.2.5, 8.2.6, 8.2.7, 9.2.1, 9.2.3, 9.2.4, 9.2.5, 9.2.6; LA 2, 3, 035, 132, 278; SC 5.

LESSON SUMMARY

Students will identify the convenience food components of pizza and the role packaging and additives play in the preservation of foods. They will do an experiment to determine the effect of preservatives in bread.

Objectives

The students will be able to:

- List the convenience characteristics of several types of manufactured pizza or manufactured pizza ingredients (shredded cheese, pre-made pizza dough, etc.).
- Describe how packaging can contribute to the preservation of foods.
- Explain why preservatives are used in convenience foods (“Stop the Mold” experiment).
- Identify common preservatives and their specific purpose in the food on which they are listed (“Preservatives: Why Are They There?”).
- Describe procedures to keep food safe by completing the NIE newspaper activity.

Materials Provided

Overhead:

1. Functions of Containers

Worksheets:

1. Stop the Mold
2. Stop the Mold: Post -Lab Questions
3. Preservatives: Why Are They There?

4. Food Safety: From Farm to Table Newspaper Activity
5. Popcorn Packaging
6. Popcorn Packaging Discussion Questions

Handout:

1. Stop the Mold Procedure

Teacher Information Sheets:

1. Proper Food Packaging Is Important
2. Requirements and Functions of Food Containers
3. Stop the Mold
4. Stop the Mold: Pre-Lab Questions/ Answers
5. Stop the Mold: Post-Lab Questions/ Answers
6. Preservatives: Why Are They There? Answer Sheet
7. Evaluation of NIE Newspaper Activity
8. Popcorn Packaging Discussion Questions/Answer Sheet
9. Glossary of Bolded Terms
10. List of Food Additives

Suggested Presentations Aids

- Different types of pizza convenience foods: frozen, boxed mix with toppings included, pre-made pizza dough, cut and packaged cheese, pepperoni, vegetables, sausage, canned pizza sauce, frozen ingredients, or kits to make pizza yourself.
- Different types of empty food containers with nutrition and ingredient labels.
- At least four different loaves of supermarket bread:
 - Two or three brands with preservatives
 - Two or three brands without preservatives
 - Wrappers with ingredient labels from all breads used.
- Newspapers and scissors

LESSON PLAN

Class Period 1

Introduction

- Technology has widened the number of food choices that are available on the market today. Grocery store shelves are filled with new and improved food products, such as fresh, canned, frozen, dehydrated, partially prepared, ready-to-serve, and dry mixes. Convenience foods have been processed or prepared to eliminate part of the preparation time required for cooking.

Lesson Sequence

- Convenience foods provide a shortcut in food preparation.
- Several points need to be considered when the consumer is deciding to use a convenience food or a similar homemade product.
- Convenience foods require less time and energy, but the consumer should also consider cost, quality, nutritive value, and skills needed for food preparation.
- Convenience foods come ready-to-serve, partially prepared, or requiring that certain ingredients be added.
- The choice of any convenience item is influenced by the timesaving factor, cost, and quality of the final product.
- Pizza has many convenience components: cut and packaged cheese, pepperoni, sausage, vegetables, pre-made pizza dough, and canned pizza tomato sauce. Also available are frozen and boxed pizza ingredients or kits to make pizza yourself, frozen ingredients for you to assemble, packaged whole pizzas, and individual ingredients like flour and yeast. **Show examples of these.**
- Convenience foods have a greater amount of surface area exposed to food contamination by bacteria. Grated cheese and sliced pepperoni, convenience foods used

on pizza, have more surface area exposed to microbial contamination.

- Packaging of food is considered a food preservation method. The packaging in which convenience foods are sold is designed to protect them from contamination by spoilage, insects, and rodents and prevent deterioration caused by contact with air, light, or heat.
- Heat sealing of metal cans and glass jars and bottles prevents and /or retards spoilage of food. Vacuum-packed foods restrict exposure to air, retarding spoilage.
- Sanitary protection refers to the protection of foods against microorganisms, insects, and rodents. Are most food packaging methods safe?

Most are, but problems can arise during transportation, storage, and handling that can contaminate food. Because food processing and packaging is done by humans, mistakes can sometimes be made (Proper Food Packaging Is Important: Teacher information sheet 1).

- Food is packaged in many ways, including metal cans, glass jars and bottles, plastic jars and bottles, aluminum foils, paper bags, and cardboard boxes, as well as many combinations of these. (Overhead 1: Functions of Containers. Discussion: Using Teacher information sheet 2, Requirements and Functions of Food Containers.)
- Show students different kinds of packaging containers or wrappers. Pizza and its various parts come in a variety of containers. Tomato sauce is packaged in glass jars or cans. Cheese can be shredded and sold in a resealable plastic bag, sold in block form wrapped in plastic, and sold in slices wrapped individually in plastic. Vegetables can be sold as a head, bunch, individual pieces, or cut up into smaller pieces and stored in a plastic bag or on a Styrofoam tray wrapped in plastic. Meats such as ground beef, sausage, or ham can be packaged on Styrofoam trays wrapped

with plastic, sealed in plastic containers, frozen, or sold in lunch meat form (sliced, chunk, or cubes).

- Frozen pizzas require less time and energy to prepare. Along with this convenience come food safety concerns. Freezer temperature needs to be below 30° F, the pizza should be eaten before the expiration date, and packaging should prevent freezer burn, bacterial growth, and loss of valuable nutrients.
- Food packages must be designed to withstand a variety of food handling situations and meet the protection needs of each type of food.
- Manufacturers responded to several tampering scares in the 1980s. Tylenol Non-Aspirin Pain Reliever had a poison introduced into the capsule, and at least one person died.
- What are some tamper-resistance systems used with food packaging?

Many foods have tamper-resistant seals, pull-tapes, over-wraps, or similar systems to detect possible tampering. Bottles and cans will have a vacuum release if properly sealed.

Closure class period 1

- Show various tamper-resistant packaging.

Class Period 2

- Additives make convenience and new foods possible by improving color, flavor, texture, nutrient value, and by acting as a preservative.
- **Preservatives** extend the shelf life of convenience foods. Preservatives delay undesirable changes in the food; retard product spoilage caused by mold, air, bacteria, fungi, and yeast; and help maintain food at its best (crisp, firm, fewer blemishes, longer shelf life). Bacterial contamination of foods can cause the digestive disorder known as food poisoning, a general term for foodborne illnesses.

- Without preservatives, baked goods would go stale or mold overnight, salad oils and dressings would separate and become rancid, table salt would turn hard and lumpy, and canned fruits and vegetables would become discolored and mushy. Meat, milk, fruit, and vegetables are perishable unless frozen, dehydrated, or preserved by some canning technique.
- **Propionates** keep baked goods from being spoiled by mold.
- **Sodium benzoate, sodium propionate, and potassium sorbate** prevent the growth of microbes on the surface of pancake or waffle syrup, cheese, margarine, mayonnaise, cakes, beverages, and pickled vegetables.
- **Sulfur dioxide** inhibits discoloration in fruit juice concentrates and dried fruits and vegetables.
- **Nitrites and nitrates** are used to cure and preserve foods like ham, bacon, sausage, hot dogs, and luncheon meats. They also add a distinct flavor to these foods. Hot dogs and luncheon meats are not heated sufficiently to kill bacteria that could cause food poisoning.
- **Antioxidants** prevent undesirable color and flavor changes in vegetables, fruits, and meat caused by oxygen in the air. Some fruits, such as apples and bananas, contain certain enzymes that cause them to brown when exposed to air. Antioxidants prevent or delay this enzymatic browning. Ascorbic acid (vitamin C) and vitamin E are natural antioxidants.
- Oxidation can also cause the rancid taste and odor that sometimes develop in fats and oils. Vitamin E acts as an antioxidant to maintain flavor during storage.
- Salt and sugar are natural preservatives that inhibit mold and bacteria growth. Salt is used to preserve meat and fish. Sugar helps preserve canned and frozen fruits as well as jams and jellies.

- **BHA (Butylated dehydroxyanisole) and BHT (Butylated hydroxytoluene)** are common antioxidants used in peanut butter, breakfast cereals, bakery products, snack foods, potato chips, lard, crackers, chicken flavor stuffing mix, unbaked cheesecake mix, and cake mixes.
- Have students complete “Stop the Mold” activity. The purpose of this experiment is to illustrate the function of preservatives in bread. (Handout #1, Worksheet 1, 2, and Teacher information sheets 3, 4, and 5)

Closure class period 2

- Preservatives: Why Are They There? (Worksheet 3 and Teacher information sheet 6) Using the worksheet, write down the ingredients from a food label. Check off the preservatives and their purpose. Discussion: What preservative is present in the largest amount and why is it used? What is the most common purpose of the preservative in the products chosen for this activity?
- Food Safety: From Farm to Table Newspaper Activity, Packaging/Preserving Foods (Worksheet 4). Find pictures of foods in the newspaper, paste them on a piece of paper, and explain how the food is packaged. Write a sentence describing the special care that was taken to keep the food safe.

Suggested Learning Activity

Class Period 3

- Popcorn Packaging (Worksheets 5 and 6, Teacher information sheet 8) Purpose: To explain how a laminated popcorn package is made and the effects this package has on popping rate. While microwave popcorn seems a simple process, it was a major accomplishment to develop the packaging materials that retain the proper moisture, heat, and energy to pop efficiently. Follow the procedure for the experiment on the Student Activity worksheet.

Closure class period 3

- Discuss the results of the Popcorn Packaging test with the class.

Evaluation

- Experiment and worksheet: Stop the Mold
- Worksheets: Preservatives- Why Are They There?
- Evaluate Suggested Learning Activity: Popcorn Packaging discussion questions
- NIE activity: Food Safety: From Farm to Table Newspaper Activity, Packaging/Preserving Foods for complete and accurate information, neatness, spelling (Teacher information sheet 7)
- Quiz 12
- Examination #3 at the end of the Processing and Manufacturing unit

References

- Creating Informed Citizens For Tomorrow’s Food Safety Decisions Teacher’s Manual: Middle/Junior High School Food Safety Curriculum. Colorado State University Cooperative Extension. Food Additives: lesson AD-5 and AD-10
- Food Science, Safety and Nutrition National FFA Foundation, P.O. Box 45205, Madison, WI 53744
Food Science: Consumer Education: Functions of Food Containers: Unit 3, pages 89-91, Popcorn Packaging Activity, pages 98-103, and Functions of Containers overhead, pages 104 and 105, Food Safety: Consumer Education: Proper Food Packaging Is Important, Unit 5, page 36
- FDA Consumer. HEW Publication No’s. (FDA) 79-2118, 79-2115, 82-2160, 79-2119. U.S. Department of Health, Education, and Welfare, Public Health Service, Food and Drug Administrative, Office of Public Affairs.

Overhead 1

Functions of Containers

The following requirements are considered essential functions of containers.

- 1. Non toxic**
- 2. Sanitary protection**
- 3. Moisture and fat protection**
- 4. Gas and odor protection**
- 5. Light protection**
- 6. Resistance to impact**
- 7. Transparency**
- 8. Tamper-resistant or tamper evident**
- 9. Ease of opening**
- 10. Pouring features**
- 11. Reseal features**
- 12. Ease of disposal**
- 13. Size, shape, and weight limitations**
- 14. Appearance and print ability**
- 15. Low cost**

Worksheet 1

Name _____

Class/Period _____

Date _____

Stop The Mold

Recording Chart

Group Name: _____ Date: _____

Where did you keep your bread? _____

RECORD SIZE, COLOR, AND NUMBER OF MOLD COLONIES:

Bread	Brand 1	Brand 2	Brand 3	Brand 4
Preservative(s)				
DAY 1				
DAY 2				
DAY 3				
DAY 4				
DAY 5				
DAY 6				

DAY 7				
DAY 8				
DAY 9				
DAY 10				
DAY 11				
DAY 12				
DAY 13				
DAY 14				

Worksheet 2

Name _____

Class/Period _____

Date _____

Stop The Mold***Post- Lab Questions***

1. Which bread stayed mold-free the longest? Why do you think it did?
2. How did the breads compare? Size of the colonies? Number of colonies?
3. Why did the instructions say to handle the bread slices and expose them to air before putting them in the bags?
4. How many different colors of mold did you find and why might this vary each time the experiment is performed?
5. What kind of bread would you like to buy? Why?

Worksheet 4

Name _____

Class/Period _____

Date _____

**Food Safety: From Farm to Table Newspaper Activity,
Packaging/Preserving Foods**

Find pictures of foods in the newspaper. Paste them on a piece of paper. Next to each one, explain how the food is packaged. Then write a sentence describing the method of food packaging preservation that was taken to keep the food safe.

Food Pictures

Special care to keep food safe

Food Pictures	Special care to keep food safe

The NIE Newspaper Supplement: Fight Bac Workshop, July 13-15, 1998

Worksheet 5

Popcorn Packaging

Objective:

Students will be able to explain how a laminated popcorn package is made and the effects this package has on popping rate.

While microwave popcorn seems a simple process, it was a major accomplishment to develop the packaging materials that retain the proper moisture, heat, and energy to pop efficiently.

Activity length: 45 minutes**Materials:**

- Popping popcorn (good quality)
- Microwave oven
- Microwave safe plate
- Plastic sacks (sandwich type—top flips over)
- Wax paper sacks (bakery sack)
- Vegetable oil
- Microwave popcorn

Warning: This is an experiment. The popcorn used in this experiment is not suitable for eating. Microwave temperatures can become very hot. Be careful not to burn yourself as well as others.

Procedure:

1. Split students into groups so they can compare answers.
2. Have the students count out ten popcorn kernels.
3. Place the kernels in the following four trials:
 - a. Not covered in anything (sitting on the microwave plate)
 - b. In a plastic sack
 - c. In a wax covered bag
 - d. In a wax covered bag with vegetable oil soaked popcorn kernels
4. Heat the popcorn in each of the experiments below on full power for three minutes.
 - a. Place the kernels on microwave dish (not covered).

What do you predict will happen (how many of the kernels will pop)?

What did happen?

- b. Next place ten kernels in a plastic sack and heat for three minutes.
What do you think will happen?

What did happen?

- c. Place the kernels in a sealed wax paper bag and heat for three minutes.
What do you think will happen?

What did happen?

- d. Place the oil soaked kernels in the sealed wax bag and heat for three minutes.
What do you think will happen?

- e. Last, What happened to the popcorn kernels in the four different packages after the kernels were popped?

Chart: Number of kernels that popped using all four methods

Student groups	Treatment			
	A. Open dish	B. Plastic sack	C. Wax covered bag	D. Soaked in oil in a bag
Group A				
Group B				
Group C				
Group D				
Group E				

Worksheet 6

Name _____

Class/Period _____

Date _____

Popcorn Packaging Discussion Questions:

1. What is needed for popcorn kernels to pop?
2. What makes it happen?
3. Examine a commercial microwave bag of popcorn. What do you find?
4. What is the bag made out of? What did the engineers have to do to develop this product so that it works properly?
5. Why do you think that there are always several un-popped kernels in a microwave bag?

Handout 1

Stop the Mold Procedure

Hypothesis: What do you think will happen? Which breads will have the least mold and the most mold? Why?

Materials:

2 slices of bread with preservatives

2 slices of bread without preservatives

4 resealable sandwich bags

Label tape and marker

Metric ruler

Water sprayer/mister

Procedure:

1. Label four plastic sandwich bags with your group name, date, and name of breads you will be testing.
2. Obtain two slices of bread with preservatives and two slices of bread without preservatives.
3. Lay each slice of bread on top of its bag and leave it there for about ten minutes (do not let the bread dry out).
4. During the ten minutes, read the bread ingredient labels. Find the preservatives and list each on the recording chart.
5. After ten minutes, lightly spray each piece of bread with water and put each slice in its bag and seal.
6. Place the bags in a warm place and observe daily. Record daily observations on chart.

Teacher Information Sheet 1

Proper Food Packaging Is Important

Proper packaging of meats and other foods is a very important aspect of food preservation. The purpose of packaging is to protect foods from microbial contamination, light, physical damage, or chemical changes.

Packaging is a method of preserving foods. Faulty packaging will negate all food processing attempts to accomplish a good sound product. Food packaging also performs many functions in addition to preservation.

A variety of materials are used for food packaging:

- Rigid metals in cans and drums
- Flexible metal in aluminum foils
- Flexible plastics of a wide variety
- Rigid cardboard, paper, and wood products in boxes
- Flexible papers in bags
- Laminates or multi-layers, which combine paper, plastic, and foil to achieve properties unattainable with any single component

In addition to many materials used, food packaging involves equipment and machinery for producing or modifying certain packaging materials. This machinery and equipment has many uses:

- Forming material into the final containers
- Weighing and dispensing food materials
- Gas flushing containers
- Sealing the final packages

These packages may have to withstand additional processing operations:

- Heat sterilization in pressure retorts
- Final cooking in the package for many high-convenience items

Teacher Information Sheet 2

Requirements and Functions of Food Containers

1. **Nontoxic and compatible with foods.** Primary containers are packages that come in direct contact with foods: for example, a candy wrapper. A secondary container is a box or carton that might be used to hold a carton of twelve candy bars and does not come in direct contact or touch the food product. It is important that the primary container is not toxic and does not become toxic while it is stored in the secondary container.
2. **Sanitary protection.** The container must protect the food product from microorganisms and boring of insects or rodents. This barrier should remain in effect while the food is in the store and in the home.
3. **Moisture protection.** Many foods need to be protected from losing moisture and from gaining moisture. However, some foods need to have films that allow for the escape of moisture, gases from respiration, and for maturation to occur. Fat protection is important for foods like butter, to keep these foods from passing through wrappings.
4. **Gas and odor protection.** Off odors need to be sealed out of food that easily takes on other food odors and tastes. Some foods need to keep their flavors sealed inside the container. Cylinder bread dough containers are designed to allow carbon dioxide gases to escape and not cause the package to explode.
5. **Light protection.** Most foods are light sensitive at least to small degree and will deteriorate if exposed to light. Meats will turn a lighter color and will not appear desirable to the consumer if exposed to light. Colored bottles are used for products that are light sensitive.
6. **Resistant to impact.** Resistant to impact prevents breakage of the package and the subsequent product contamination. This also implies that the product will not break while it is being consumed. Processed potato chips sold in cylindrical cans resist damage from impact at the wholesale, retail, and consumer level.
7. **Transparent.** Many foods are sold on their appetizing appeal to the customer. People like to see what they are buying. Bacon is often displayed so that the amount of fat can be seen from both sides of the package. Often a single piece of fruit is cut and displayed in plastic wrap in grocery stores to enhance customer interest.
8. **Tamper-resistant and tamper-evident.** Since criminal acts of sabotage have occurred where individuals have poisoned medicine and foods, many food packages are equipped with plastic seals to indicate if they have been opened. Membranous films are used over mouths of jars, and vacuum packing foods and seals are used to indicate violation.

9. **Ease of opening/closing.** Twist-off caps and pop-top caps used in the beverage industry are examples of this container function. Pull-tabs on cereal boxes and reinforced strings on cellophane wrappers are other examples.
10. **Pouring features.** Pouring features apply to containers used for granular and particulate solids. This pertains to breakfast cereals, salt, and liquids. Think about how difficult it would be to pour milk out of a gallon container if the handle did not allow release of air pressure.
11. **Reseal features.** The ability to reseal is a feature of items such as coffee cans, screw-type bottles, plastic bread sleeves, zip-top cheese packages, and insert-tabs, as the food industry introduces special devices that have utility value for the consumer as well as protect the food product and make it more desirable.
12. **Ease of disposal.** Ease of disposal is improved if packages can be burned, crushed, ground up, or easily recycled. Metal can easily be crushed, glass can be ground up, and paper can be burned and recycled. Many plastic bottles can be recycled.
13. **Size, shape, and weight limitations.** Lighter weight packages are more economical provided they give the right amount of protection. In general, people prefer square packages because they use space on shelves better. However, square containers are more expensive to construct.
14. **Appearance and print ability.** Appearance and cost, after other criteria are met, are important considerations. Print ability allows the manufacturer to print the “pack date” or “best if used by date” or “sell date” or “use date” on the package. This gives the consumer further evidence that the product is good and wholesome. The print ability also affects the type or extent of advertising that a food processor might be able to use to promote the product.
15. **Low cost.** Obviously, no manufacturer wants to spend more for its product’s package than what it is worth. For some products the packaging costs more than the original raw ingredient bought from the farmer.

Teacher information sheet 3

Stop the Mold

The effect of preservatives in bread is illustrated by observing mold growth on breads with and without preservatives.

Hypothesis: What do you think will happen? Which breads will have the least mold and which will have the most mold and why?

Lab time: Day 1: 20 - 25 minutes; daily observations for two weeks

Students will list two preservatives found in bread and state the purpose of preservatives in bread.

Materials: 4 different loaves of store bought bread

- 2 loaves with preservatives

- 2 loaves without preservatives

Bread wrappers from all breads tested

Homemade bread may be used for examples of bread without preservatives

Plastic sandwich bags, water spray/mister

Label tape and markers

Copy of recording chart

Ruler for measuring size of mold formation

Procedure: Divide students into groups of three or four. Review the procedure and recording chart. Illustrate with a chart on the black board. Ask students to hypothesize which breads will have the least mold and which the most mold and why. Record answers on recording chart. Perform the experiment and record observations daily.

Class Discussion Questions:

Pre- Lab

1. Which bread do you think will be the best preserved? How long do you think it will stay mold free? How will you identify the mold?
2. What preservatives are used in bread?
3. Why do you think bakers use preservatives?
4. Why do some consumers want bread with preservatives? Why do some consumers want bread without preservatives?

Teacher information sheet 4

Stop the Mold

Answers: Pre- Lab Questions

- 1. Which bread do you think will be the best preserved? How long do you think it will stay mold free? How will you identify the mold?**

Answers will vary. The prediction is that bread with preservatives will stay mold - free the longest.

The bread without preservatives will show mold after about one week; the bread with preservatives may last beyond two weeks.

Mold on bread is fuzzy and grows in round colonies. Colors vary, but are commonly gray, white, green-blue, black, or orange, depending on the type of spores that got on the bread, the type of bread, and the conditions under which it was stored.

- 2. What preservatives are used in bread?**

Calcium Propionate and Sodium Benzoate.

- 3. Why do you think bakers use preservatives?**

Bread with preservatives lasts longer than bread without preservatives. This makes it easier to store, ship, and sell bread. Stores like it because bread can stay longer on the shelves and consumers like it because it keeps longer at home.

- 4. Why do some consumers want bread with preservatives? Why do some consumers want bread without preservatives?**

With preservatives

Bread with preservatives keeps longer and is easier to store. It does not have to be kept in the refrigerator.

Without preservatives

Some consumers try to avoid additives, including preservatives, in their food. Some prefer the flavor and texture of breads made without preservatives.

Teacher information sheet 5

Answers: Post Lab Questions

1. Which bread stayed mold-free the longest? Why do you think it did?

Breads with preservatives most often will stay mold-free the longest. How fresh the breads were when purchased will affect results. Check the expiration dates.

2. How did the breads compare?

Review recording charts and summarize results for size of the mold colonies and number of colonies.

3. Why did the instructions say to handle the bread slices and expose them to air before putting them in bags?

Mold spores are everywhere, including on our hands and in the air. In order for mold to grow, the bread had to be “inoculated” with some spores.

4. How many different colors of mold did you find and why might this vary each time the experiment is performed?

The most common colors are gray, white, green-blue, black, orange, depending on the strain of mold. The strain that grows on the bread will depend on the spores that reached the bread, type of bread, and conditions under which it was stored.

5. What kind of bread would you like to buy? Why?

Answers will vary.

Teacher information sheet/Answer Sheet 6

Preservatives: Why Are They There?

Name of Food: *Hearty Slices: Crunch Oat Sandwich Bread*

List Ingredients	Is the ingredient a preservative?	Purpose of preservative	How it works
Unbromated-bromated, unbleached enriched wheat flour	no		
Water	no		
Unbromated stone ground 100% whole wheat flour	no		
Corn syrup	no		
Oatmeal	no		
Hazel nuts	no		
Wheat gluten	no		
Spent wheat	no		
Honey	no		
Partially hydrogenated soybean oil	no		
Oat bran	no		
Salt	no		
Oat flour	no		
Yeast	no		
Wheat bran	no		
Rice bran	no		
Potato flour	no		
Mono and di-glycerides	yes	Processing aid to maintain freshness	Dough conditioner (tenderizers), prevents baked products from going stale, emulsifiers prevents oil from separating out)
Oat fiber	no		
Calcium propionate	yes	Maintain freshness	Inhibits mold growth

Answer Sheet #6 cont.

Discussion Questions

- 1. What preservative is present in the largest amount and what is its purpose?**

Answers will vary

- 2. What is the most common purpose of the additives in the products chosen for this class?**

Answers will vary

Teacher information sheet 7

Name _____

Class/Period _____

Date _____

Evaluation of NIE Newspaper Activity

Grade the NIE activity on the following criteria using the 0-4 rating scale. Four is the highest rate and zero is the lowest rate. Write comments in the boxes under the rating for each criterion.

Criteria	4	3	2	1	0
Content: Information is correct, complete, and useful.					
Neatness: Clean, organized, and not sloppy.					
Spelling: All words spelled correctly.					
Handed in on time: Handed in on due date. A point is deducted for each day late.					
Time Management: Time used wisely and working on project at allotted time.					

Teacher information sheet/Answer Sheet 8

Popcorn Packaging Discussion

Questions:

1. What is needed for popcorn kernels to pop?

Popcorn needs heat, proper humidity (moisture content), and a good viable seed to pop.

2. What makes it happen?

The moisture in the seed heats up (the vegetable oil acts as a moisture barrier) until it escapes very rapidly out of the seed coat and this rapid departure causes the seed to “explode” inside out.

3. Examine a commercial microwave bag of popcorn. What do you find?

Typically you find a small paper bag that has popcorn seed covered with oil and salt. Inside the bag is a microwave receptor that helps generate the heat for the microwaving process.

4. What is the bag made of? What did the engineers have to do to develop this product so that it works properly?

The bag is made of paper. It must seal the moisture in, allow for the bag to expand, provide consumer information, allow for the steam to escape slowly, retain the oil in the bag, and keep consumers from getting burned.

5. Why do you think there are always several unpopped kernels in a microwave bag?

Kernels are not perfect. The microwave heating process is not as predictable as stove top heating.

Teacher information sheet 9

Glossary of Bolded Terms

Preservatives: Extend the shelf life of convenience foods by delaying undesirable changes in the food, retard product spoilage caused by mold, air, bacteria, fungi, and yeast to help maintain food at its best quality.

Propionates: Keep baked goods from being spoiled by mold.

Sodium benzoate, sodium propionate, and potassium sorbate: Prevent the growth of microbes on the surface of pancake and waffle syrup, cheese, margarine, mayonnaise, cakes, beverages, and pickled vegetables.

Sulfur dioxide: Inhibits discoloration in fruit juice concentrates and dried fruits and vegetables.

Nitrites and nitrates: Used to cure or preserve foods like ham, bacon, sausage, hot dogs, and luncheon meats. They also add a distinctive flavor to these foods.

Antioxidants: Prevent undesirable color and flavor changes in vegetables, fruits, and meat caused by oxygen in the air (oxidation).

BHA and BHT: Butylated hydroxytoluene and Butylated dehydroxyanisole are common antioxidants used in peanut butter, breakfast cereals, bakery products, snack foods, potato chips, lard, crackers, chicken flavor stuffing mix, unbaked cheese cake mix, and cake mixes.

LIST OF FOOD ADDITIVES

COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Acesulfame-K	Processing aid; appeal	Low-calorie sweetener	Table-top sweetener (Sunette® and Sweet One®), dry food products, confections (FDA petitioned to approve use in baked goods and soft drinks.)
Acetic Acid	Maintain freshness	Acidifies foods, flavoring	Baked goods, salad dressings and spreads, the primary component in vinegar
Acetone Peroxide	Processing aid	Bleaches and ages flour to improve dough handling properties	Flour, baked goods
Adipic Acid	Maintain freshness	Acidifies foods, flavoring, antioxidant	Sweet foods (jello, beverages, jams, jellies, candies), processed cheeses, dry mixes
Agar	Processing aid	Thickening agent	Icings, ice cream, jam, whipped cream
Algin	Processing aid	Stabilizer, thickener, emulsifier, gelling agent. Used as sodium alginate, ammonium-, and propylene glycol alginates	Evaporated milk, cheeses, cream, ice cream, fruit drinks, beer (stabilized foam), salad dressings, puddings, fudgsicles
Alum	See Potassium Aluminum Phosphate		
Ammonium Sulfate	Processing aid	Yeast nutrient (decreases leavening and baking times)	Baked products
Amylase	Processing aid	Enzyme (breaks down starch into sugar)	Baked products, dry breakfast foods

PAGE 2

COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Annatto Extract (Bixin)	Appeal	Natural yellow colorant related to carotenoids	Ice cream, butter, margarine, vegetable oils
Artificial Flavors	Appeal	One of more than 700 approved compounds used in minute amounts in foods; synthetic derivatives of naturally occurring materials; add flavor	Various processed foods including cereals, mixes, beverages, confections
Ascorbic Acid	Nutritional value; maintain freshness	Nutrient (vitamin C); antioxidant and color stabilizer	Processed meats, canned vegetables, powdered and liquid beverages, potato flakes, breakfast foods
Ascorbyl Palmitate	Maintain freshness	Antioxidant; nutrient vitamin C is formed by combining ascorbic acid with palmitic acid (from fat)	Shortening
Aspartame	Processing aid; appeal	Low-calorie sweetener	Tabletop sweetener (NutraSweet® and Equal®), beverages, multivitamins, frozen desserts, yogurt
Benzoyl Peroxide	Processing aid	Bleaching agent	Flour

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Beta-carotene	Appeal; nutritional value	Adds color; precursor to vitamin A (humans and animals can convert beta carotene to vitamin A)	Natural carotenoid pigment found in carrots and yellow-orange fruits and vegetables; used in milk products (butter, cheese), margarine, shortening, imitation dairy products.
BHA (Butylated Hydroxy-anisole)	Maintain freshness	Antioxidant (used in combination with BHT)	Dry mixes, dry cereals, oils and shortening, potato chips and flakes, chewing gum
BHT (Butylated Hydroxy-toluene)	See BHA		
Bicarbonate of Soda	See Sodium Bicarbonate		
Biotin	Nutritional value	Nutrient	Various processed foods
Bromated Flour	See Potassium Bromate		
Caffeine	Appeal	Flavoring, stimulant	Naturally present in coffee, tea, cocoa. Added to many cola soft drinks. Also present in many over-the-counter drugs.
Calcium Chloride	Processing aid	Firming agent	Pickles, cheese, canned vegetables

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Calcium Caseinate	Processing aid	Nutrient, flavoring and whitening agent (derived from milk protein)	Ice cream, ice milk, sherbet, coffee creamers
Calcium Iodate	See Potassium Iodate		
Calcium Pantothenate	Nutritional value	Nutrient (is name for the synthetic form of pantothenic acid, a vitamin)	Fortified cereals
Calcium Phosphate	Processing aid	Regulates acidity, yeast food	Baked products
Calcium Propionate	See Propionates		
Calcium Saccharin	See Saccharin		
Calcium Silicate	Processing aid	Anti-caking agent	Packaged mixes
Calcium Stearoyl Lactylate	Processing aid	Dough conditioner (improves dough handling properties)	Bakery products
Calcium Sulfate	Processing aid	Firming agent, yeast nutrient, dough conditioner	Cheese, bakery products
Carboxy-methyl Cellulose	Processing aid	Stabilizer, thickener	Ice cream, icings, jellies, puddings, pie fillings, baked goods, salad dressings, reduced fat products

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Carob Bean Gum	Processing aid	Stabilizer, thickener, prevents rapid melting	Cheese, frozen deserts
Carrageenan (gum)	Processing aid	Thickening and stabilizing agent	Ice cream, jelly, chocolate, milk, infant formula
Carnauba Wax	Processing aid; appeal	Provides shine to chocolates	Chocolate candies
Cellulose Gum	See Carboxymethyl Cellulose		
Chlorine Dioxide	Processing aid	Bleaching agent	White flour
Citric Acid	Processing aid	Controls acidity, antioxidant, stabilizer	Fruit juice/drinks, mayonnaise, margarine, salad dressings, processed cheeses, carbonated beverages, canned fruits and fish, bakery products, spices
Cobalamin, Cyano-cobalamin	Nutritional value	Vitamin B-12	Fortified foods
Corn Syrup	Processing aid	Sweetener, thickener. Has replaced sugar in many processed foods due to its low cost, especially high fructose corn syrup	Candies, toppings, syrup, sweet snack foods, imitation dairy foods, soft drinks
Corn Syrup Solids	Processing aid	Sweetener (dried corn syrup)	Coffee whiteners

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Dextrin	Processing aid	Regulates consistency, prevents crystallization (Starch can be broken down to dextrans and then to dextrose or glucose.)	Candies, gravy mixes
Dextrose (Glucose)	Processing aid; appeal	Sweetener, coloring agent, texture agent (gives body or "mouthfeel")	Bread, caramel, bacon, soda pop, cookies, processed meats, syrups, occurs naturally in honey, fruits and vegetables
Diglycerides and Mono-glycerides	Processing aid; maintain freshness	Dough conditioners (tenderizes), preservative (prevents baked products from going stale), emulsifiers (prevents oil from separating out)	Baked products, dry mixes, margarine, fats and oils, peanut butter, candies
Dipotassium Phosphate	Processing aid	Sequestrant, emulsifier, acidity control	Coffee lighteners, potato products, dry mixes
Disodium EDTA	See EDTA		
Disodium Guanylate	Processing aid; appeal	Flavor enhancer. Belongs to same family of food additives as MSG -- has no taste of its own, but accentuates natural flavor of foods	Dry mixes, frozen entrees, canned vegetables
Disodium Inosinate	Similar to Disodium Guanylate		

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
EDTA (Ethylene- diamine tetra acetic acid)	Maintain freshness	Sequestrant	Salad dressings, spreads, margarine, processed fruits and vegetables, soft drinks, wine, cider
FD & C Yellow #5 (Tartrazine)	Appeal	Adds yellow color	Widely used yellow coloring in sauces and seasoning mixes, frozen pies, ice cream, frozen entrees
FD & C Yellow #6	Appeal	Adds yellow color	Sauce and seasoning mixes, ice cream
Ferric... " Lactate " Oxide " Phosphate " Sodium " Sulphate	Nutritional value	Forms of the mineral iron	Iron-fortified foods
Fluoride	Nutritional value	A mineral supplement	Fortified foods
Folacin or Folic Acid	Nutritional value	Nutrient supplement, a B vitamin	Fortified foods
Fructose (Levulose)	Appeal; processing aid	Sweetener. Occurs naturally in honey and fruits. Most common form used in processing is high fructose corn syrup.	Carbonated beverages and other sweetened products
Fumaric Acid	Maintain freshness	Antioxidant, acidifier, flavor (add tartness).	Fruit juice drinks, gelatin desserts, puddings, candy, leavening agents

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Fungaryl Protease	Processing aid	Dough conditioner	Baked products
Furcelleran	Processing aid	Thickening and gelling agent	Puddings
Gelatin	Processing aid	Thickening and gelling agent	Powdered dessert mix, yogurt, ice cream, cheese spreads, beverages
Glucose	See Dextrose		
Glycerin/ Glycerol	Processing aid	Stabilizer, helps retain moisture in foods	Marshmallows, candy, baked goods
Glycerol Monostearate	Processing aid	Emulsifier; a monoglyceride	Pasta products, whipped topping
Guar Gum	Processing aid	Thickening agent, stabilizer, prevents rapid melting	Popsicles, fudgsicles, non-dairy whipped toppings, cheese substitutes, ice cream
Gum Arabic (Acacia Gum, Gum Senegal)	Processing aid	Thickening agent, foam stabilizer	Icings, beverages
Heptyl Paraben	See Parabens		
High Fructose	See Fructose		
Hydrochloric Acid	Processing aid	Acidifier	Used to coagulate casein in "directly set" cottage cheese
Hydrogen Peroxide	Maintain freshness	Preservative (kills special bacteria); bleaching agent	Cheese

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Hydrolyzed Vegetable Protein (also hydrolyzed plant protein, textured vegetable protein)	Processing aid; nutritional value	Protein source or protein extender; flavor enhancer, moisture binder	Canned and dried soups, frankfurters, sauce mixes, canned vegetables and meats
Invertase (also sucrose)	Processing aid	An enzyme that converts sucrose to dextrose and levulose	Candies
Invert Sugar	Appeal	Sweetener (mixture of glucose or dextrose and fructose), sweeter and more soluble than sucrose	Candies, soft drinks, many other processed foods
Iodine	Nutritional value	Mineral supplement	Iodized salt
Isopropyl Citrate	See Stearyl Citrate		
L-Cysteine	Processing aid	Dough conditioner; (cysteine is a naturally occurring amino acid)	Baked products
Lactalbumin	Nutritional value	A source of protein; a by-product from milk used in the manufacture of cheese	Baked products

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Lactic Acid	Processing aid; maintain freshness	Acidifier, flavor (adds tartness)	Baked products, cheese and cheese spreads, baking soda, savory snacks, olives, frozen deserts, carbonated fruit-flavored drinks
<u>Lactobacillus bulgaricus</u>	Processing aid	Bacteria used to ferment milk (converts lactose to lactic acid) to make yogurt or other cultured dairy products	Yogurt, sour cream, buttermilk, and dairy products made from live bacterial cultures
Lactose	Appeal, filler	Sweetener (a sugar found in milk)	Whipped topping mix, pastries, baked products, some medications
Lecithin	Processing aid	Emulsifier, anti-oxidant, tenderizer (in baked products). Naturally occurs in egg yolk, soybeans and corn	Baked goods, margarine, chocolate, ice cream, frozen entrees and toppings
Levulos	See Glucose or Dextrose		
Licorice (Ammoniated Glycyrrhizin)	Appeal	Flavoring	Candies, beverages (root beer, wintergreen flavor), baked goods
Locust Bean Gum	See Carob Bean Gum		
Magnesium Carbonate	Processing aid	Regulates acidity	Cheese

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Malic Acid	Processing aid	Acidifier, flavor (tartness). Naturally found in many fruits.	Beverages (especially fruit drinks)
Mannitol	Appeal; processing aid	Sweetener, moisture control	Chewing gum, low-calorie foods
Methyl Anthranilate	Appeal	Flavoring (grape)	Grape-flavored drinks
Monocalcium Phosphate	Processing aid	Leavening salt, dough conditioner	Baked goods
Mono-glycerides	See Diglycerides		
Monosodium Glutamate (MSG)	Appeal; processing aid	Flavor enhancer (glutamic acid is an amino acid that brings out the flavor of protein-containing foods)	Soups, seafood, poultry, cheese sauces, stews and many Chinese foods
Monostearate	Processing aid	Emulsifier	Frozen pies, imitation dairy products
Nitrates and Nitrites	Processing aid; maintain freshness	Preservatives (prevent botulism), fixes color of cured meats, flavoring agents in cured meats	Cured meats, some soups
Nutmeg	Appeal	Flavoring	Cookies and other baked products

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Oxystearin	Processing aid	Prevents oil from crystallizing (becoming cloudy) in the refrigerator	Salad dressings
Pantothenyl Alcohol	See Calcium Pantothenate		
Parabens Menthyl- Propyl- Heptyl-	Maintain freshness	Prevents microbial growth	Carbonated beverages, fruit juices, pickles, sauerkraut, beer
Petrolatum	Processing aid	Produces surface sheen on candy (is same substance as petroleum jelly, e.g. Vaseline)	Candy
Phosphoric Acid	Processing aid; appeal	Acidifier, flavor	Carbonated beverages, baked goods, cheese, dehydrated potatoes
Polydextrose	Processing aid	A bulking agent used in making low-calorie foods	Baked goods, confections, puddings and other foods
Polysorbate 60	Processing aid	Used in same roles as monoglycerides but smaller amounts are needed; emulsifiers, preservatives (retain moisture)	Imitation dairy products, baked goods, frozen desserts, food dressings
Polysorbate 80	Similar to Polysorbate 60		

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Potassium Aluminum Sulfate (also called alum)	Processing aid	Firming agent; leavening	Cheeses, pickles, maraschino cherries, leavening salt in baking powder
Potassium Bisulfite	See Sulfites		
Potassium Bromate	Processing aid	Oxidizing agent (ages and improves baking properties of flour)	Flour, baked goods
Potassium Carbonate	Processing aid	Improves flavor and darkens chocolate color (process is called dutching); also used to extract color from annatto seed which is used as a yellow dye	Confections, cocoa products, processed chicken products such as ramen
Potassium Citrate	Processing aid	Controls acidity. (Human blood normally contains sodium and potassium citrates)	Beverages
Potassium Iodate	Processing aid	Oxidizing agent, dough conditioner	Flour, baked goods
Potassium Metabisulfite	See Sulfites		

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Potassium Phosphate	Processing aid; maintain freshness	Antioxidant, emulsifier, buffer. Increases overrun of whipped toppings; also used as yeast food in brewing industry	Dairy products such as cheese, frozen whipped topping, alcoholic beverages
Potassium Sorbate	See Sorbates		
Propionates	Maintain freshness	Inhibits mold growth. Usually added to calcium propionate (in bread), or sodium propionate (in cakes)	Breads, rolls, cakes, pies
Propionic Acid	See Propionates		
Propyl Gallate	Maintain freshness	Antioxidant (retards spoilage of fats and oils)	Oils, savory snacks, soups, processed meats, dried mixes
Propylene Glycol	Processing aid	Solvent for artificial flavors, maintains moisture content and texture	Baking mixes, sweet baked foods, beverages
Pyrophosphates	Processing aid	Firming agents, emulsifiers	Dairy products, processed meats
Quinine	Appeal	Flavoring (also an antimalarial drug at high doses)	Tonic and quinine water, bitter lemon

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Saccharin	Appeal	Non-nutritive, low-calorie sweetener. Lower cost than other sweeteners and very stable. Animal studies have caused concern about the possibility that saccharin might be linked to bladder cancer at very high doses.	"Diet" foods, beverages, vitamins and drugs. Warning labels are required on saccharin-containing foods and beverages; warning notices are required in stores which sell saccharin-containing products.
Salt (Sodium Chloride)	Appeal; maintain freshness	Add flavor; salt is a flavor enhancer to many foods, preservative in cured meats	Meats, luncheon meats, pickled products, canned and dried soups
Salt peter	See Sodium Nitrate		
Silicon Dioxide	Processing aid	Anti-caking agent	Salt, dry mixes
Sodium Acid Pyrophosphate	Processing aid	Leavening	Leavening salt in baking powder, baked products, cake and biscuit mixes
Sodium Alginate	See Algin		
Sodium Aluminum Phosphate	Processing aid	Leavening; firming agent in processed cheese	Leavening salt in baking powders, cake and biscuit mixes, processed cheese

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Sodium Ascorbate	Processing aid; maintain freshness	Curing agent, nutrient, antioxidant, color stabilizer (is the synthetic form of vitamin C)	Processed meats
Sodium Benzoate	Maintain freshness	Prevents yeast and mold growth	Carbonated beverages, fruit, juices, pickles, sauerkraut
Sodium Bicarbonate (Bicarbonate of Soda)	Processing aid	Reacts with an acid or acid salt to produce carbon dioxide to make baked products rise	Baking soda, baking powder, chemically leavened baked goods (cakes, quick breads)
Sodium Bisulfite	See Sulfites		
Sodium Caseinate	Processing aid	Flavoring, coloring, source of milk protein	Milk, milk products, baked goods, dry mixes (cocoa, gravy, soup). The milk protein, casein, combined with sodium forms sodium caseinate in milk.
Sodium Citrate	Processing aid	Flavoring (tartness), chelating agent, buffer (controls acidity)	Beverages, jams and jellies, frozen entrees, cheese, evaporated milk
Sodium Erythorbate	Processing aid	Antioxidant, color enhancer, curing agent	Processed meats, such as ham, hot dogs, and luncheon meats
Sodium Metabisulfite	See Sulfites		

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Sodium Nitrates / Nitrites	See Nitrates and Nitrites		
Sodium Phosphate	Processing aid	Firming agent	Processed meats, cheese, evaporated milk
Sodium Propionate	See Propionates		
Sodium Pyrophosphate	Processing aid	Holds water in meats, sequestrant	Soups, processed meats, coffee lighteners
Sodium Silicoaluminate	Processing aid	Anti-caking agent	Dried mixes, coffee lighteners
Sodium Stearol Lactylate	See Sodium Stearoyl Fumarate		
Sodium Sulfite and Bisulfite	See Sulfites		
Sodium Stearoyl Fumarate	Processing aid	Dough conditioner, emulsifier, whipping agent	Baked goods, dried and frozen egg whites, artificial whipped cream
Sodium Tripolyphosphate	Processing aid	Sequestrant, holds water in meats	Nondairy creamers, processed meats, frozen fish products

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Sorbates/ Sorbic Acid	Maintain freshness	Prevents mold growth	Cheese and cheese substitutes, baked goods (except yeast leavened since it interferes with yeast growth), salad dressings
Sorbitol	Appeal; processing aid	Sweetener (a sugar alcohol), thickening agent, maintains moisture	Dietetic drinks and foods, candy, shredded coconut, chewing gum, moist pet foods; naturally occurs in fruits and berries
Soy Protein	See Textured Vegetable Protein (TVP)		
Stannous Chloride	Maintain freshness	Antioxidant, prevents discoloration and off-odors	Soft drinks, canned asparagus
Starch, Modified Starch	Processing aid	Antioxidant (by binding metal ions that catalyze oxidation reactions). Isopropyl citrate is used in vegetable oils.	Margarine, vegetable oils
Sucrose (Sugar)	Appeal; processing aid	Sweetener, preservative, browning agent, flavor. Sucrose is disaccharide made from glucose and fructose.	Naturally found in many foods and also added to many processed foods
Sucrose Polyester	Processing aid	A fat replacer such as Olestra®	FDA has not approved its use (9/93); proposed to be used for frying foods and in salad dressings.

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Sulfites	Maintain freshness	Antioxidant, prevents discoloration (browning) in dried fruits and freshly cut fruits and vegetables	Dried fruits, wine, fresh fruits and vegetables in salad bars (must have warning), dehydrated potatoes, dried mixes, some baked goods. Forms of sulfites in use today include: sodium and potassium bisulfite, sulfur dioxide, sodium sulfite, sodium and potassium metabisulfites.
Sugar	See Sucrose		
Sulfur Dioxide	See Sulfites		
Tannin/Tannic Acid	Appeal	Flavoring, coloring	Used to flavor processed foods, also found naturally in teas, coffee and chocolate
Tartaric Acid	Processing aid	Acidifier, flavoring (tartness)	Baked products, beverages, candy, ice cream, yogurt, gelatin desserts
Textured Vegetable Protein (TVP)	Nutritional value	Protein extender (soybeans become source of high-quality, low-cost protein)	Products containing meats (considered a food not an additive)
Titanium Dioxide	Appeal; processing aid	Coloring (a pigment known as FD & C Lake); possesses great covering power.	White coated tablets, coffee lighteners, baking mixes, some baked products, candy, gums, white paint

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COMPOUND	PRIMARY PURPOSE	HOW IT WORKS	WHERE IT IS COMMONLY FOUND
Tocopherols	Maintain freshness; nutritional value	Antioxidant, nutrition (active form of vitamin E)	Vegetable oils; vitamin supplement
Tragacanth Gum	Processing aid	Stabilizer, thickening agent	Salad dressings, ice cream, ice milk, pie fillings, sherbets
Tricalcium Phosphate	Processing aid	Anti-caking agent	Cereals, dry drink mixes
Vanillin, Ethyl vanillin	Appeal	Flavoring (synthetic form of vanilla)	Ice cream, baked goods, beverages, chocolate, candy gelatine, desserts
Whey	Nutritional value	Whey is the fluid left after the casein protein in milk has been coagulated to make cheese. Whey contains water, lactose (milk sugar), and other milk proteins	Baked goods, processed cheese products
Xanthan Gum	Processing aid	Stabilizer, thickener, emulsifier, foam enhancer	Cheese, salad dressing, beer, sauces, pickle relishes, milk puddings, gelled products, low-calorie products

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 for the CIC Curriculum Manual, August 1993.

Quiz 12

Name _____

Class/Period _____

Date _____

Unit: Processing and Manufacturing**Lesson: Convenience Foods and the Role of Preservatives**

Matching: Match the vocabulary terms in column A with the definitions in column B. Write the letter of the definition in column B in the space next to the terms in column A.

A	B
_____ 1. Preservatives	A. Provide a shortcut in food preparation, require less time and energy to prepare, and foods come partially prepared or ready-to serve.
_____ 2. BHT and BHA	B. Prevent undesirable color and flavor changes in vegetables, fruits, and meat caused by oxygen in the air (oxidation).
_____ 3. Convenience food	C. Used to cure or preserve foods like ham, bacon, sausage, hot dogs, and luncheon meats.
_____ 4. Packaging	D. Common antioxidants used in peanut butter, breakfast cereals, bakery products, snack foods, etc.
_____ 5. Propionates	E. Metal cans, glass jars, plastic jars and bottles, aluminum foil, paper bags, cardboard boxes, used as a means to preserve foods.
_____ 6. Nitrates and nitrites	F. Keep baked goods from being spoiled by mold.
_____ 7. Antioxidants	G. Extend the shelf life of convenience foods by delaying undesirable changes in the food, retard product spoilage caused by mold, air, bacteria, fungi, and yeast to help maintain food at its best quality.

Short answer and fill in the blank: Write short answers or fill in the blank to the following questions and statements. Use complete sentences when answering questions.

1. List two types of packaging food that can decrease the potential for bacterial contamination.
 - a.
 - b.

Quiz 12 Key

Unit: Processing and Manufacturing

Lesson: Convenience Foods and the Role of Preservatives

Matching: Match the vocabulary terms in column A with the definitions in column B. Write the letter of the definition in column B in the space next to the terms in column A.

A	B
<u> G </u> 1. Preservatives	A. Provide a shortcut in food preparation, require less time and energy to prepare, and foods come partially prepared or ready-to-serve.
<u> D </u> 2. BHT and BHA	B. Prevent undesirable color and flavor changes in vegetables, fruits, and meat caused by oxygen in the air (oxidation).
<u> A </u> 3. Convenience food	C. Used to cure or preserve foods like ham, bacon, sausage, hot dogs, and luncheon meats.
<u> E </u> 4. Packaging	D. Common antioxidants used in peanut butter, breakfast cereals, bakery products, snack foods, etc.
<u> F </u> 5. Propionates	E. Metal cans, glass jars, plastic jars and bottles, aluminum foil, paper bags, cardboard boxes, used as a means to preserve foods.
<u> C </u> 6. Nitrates and nitrites	F. Keep baked goods from being spoiled by mold.
<u> B </u> 7. Antioxidants	G. Extend the shelf life of convenience foods by delaying undesirable changes in the food, retard product spoilage caused by mold, air, bacteria, fungi, and yeast to help maintain food at its best quality.

Short answer and fill in the blank: Write short answers or fill in the blank to the following questions and statements. Use complete sentences when answering questions.

1. List two ways packaging of food can decrease the potential for bacterial contamination.
 - a. *Packaging of food is considered to be a food preservation method. The packaging in which convenience foods are sold is designed to protect them from contamination by spoilage, insects, and rodents and prevent deterioration caused by contact with air, light, or heat.*
 - b. *Heat sealing of metal cans and glass jars and bottles prevents and /or retards spoilage of food. Vacuum-packed foods: restricting exposure to air retards spoilage.*

2. Why are preservatives added to foods? Name one preservative and its purpose.

Preservatives extend the shelf of convenience foods. They delay undesirable changes in the food, retard product spoilage caused by mold, air, bacteria, fungi, and yeast, and help maintain food at its best quality.

Propionates, sodium benzoate, sodium propionate, potassium sorbate, sulfur dioxide, nitrites, nitrates, antioxidants, salt, and sugar. (See teacher information sheet #11)

3. Name two tamper-resistant packaging methods.
 - a. *Pull tapes: lids on milk and juice containers, dairy products, such as yogurt, sour cream, ricotta cheese, etc. Plastic bags with resealable closures.*
 - b. *Tamper-resistant seals: pop-up lids on glass jars and bottles (if the seal on the lid has been broken, the lid will be popped up), foil seal on perishable refrigerated foods, such as sour cream, yogurt, cream cheese, margarine, butter.*
 - c. *Vacuum release: bottles and cans will be vacuum release if properly sealed.*
4. List three ways food can be packaged.
 - a. *metal cans*
 - b. *glass jars and bottles*
 - c. *plastic jars, bottles and bags*
 - d. *aluminum foils*
 - e. *paper bags*
 - f. *cardboard boxes*
5. Name two functions of containers or packaging of foods.
 - a. *sanitary protection*
 - b. *moisture and fat protection*
 - c. *gas and odor protection*
 - d. *pouring features*
 - e. *light protection*
 - f. *resistance to impact*
 - g. *transparency*
 - h. *tamper-resistance*
 - i. *ease of opening*
 - j. *reseal features*
 - k. *ease of disposal*
 - l. *low cost*

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