

Science Skills in the Hospitality Industry: Scientific Management of Production, Fabrics, and Cleaning

Unit: Basic Skills for FCS

Problem Area: Apply Science Skills in Laboratory Work Settings

Lesson: Science Skills in the Hospitality Industry: Scientific Management of Production, Fabrics, and Cleaning

■ **Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

- 1 Explain how scientific management is used in the hospitality industry.
- 2 Summarize the origin and uses of natural and human-made fibers in homes and industry.
- 3 Explain the science related to how cleaners work.

■ **Resources.** The following resources may be useful in teaching this lesson:

“Controlling Exposure: Protecting Workers from Infectious Disease,” *Work Safe BC*. Accessed July 26, 2010. <http://www.worksafebc.com/publications/high_resolution_publications/assets/pdf/bk129.pdf>.

“Fiber Facts,” *NuMei*. Accessed July 26, 2010. <<http://www.numei.com/fiberfacts.htm>>.

“Fiber Facts,” *The Textile Rooms*. Accessed July 26, 2010. <http://www.textilerooms.com/tecnical/fibre%20content%20labelling/parte%20usa/fiber_fact.html>.



- "Five Stain-Busters to Have on Hand," *iVillage*. Accessed July 26, 2010. <<http://home.ivillage.com/cleanandorganize/cleaning/0,,75vb,00.html>>.
- "Frederick Taylor and Scientific Management," *NetMBA*. Accessed July 26, 2010. <<http://www.netmba.com/mgmt/scientific/>>.
- "How to Make Your Own Laundry Detergent—And Save Big Money," *The Simple Dollar*. Accessed July 26, 2010. <<http://www.thesimpledollar.com/2007/03/15/how-to-make-your-own-laundry-detergent-and-save-big-money>>.
- "Man-Made Fiber," *About.com*. Accessed July 26, 2010. <<http://composite.about.com/library/glossary/m/bldef-m3209.htm>>.
- "Resources for Hospitality," *Work Safe BC*. Accessed July 26, 2010. <<http://www.healthandsafetycentre.org/resources/hospitality/resHospitality.htm>>.
- "Scientific Management," *Wikipedia*. Accessed July 26, 2010. <http://en.wikipedia.org/wiki/Scientific_management>.
- "Scientific Management in the 21st Century," *eioba*. Accessed July 26, 2010. <http://www.eioba.com/a11000/scientific_management_in_21st_century>.

■ **Equipment, Tools, Supplies, and Facilities**

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

■ **Key Terms.** The following terms are presented in this lesson (shown in bold italics):

- chlorine bleach
- detergent
- emulsify
- human-made fibers
- natural fibers
- oxygen bleach
- sanitizers
- scientific management
- solute
- solvent
- surfactants

- **Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Tell the students that “hospitality” is the Latin word for “host.” The hospitality industry includes hotels, motels, inns, theme parks, event planning, and cruise lines. Some hospitality facilities contain food service operations. Many of these facilities use scientific management for efficiency and standardization of products.

Give the students between five and eight minutes to write about their hospitality industry experiences (e.g., Six Flags, Hilton, or Walt Disney World). Ask several students to share their experiences. Briefly discuss what hospitality industry employees can do to improve the experience for patrons.

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Explain how scientific management is used in the hospitality industry.

Anticipated Problem: What is scientific management?

- I. Scientific management
 - A. Frederick Winslow Taylor wrote *The Principles of Scientific Management* in 1911 and designed four principles of **scientific management** (Taylorism is a method of breaking down workplace actions, jobs, and tasks into small subparts that are analyzed and taught), which is the study of time and motion efficiency in the workplace. In the 20th century, scientific management was epitomized by the efficiency expert. Taylor and Gantt (Gantt Project Management Charts) were interested in making the workplace and its inhabitants more productive and efficient. The following are the four principles of scientific management:
 1. “Rule-of-thumb” work methods should be changed to methods based on the scientific study of the work task. For example, Taylor once analyzed the task of shoveling coal for a furnace. In his analysis, he determined a better way to organize the shoveling that reduced the number of people required to do the task from 500 to 140.
 2. It is necessary to train workers to use the scientific work techniques.
 3. Workers should be evaluated to ensure they use the scientific work techniques.
 4. The work of managers and workers should be divided, with both following scientific work techniques.

- B. Worker productivity
 - 1. It improves efficiency.
 - 2. It reduces waste.
 - 3. It reduces worker time and motion per task.
- C. 21st century scientific management
 - 1. Motorola's Six Sigma business management model seeks to eliminate product defects and to minimize product variables.
 - 2. Lean manufacturing principles (originally called the "Toyota Production System") use small stockpiles of inventory placed around the manufacturing facility instead of in centralized warehouses. The net effect of lean manufacturing is to reduce waste and to increase productivity.
 - 3. McDonald's implements scientific management techniques in its fast food stores, especially for food production tasks.
 - a. All tasks are divided into smaller tasks.
 - b. Exact cooking times are used.
 - c. Suggested equipment food temperatures are used.
 - d. All food supplies are standard.
 - e. Menu items are prepared following a diagram.
 - f. Standard clean-up procedures for McDonald's stores are also provided. These standard operating procedures (SOPs) are common across the corporation and have common step-by-step methods and meet local health department regulations.
- D. Pros and cons
 - 1. Pro: A scientific management process is especially important in cleanliness standards for the hospitality and medical facilities industries.
 - 2. Pro: Safety and production standards can be maintained using scientific management in hospitality manufacturing production lines.
 - 3. Con: Scientific management may be viewed as "deskilling" workers, as all tasks are simplified and divided.
 - 4. Con: Concepts of teamwork and communicating between departments are not specifically encouraged in scientific management techniques.

Teaching Strategy: Use VM-A, VM-B, and VM-C to facilitate a discussion of the ways scientific management is used in the hospitality industry. Assign LS-A.

Objective 2: Summarize the origin and uses of natural and human-made fibers in homes and industry.

Anticipated Problem: What are origins and uses of natural and human-made fibers used in homes and hospitality businesses?

II. Fabric selection

- A. Scientific management principles are used in the manufacture of fibers and fabrics utilized in the hospitality industry. An especially compelling story is that of the first manufactured fiber: rayon. The complex process required for producing rayon fibers results in a high level of environmental pollution. The plant material is steeped in caustic soda, treated with carbon disulfide, and filtered to remove impurities. As the slurry is fed through spinnerets, the fabric is human-made from a natural plant material. The rayon industry is working to clean up the process and its image. Fibers are classified as natural and human-made.
1. **Natural fibers** are fibers from animal or plant sources. Natural fibers from animal sources:
 - a. Angora wool—Angora rabbit
 - b. Mohair—Angora goat
 - c. Alpaca wool—Camel family
 - d. Cashmere—Kashmir goats
 - e. Wool—sheep fleece
 - f. Silk—silkworm cocoon filaments
 2. Natural fibers from plant sources:
 - a. Cotton and organic cotton—cotton plants
 - b. Linen—flax plant
 - c. Ramie—natural Chinese grass
 - d. Hemp—Cannabis Sativa plant (tough fiber similar to jute)
 - e. Jute—vegetable fiber (rope and carpet backing)
 - f. Rayon—regenerated cellulose (wood pulp; although it is a human-made fiber, it is not considered a synthetic)
 3. **Human-made fibers**, or manufactured fibers, constitute a long list and include:
 - a. Acetate—A fast drying cellulose fiber that must be dry-cleaned
 - b. Acrylic—A synthetic (produced from chemicals) fiber with wool-like qualities
 - c. Aramid—A lightweight polyamide fiber used for Kevlar® bulletproof vests and fire-resistant fabrics
 - d. Modacrylic—A group of synthetic polymer fibers used for a variety of purposes, including wigs, trims, linings, simulated fur, children's sleepwear, and work uniforms; may form pills; not absorbent.
 - e. Nylon—A tough, elastic synthetic fabric with silk-like qualities; used in for bristles and other cleaning tools

- f. Olefin—A tough synthetic polypropylene used in home furnishings, carpets, mats, and durable clothing
 - g. Polyester—A polymer used in making fibers and plastics; holds its shape well and is often added to blends with natural fibers
 - h. Spandex—An elastic textile fabric made primarily from polyurethane
- B. Hospitality industry fiber considerations
- 1. Absorption—Food service and hotel kitchen and bath towels are often made of cotton because of its strength and absorbent characteristics.
 - 2. Diffusion of light—Synthetic roller shades are environmentally friendly. They help cool the dining areas and waiting areas in the summer and retain heat in the winter. In addition, synthetic roller shades gently diffuse light, are durable, and are fade resistant. Although triacetate fabric would drape well as a window treatment, it is too sensitive to heat to make a good window covering.
 - 3. Strength and durability—Olefin is a very strong, durable fiber. It is an excellent choice for restaurant dining rooms, hotel foyers, and waiting area furniture fabric.
 - 4. Flame retardant—Modacrylic and aramid fibers are excellent choices if flame retardant is needed.

Teaching Strategy: Use VM-D, VM-E, and VM-F to facilitate a discussion of natural fibers and the ways science affects human-made fabric characteristics and selection. Assign LS-B.

Objective 3: Explain the science related to how cleaners work.

Anticipated Problem: How and why do cleaning products work?

III. How cleaners work

- A. According to the National Institute for the Foodservice Industry (NIFI), cleaning agents loosen soil and keep it suspended so it is not redeposited. Cleaning agents could be water, sand, soap, or steam—anything that removes soil. However, cleaning agents are typically chemical compounds formulated to remove a specific type of soil, stain, or deposit.
- B. Solvents and solutes
 - 1. A **solvent** is something that dissolves or disperses substances (solutes). Water is a universal solvent.
 - 2. A **solute** is the substance being dissolved. Salt and sugar are solutes.
- C. Detergents and surfactants
 - 1. **Detergent** is a cleaning agent that dissolves or suspends soil with a surfactant. Soap is the oldest manufactured detergent. However, soap reacts with mineral salts to form insoluble deposits (a bathtub ring), so it is not widely used in the hospitality industry, except for hand washing. Most food service

lodging establishments use synthetic detergents designed to work in a variety of situations. Some work well in hard water. Others are designed for a low suds variety, and still other are compatible with other cleaning agents.

2. Detergents and soaps contain **surfactants**—ingredients that reduce the surface tension between the water and the soil (to loosen and disperse).
 - a. Mildly alkaline detergents are for general purpose cleaning—walls, floors, ceilings, and most equipment.
 - b. Heavy-duty detergents have a high level of alkaline salts and are used in mechanical dishwashers, to remove wax, and to remove baked-on grease. Alkaline detergents do not remove rust or tarnish.
3. Agitation of garments, towels, or table covers during washing assists the detergent to **emulsify**—to surround and suspend the dirt and oil.

D. Sanitization

1. According to NIFI, sanitizers are used to disinfect items. Literally, **sanitizers** are items used to reduce the bacterial contamination on a clean (absence of soil and dirt) surface (e.g., table, stove, or sink) or an object (e.g., glass, cup, flatware, or paring knife) to a safe level. Sanitizing a surface or an object is one level above clean.
2. Objects and surfaces are sanitized in two ways:
 - a. Sometimes heating to a high enough temperature to kill microorganisms is an option.
 - b. An alternative is treating with a chemical compound to kill microorganisms.
3. Sanitization is no substitute for thorough cleaning; people cannot sanitize dirt.
4. NIFI recommends two common ways to sanitize an object or a surface in a food service or lodging facility.
 - a. Heat sanitization—Holding a clean object to the designated high heat for a designated period of time is required to kill bacteria and other microorganisms.
 - (1) Immersion—An object must be immersed in 170°F water for 30 seconds or longer.
 - (2) Steam—Live, additive-free steam is used to clean objects and equipment that cannot be immersed.
 - b. Chemical sanitization—Chemical compounds are capable of destroying microorganisms left on cleaned objects and equipment. Chemical sanitization is completed in two ways: immersing in a solution of sanitizer and water (at the correct temperature) or using double the strength necessary to clean via immersion to rinse, swab, or spray the equipment. Three common types of chemical sanitizers are:
 - (1) Chlorine compounds
 - (2) Iodine compounds
 - (3) Quaternary ammonia compounds

E. Stain treatments

1. Stain treatments remove a mark or discoloration.

2. Laundry boosters (e.g., Borax) can be used to remove stains and to deodorize. Some laundry boosters are also useful for general household cleaning.
 3. Bleach removes dirt and stains; sanitizes; and whitens garments and towels. Bleach's chemical reaction with soil breaks it down and removes it.
 - a. **Chlorine bleach** is usually a liquid form of approximately 3 to 6 percent sodium hypochlorite (NaOCl) diluted with water. Chlorine bleach sanitizes and removes stains from sturdy white clothing.
 - b. **Oxygen bleach** is a combination of hydrogen peroxide and washing soda. It is safe for colors.
 4. Washing soda is a sodium carbonate used to boost detergent performance and to remove stains. Because washing soda's pH is 11 (7 is neutral), it is often used to remove grease build-up (e.g., in ovens and on stove tops).
 5. Enzyme (organic substances that create a chemical change without being destroyed in the process) stain removers are used for organic stains, such as wine, dairy, grass stains, and berry stains. Active enzymes literally digest protein, carbohydrate, and fat molecules. They need to be applied several minutes ahead of washing.
- F. The hospitality industry uses scientific management techniques to prevent exposure and the spread of infectious diseases. Infectious diseases are divided into several types:
1. Blood-borne diseases—These are transmitted through contact with infected blood and some body fluids.
 2. Contact diseases—These are transmitted by direct or indirect contact with bacteria or viruses.
 3. Airborne diseases—These are spread through droplets in the air.

Teaching Strategy: Display VM-G for discussion purposes. Assign LS-C, LS-D, and LS-E.

- **Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle.
- **Application.** Use the included visual master(s) and lab sheet(s) to apply the information presented in the lesson.
- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

■ **Answers to Sample Test:**

Part One: Matching

1. g

2. c
3. f
4. i
5. h
6. j
7. b
8. a
9. d
10. e

Part Two: Short Answer

1. Taylor's four principles of scientific management:
 - a. Change "rule-of-thumb" work methods to methods based on the scientific study of the work task.
 - b. Train workers to use the scientific work techniques.
 - c. Evaluate workers to ensure they use the scientific work techniques.
 - d. Divide the work of managers and workers, with both following scientific work techniques.
2. Answers may vary. Natural fibers from animal sources and the animal sources are:
 - a. Angora wool—Angora rabbit
 - b. Mohair—Angora goat
 - c. Alpaca wool—Camel family
 - d. Cashmere—Kashmir goats
 - e. Wool—sheep fleece
 - f. Silk—silkworm cocoon filaments
3. Answers may vary. Natural fibers from plant sources and their plant sources are:
 - a. Cotton and organic cotton—cotton plants
 - b. Linen—flax plant
 - c. Ramie—natural Chinese grass
 - d. Hemp—Cannabis Sativa plant
 - e. Jute—vegetable fiber

Part Three: True/False

1. T
2. T
3. T
4. F
5. T
6. F
7. F
8. T
9. F
10. T

Science Skills in the Hospitality Industry: Scientific Management of Production, Fabrics, and Cleaning

► Part One: Matching

Instructions: Match the term with the correct definition.

- | | |
|----------------------|------------------|
| a. chlorine bleach | f. oxygen bleach |
| b. detergent | g. sanitizers |
| c. emulsify | h. solute |
| d. human-made fibers | i. solvent |
| e. natural fibers | j. surfactants |

- _____ 1. Items used to reduce bacterial contamination on a clean surface or object
- _____ 2. To surround and suspend dirt and oil
- _____ 3. A combination of hydrogen peroxide and washing soda
- _____ 4. Something that dissolves or disperses substances
- _____ 5. The substance being dissolved
- _____ 6. Ingredients that reduce the surface tension between the water and the soil
- _____ 7. A cleaning agent that dissolves or suspends soil with a surfactant
- _____ 8. A liquid form of approximately 3 to 6 percent sodium hypochlorite (NaOCl) diluted with water
- _____ 9. Manufactured fibers
- _____ 10. Fibers from animal or plant sources



► Part Two: Short Answer

Instructions: Answer the following.

1. List and briefly describe Taylor's four principles of scientific management.
2. List three examples of natural fibers from animal sources and their animal source.
3. List three examples of natural fibers from plant sources and their plant source.

► Part Three: True/False

Instructions: Write *T* for true or *F* for false.

- ____ 1. Airborne diseases are spread through droplets in the air.
- ____ 2. Enzyme stain removers are used for organic stains.
- ____ 3. Scientific management is the study of time and motion efficiency in the workplace.
- ____ 4. Contact diseases are transmitted by direct or indirect contact with surfactants.
- ____ 5. McDonald's restaurants use scientific management principles in their food production tasks.
- ____ 6. Concepts of teamwork and communicating between departments are encouraged by scientific management principles.
- ____ 7. Towels often incorporate nylon fiber in the cloth for strength and absorbency.
- ____ 8. Olefin is a very strong fiber and is used in home furnishings and in industrial carpets.
- ____ 9. *The Principles of Scientific Management* was written in 2001.
- ____ 10. Blood-borne diseases are transmitted through contact with infected blood and some body fluids.

FOUR PRINCIPLES OF SCIENTIFIC MANAGEMENT

Scientific management is a method of breaking down workplace actions, jobs, and tasks into small subparts that are analyzed and taught (e.g., by an efficiency expert).

1. Change “rule-of-thumb” work methods to methods based on the scientific study of the work task. An analysis of the task should be conducted. By better organizing the task, the number of people required may decrease (e.g., 500 to 140 people to shovel coal in Taylor’s example).
2. Train workers to use the scientific work techniques.
3. Evaluate workers to ensure they use the scientific work techniques.
4. Divide the work of managers and workers, with both following scientific work techniques.

GOAL: Worker Productivity

- ◆ Improve efficiency.
- ◆ Reduce waste.
- ◆ Reduce worker time and motion per task.

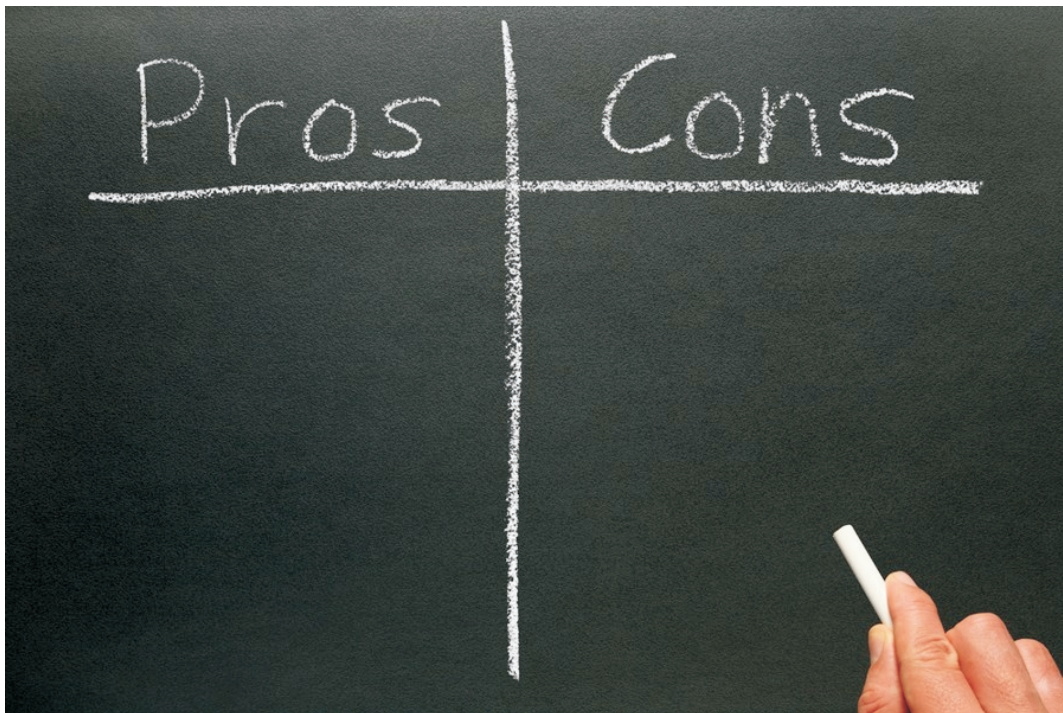


21ST CENTURY SCIENTIFIC MANAGEMENT

- ◆ **Motorola's Six Sigma** business management model seeks to eliminate product defects and to minimize product variables.
- ◆ **Lean manufacturing** principles (originally called the "Toyota Production System") use small stockpiles of inventory placed around the manufacturing facility instead of in centralized warehouses. The net effect is to reduce waste and to increase productivity.
- ◆ McDonald's fast food production techniques use scientific management.
 - All tasks are divided into smaller tasks.
 - Exact cooking times are used.
 - Suggested equipment food temperatures are used.
 - All food supplies are standard.
 - Menu items are prepared following a diagram.
 - Clean-up procedures for McDonald's stores follow a corporation-wide SOP.

SCIENTIFIC MANAGEMENT PROS AND CONS

- ◆ Pro: A scientific management process is especially important in cleanliness standards for hospitality and medical facilities industries.
- ◆ Pro: Safety and production standards can be maintained using scientific management in hospitality industry manufacturing production lines.
- ◆ Con: Scientific management may be viewed as “deskilling” workers, as all tasks are simplified and divided.
- ◆ Con: The concepts of teamwork and communicating between departments are not specifically encouraged in scientific management techniques.



NATURAL FIBERS FROM ANIMAL SOURCES

Natural fibers from animal sources are:

- ◆ Angora wool—Angora rabbit
- ◆ Mohair—Angora goat
- ◆ Alpaca wool—camel family
- ◆ Cashmere—Kashmir goats
- ◆ Wool—sheep fleece
- ◆ Silk—silkworm cocoon filaments



NATURAL FIBERS FROM PLANT SOURCES

Natural fibers from plant sources are:

- ◆ Cotton and organic cotton—cotton plants
- ◆ Linen—flax plant
- ◆ Ramie—natural Chinese grass
- ◆ Hemp—Cannabis Sativa plant (tough fiber similar to jute)
- ◆ Jute—vegetable fiber (rope and carpet backing)
- ◆ **Rayon**—regenerated cellulose (wood pulp; the first human-made fiber; not considered synthetic)



HUMAN-MADE FIBERS

Human-made fibers constitute a long list and include:

- ◆ Acetate—A fast drying cellulose fiber
- ◆ Acrylic—A synthetic with wool-like qualities
- ◆ Aramid—A lightweight polyamide fiber
 - Kevlar® bulletproof vests and fire-resistant fabrics



◆ Modacrylic—A group of synthetic polymer fibers used for a variety of purposes

- Wigs, trims, linings, faux fur, children's sleepwear, and work uniforms

◆ Nylon—A tough, elastic synthetic fabric with silk-like qualities

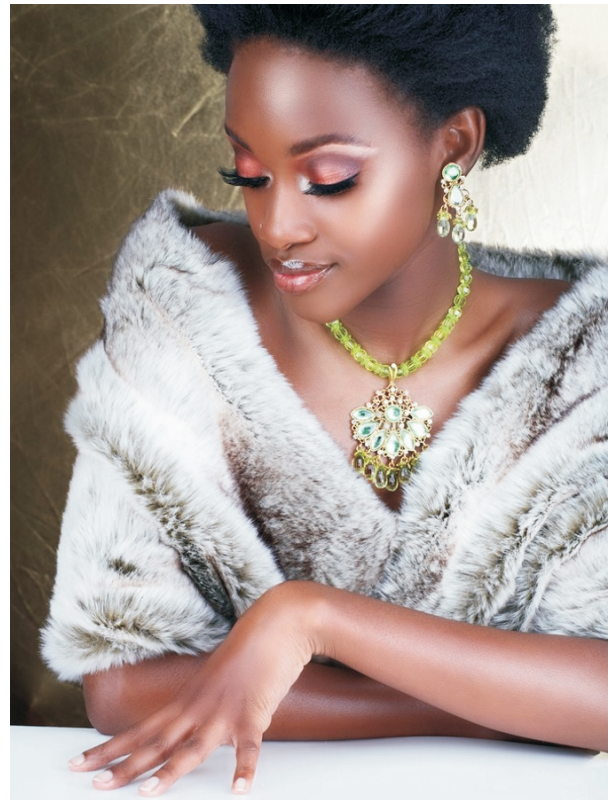
- Brush bristles and other cleaning tools

◆ Olefin—A tough synthetic polypropylene fabric

- Home and office furnishings, carpets, mats, and durable clothing

◆ Polyester—A polymer used in making fibers and plastics

◆ Spandex—An elastic textile fabric made primarily from polyurethane



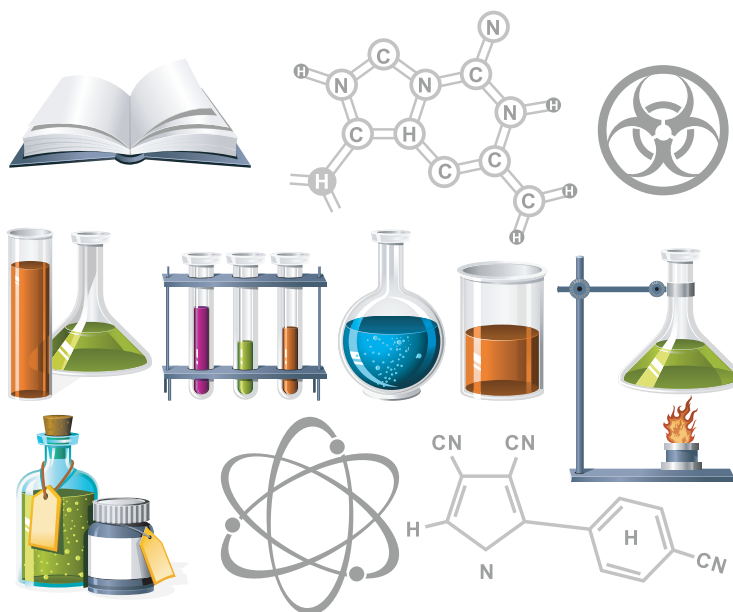
HOW CLEANING AGENTS WORK

Solvents and Solutes

- ◆ Solvents dissolve or disperse substances (solute). Water is a universal solvent.
- ◆ Solute are the substances being dissolved. Salt and sugar are solutes.

Detergent and Surfactants

- ◆ Detergent is a cleaning agent that dissolves or suspends soil with a surfactant.
- ◆ Surfactants reduce the surface tension between the water and the soil.



Sanitizers

- ◆ Sanitizers reduce the bacterial contamination on a clean surface or object to a safe level. Sanitizing a surface or an object is one level above clean.
 - Heat sanitization can be accomplished via immersion, live, or additive-free steam.
 - Chemical sanitization can be done with chlorine, iodine, or quaternary ammonia.

Stain Treatments

- ◆ Stain treatments remove a mark or discoloration.
- ◆ Laundry boosters, chlorine bleach, oxygen bleach, washing soda, and enzyme stain removers may be used.



Scientific Management in Fast Food Restaurants

Purpose

The purpose of this activity is to identify and evaluate scientific management techniques used in fast food restaurants.

Objectives

1. Identify scientific management techniques used in fast food restaurants.
2. Evaluate scientific management techniques used in fast food restaurants.
3. Participate in a Think-Pair-Share activity to debrief the on-site observations.
4. Participate in a class discussion to identify common procedures and suggestions for improvement.

Materials

- ◆ lab sheet
- ◆ VM-B
- ◆ black or white board
- ◆ chalk or white board markers
- ◆ paper
- ◆ writing utensil

Procedure

1. Complete this lab sheet individually or as a pair (as directed by your teacher). As homework, observe the following procedures and tasks in a fast food restaurant:
 - a. Food preparation



- b. Counter service
 - c. Drive-thru service
 - d. Cleaning
2. Observe each area. Look for the principles of scientific management. Review VM–B to recall the scientific management issues. Keep in mind that the goal of scientific management techniques is to increase work productivity. Record notes on the table below in each area and make suggestions for improvement. Bring your completed table to class for use in a discussion.

Area	Procedures Observed	Suggestion for Improvement—Student 1	Suggestions for Improvement—Student 2
Food preparation			
Counter service			
Drive-thru area			
Cleaning			

3. Participate in a think, pair, share activity.
- a. Think about the procedures and suggestions you identified.
 - b. Share the information with a partner.
4. When it is your turn, write one observed procedure. Your partner should add a brief suggestion for improvement of the procedure.
5. Participate in a class discussion to identify any common procedures and suggestions.

What Human-made Fibers Are Found in Our Homes and Businesses?

Purpose

The purpose of this activity is to research human-made fibers (found in your home or in a local hospitality business) and to research the fiber characteristics, use, and care.

Objectives

1. Identify a minimum of five human-made fibers found in a home or in a hospitality business.
2. Read the fabric labels and MSDS on textiles in homes and businesses.
3. Research human-made fiber characteristics, uses, care, and cautions.
4. Select the best human-made fiber for various uses.

Materials

- ◆ lab sheet
- ◆ writing utensil

Procedure

1. Find a minimum of five human-made fibers found in a home or in a hospitality business. The fabric content would be found on a textile label in home goods and in a Material Safety Data Sheet or a label in a hospitality business. Remember that many human-made fibers are blended with natural fibers. List those fibers in the “Human-Made Fiber Table” below, and indicate the source (e.g., home or business).



2. Next, research the characteristics, uses, care, and cautions (e.g., “Do not iron” or “Do not dry clean”) of the human-made fibers you identified, using the following or other resources:
 - a. Human-Made Fiber <http://composite.about.com/library/glossary/m/bldef-m3209.htm>
 - b. Fabric Characteristics and Properties <http://www.fashion.vavpycom.net/FiberCharacteristics.htm#Microfibers>
 - c. Manufactured or Human-Made Fabrics <http://www.fabrics.net/manufact.asp>
 - d. How to Care for Synthetic Fabrics http://www.ehow.com/how_4471919_care-synthetic-fabrics.html
3. Complete the following table. Summarize the answers.

Human-Made Fiber Summary Table for _____ Sources

Fiber Name	Characteristics	Uses	Care and Cautions
1.			
2.			
3.			
4.			
5.			
6.			
7.			

4. Based on your human-made fiber research, decide which fiber would be best for each of the uses listed in “The Best Human-Made Fiber Table” below. Complete the table by writing your answers in the spaces provided.

5. Provide the reasons for your choice in the appropriate column. Should no human-made fiber be suitable, state that as your reason and provide a better natural fiber choice.

Use	Best Human-Made Fiber Choice	Reasons
Furniture covering—home		
Furniture covering—business		
Window treatment		
Kitchen dish cloths		
Carpet—home		
Carpet—business		
Table covers—home		
Table covers—business		
Bed coverings		

6. Submit the completed lab sheet to your instructor.

Observe How Soaps and Detergents Work

Purpose

The purpose of this activity is to complete science experiments to observe how soaps and detergents work.

Objectives

1. Complete an experiment to show the effect of liquid dish detergent on the surface tension of water.
2. Create homemade laundry detergent slime.
3. Compare and contrast the results of washing laundry with a commercial and with a homemade laundry detergent.
4. Evaluate the results.

Materials

- ◆ lab sheet
- ◆ writing utensil
- ◆ ingredients and equipment for surface tension experiment—clear glass bowl, water, paprika, and drop of liquid dish detergent
- ◆ ingredients to make laundry detergent—1 bar soap, hot water, 1 cup Arm & Hammer washing soda, $\frac{1}{2}$ cup Borax
- ◆ equipment to make laundry detergent slime—liquid measuring cup; saucepan; five-gallon bucket with lid, knife, or grater; long-handled spoon



Procedure

1. Watch the video and read the experiment at <http://www.thesimpledollar.com/2007/03/15/how-to-make-your-own-laundry-detergent-and-save-big-money>.
2. Conduct the following scientific experiments:
 - a. Experiment 1: Surface Tension Experiment—How does detergent affect the surface tension of water?
 - (1) Place 1 cup of cold water in a clear glass bowl.
 - (2) Sprinkle paprika on top of the water in the bowl. The paprika stays on the top of the water due to the surface tension.
 - (3) Immediately add one drop of liquid dish detergent to the middle of the bowl.
 - (4) Describe what happens to the paprika.
 - b. Experiment 2: Making Laundry Detergent Slime
 - (1) Bring 1 quart of water almost to a boil.
 - (2) While the water is heating, shave or grate a bar of soap.
 - (3) When the water is nearly at a boil, add the shaved or grated soap.
 - (4) Stir the mixture to dissolve the soap.
 - (5) Add three gallons of hot water to a 5-gallon bucket. Then add the dissolved soapy water, 1 cup of Arm & Hammer washing soda, and $\frac{1}{2}$ cup Borax. Stir until it is dissolved.
 - (6) Let the mixture sit overnight.
 - (7) The next day, you will have a gelatinous laundry detergent slime.
3. Conduct an experiment by washing two batches of laundry—one with a commercial laundry detergent and one with the laundry slime. Use 1 cup of each mixture to wash the clothes.
4. Compare and contrast the results of the two laundry detergent mixtures by using the data table below. As a group, decide on at least two other characteristics that help discriminate (show the difference) between the two products.

Characteristics	Commercial Detergent	Homemade Laundry Slime
1. Cleanliness		
2. Whiteness		

Characteristics	Commercial Detergent	Homemade Laundry Slime
3. Feel, touch of the laundry		
4. Smell		
5. Cost		
6. Other: _____		
7. Other: _____		

Four-Point Rating Scale: 1 = poor and 4 = excellent

- Determine if making and storing a 5-gallon batch of laundry detergent is worth saving \$70.

Remove Stains

Purpose

The purpose of this activity is to research various ways to remove stains.

Objectives

1. Evaluate a video about removing summer stains on white clothing.
2. Identify ways to remove five additional stains.

Materials

- ◆ lab sheet
- ◆ writing utensil

Procedure

1. Review the list of summer stains shown below that will be discussed in a stain-removal video clip.

Stain	Recommended Treatment
1. Grass	
2. Chocolate ice cream	
3. Berries	
4. Mustard	
5. Red wine	



2. Watch the video “Removing Summer Stains” at <http://home.ivillage.com/cleanandorganize/cleaning/0,,75vb,00.html>.
3. Next, list five other common stains you encounter with your own clothing. Use a computer search engine or other materials to research ways to remove these additional stains, and fill in the chart below.

Stain	Recommended Treatment
1.	
2.	
3.	
4.	
5.	

4. Submit the completed lab sheet to your instructor.

Preventing Infectious Diseases in the Hospitality Industry

Purpose

The purpose of this activity is to prepare and present a five-minute summary of an infectious disease and ways to prevent exposure.

Objectives

1. Select an infectious disease to study.
2. Describe the infectious disease.
3. Identify various ways to prevent exposure.
4. Write a paper that covers the presentation research.
5. Present your information to the class.

Materials

- ◆ lab sheet
- ◆ paper
- ◆ writing utensil

Procedure

1. Work in pairs or teams of three students.
2. Select an infectious disease from the list below.
3. Other infectious diseases may be added to the list, if approved by your instructor.



Infectious Disease	Team Members
Hepatitis B	
Hepatitis C	
Norovirus	
Methicillin-resistant Staphylococcus aureus (MRSA)	
Clostridium difficile (C. difficile)	
Tuberculosis (TB)	
Influenza	
Severe Acute Respiratory Syndrome (SARS)	
Legionnaires	
H1N1	
Other: _____	

2. Research the selected infectious disease, using the table below as a guide. Other research categories may be added. Word process the information required for the class distribution and discussion.

Infectious Disease: _____	Research Notes
1. Disease description	
2. Disease transmission	

Infectious Disease: _____	Research Notes
3. Course of the disease	
4. Exposure prevention	
5. Recommended cleaning agents and procedures to prevent exposure and transmission	
6. Other: _____	
7. Other: _____	

3. Duplicate or project the information for the class presentation.
4. Present your infectious disease information as a team. All team members should participate in the presentation. Your instructor will time each presentation.
5. Turn in the lab sheet and the word-processed paper to your instructor.