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| **TEXAS CTE LESSON PLAN**[www.txcte.org](http://www.txcte.org) |
| **Lesson Identification and TEKS Addressed** |
| **Career Cluster** | Hospitality and Tourism |
| **Course Name** | Food Science |
| **Lesson/Unit Title** | Keeping It Safe in the Food Science Lab |
| **TEKS Student Expectations** | **130.256. (c) Knowledge and Skills**(6) The student evaluates the principles of microbiology and food safety practices. The student is expected to:(A) investigate the properties of microorganisms that cause food spoilage(B) compare food intoxication and food infection(C) examine methods to destroy or inactivate harmful pathogens in foods(D) compare beneficial and harmful microorganisms(E) analyze sanitary food-handling practices(F) prepare for a state or national food managers sanitation certification or alternative credential within the field of food science technology |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | **Students will:*** Discuss safety in the food science lab
* Identify how to use a fire extinguisher
* Analyze the safety features or procedures for equipment used in the lab
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| **Rationale** | Safety in the food science lab is of ultimate importance. This lesson will provide you with knowledge and skills that will allow you to keep your colleagues and yourself safe and free from accidents during the experiments. |
| **Duration of Lesson** | Three 45-minute class periods |
| **Word Wall/Key Vocabulary***(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | **Caustic:** Capable of destroying or eating away by a chemical**Corrosive:** Tending or having the power to corrode (to weaken or destroy gradually)**Experiment:** A scientific procedure undertaken to make a discovery, test a hypothesis or demonstrate a known fact**Fire Extinguisher** A portable container, usually filled with special chemicals for extinguishing a fire**Laboratory:** A room or building equipped for scientific experiments, research or teaching**Personal Protective Equipment (PPE):** Any clothing and/or equipment used to protect the head, torso, arms, hands, and feet from exposure to chemical, physical, or thermal hazards**Safety:** The condition of being protected from or unlikely to cause danger, risk, or injury**Symbol:** A thing that represents or stands for something else, especially a material object representing something abstract**Volatile:** Readily vaporizable at a relatively low temperatureNote: Many other terms on the slide presentation can be identified. Encourage students to include the word and definition in the assignment. |
| **Materials/Specialized Equipment Needed** | **Equipment:*** Computer with projector for PowerPoint presentation
* Computers with Internet access (be sure to follow district guidelines)

**Materials:*** Basket
* Cardstock
* Markers
* Poster (half-sheet)
* Safety equipment manuals
	+ Deluge shower
	+ Eye wash station
	+ Fume hood

**Supplies:*** Apron
* Beaker
* Burner
* Cylinders
* Electronic balance
* Fire extinguisher
* Gloves
* Goggles
* Test tubes
* Triple-beam balance
* Copies of handouts

**PowerPoint:*** Keeping It Safe in the Food Science Lab

**Technology:*** Free iPad App
	+ Solve the OutbreakYour mission, if you choose to accept, is to get clues and analyze data to solve the outbreak and save lives![https://itunes.apple.com/us/app/solve-the-outbreak/id592485067?mt=8](http://cte.sfasu.edu/wp-content/uploads/2014/12/Keeping-It-Safe-in-the-Food-Science-Lab-PPT.pptx?mt=8)
* TED Talks:

Top 10 Rules of Science Lab SafetyThe rules for science lab safety should always be followed to keep students and teachers out of harm. The lab safety rules should always be reviewed before starting every lab. The rules should be posted on the wall of the lab in order for them to be readily accessible for students to review. <http://ed.ted.com/on/UmXt0Q4T>**Graphic Organizer:*** Fire extinguisher use
* Fire extinguisher use (key)
* Lab safety skills checklist
* Safety symbols notes
* Safety symbols notes (key)

**Handouts:*** Following directions
* Food science lab safety contract
* Lab safety rules for personal protective equipment and sanitation
* Rubric for safety demonstrations
* Safety demonstrations
* Safety in the science classroom

School chemistry laboratory safety guide |
| **Anticipatory Set**(May include pre-assessment for prior knowledge) | **Before class begins:**Note to Teacher: Prior to lesson, be sure to read the handout School Chemistry Laboratory Safety Guide (see All Lesson Attachments tab) from the Centers of Disease Control (CDC) and the National Institute for Occupational Safety and Health (NIOSH) to become familiar with your responsibilities as a lab instructor.Display as many of the items as you have available from the Materials/Specialized Equipment Needed tab on a table in front of the classroom.Distribute handout Lab Safety Skills Checklist to find out what your students already know about lab safety. This will give you an idea of the skills your students may have.Do not worry if the students do not have all of the items checked. The students will re-visit this handout in the Lesson Closure tab.The following questions may be asked:* Why is it important to follow lab safety?
* Why is it important to be knowledgeable of the skills and procedures for labs?
* Why is it important to read a science experiment thoroughly?

Discuss the answers with your students. |
| **Direct Instruction \*** | Introduce lesson objectives, terms, and definitions.It is extremely important that students are taught safety before they are allowed in the lab area. Many school districts provide safety awareness guidelines that students and parents are required to sign. Be sure to follow your district’s guidelines. Distribute Safety Symbols Notes so that students may take notes during slide presentation.Introduce PowerPoint, Keeping It Safe in the Food Science Lab and lead a discussion about safety in a food science lab.View the YouTube video:* Flinn Scientific Laboratory Safety ChallengeWitnessing lab procedures gone awry may make students think twice about some of their own safety shortcomings. Featuring Sue Bober, Schaumburg High School, IL. This video is part of the Flinn Scientific Teaching Chemistry video series.<http://youtu.be/V-fNpaOX0-g>

Optional video:* The (Lab) Safety DanceAn homage to the infamous Chemistry Lab Safety Video produced by the Quigg Lab and set to the dulcet tones of Men Without Hats!<http://youtu.be/1_HBM_NwrRE>

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** checking for understanding
* providing assistance with note-taking
 |
| **Guided Practice \*** | Distribute the handout Safety in the Science Classroom and instruct the students on the importance of following all lab rules and regulations while working with experiments.You may use the last page as a contract or distribute the handout Food Science Lab Safety Contract for students. Students will need to take this home and have their parents read the rules and regulations and sign the contract. Other samples of contracts can be found online from lab supply companies. Distribute the handout Lab Safety Rules for Personal Protective Equipment and Sanitation. Discuss appropriate attire for the classroom labs. They may be different from those listed on the slide presentation.Distribute the graphic organizer Fire Extinguisher Use. Students may answer handout as they view the video below.Ask students if they have a fire extinguisher at home. By law, their college dorm or apartment must have a fire extinguisher within a few feet from the kitchen. They should know how to use it. Explain the PASS acronym.View video:* How to use a fire extinguisherAccidents happen. Be prepared to fight your own fire by learning how to use a fire extinguisher.<http://youtu.be/lUojO1HvC8c>

Demonstrate the steps required to use the fire extinguisher. Be careful not to press the handle, as some students may have allergies and the fumes and chemicals may be harmful to them.Inquire with your school district’s safety officer for procedures to be able to demonstrate the fire extinguisher use outside. Or, inquire with the fire education officer at your fire department about speaking to your class about fire safety and proper fire extinguisher use.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** providing peer tutoring
* checking for understanding
 |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Divide the class into subgroups of two or three students.Distribute posters and markers.Students will analyze the safety features or procedures for equipment used in the lab rather than you demonstrating each item.Place the Safety Demonstration cards in a basket and ask students to select a card. Students will research the information needed and demonstrate or present to the class.Distribute the Rubric for Safety Demonstrations so students understand what is expected.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** assisting student in gathering information
* providing praise and encouragement
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| **Lesson Closure** | Re-distribute the handout Lab Safety Skills Checklist and review the answers from the Anticipatory Set Tab. Ask students if all of the items are now checked.Discuss possible consequences of not following correct safety procedures.Distribute the handout Following Directions and remind students how important it to follow directions carefully.If students are successful in following directions, they should have a paper cup. If possible, provide an incentive or reward for accomplishing the task.Examples of possible rewards:* Coupons for homework assignments
* Fat-free animal crackers
* Hot air popcorn
* Whole grain cereal
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| **Summative/End of Lesson Assessment \***  | Students will present safety demonstrations.Students will be assessed with appropriate rubric.*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:** encourage participation
* praise efforts
 |
| **References/Resources/****Teacher Preparation** | **Textbook:*** Mehas, K. Y., & Rodgers, S. L. (2002). *Food science: The biochemistry of food and nutrition.* New York, NY: Glenco/McGraw-Hill.
* Ward, J. D., & Ward, L. T. (2013). *Principles of food science.* Tinley Park, IL: Goodheart-Wilcox Company.

**Websites:*** National Science Teachers AssociationNSTA works with other science teaching and education professionals<http://www.nsta.org/>

**YouTube:*** Flinn Scientific Laboratory Safety Challengewitnessing lab procedures gone awry may make students think twice about some of their own safety shortcomings. Featuring Sue Bober, Schaumburg High School, IL. This video is part of the Flinn Scientific Teaching Chemistry video series.<http://youtu.be/V-fNpaOX0-g>
* How to use a fire extinguisherAccidents happen. Be prepared to fight your own fire by learning how to use a fire extinguisher.<http://youtu.be/lUojO1HvC8c>
* The (Lab) Safety DanceAn homage to the infamous Chemistry Lab Safety Video produced by the Quigg Lab and set to the dulcet tones of Men Without Hats!<http://youtu.be/1_HBM_NwrRE>
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| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** | * Word wall
* Draw visual representations of terms on word wall
* [http://www.learnerdictionary.com](http://www.learnerdictionary.com/) for pronunciation and meaning of safety terms
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| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** |
| **Reading Strategies** | Encourage students to continue reading articles pertaining to this lesson:* Food Preparation and Safety LabFood preparation safety practices ensure that you avoid injury to yourself from hot surfaces and avoid contaminating food as you prepare it.<http://www.ehow.com/way_5679418_food-preparation-safety-lab.html>
* How to Teach Lab SafetyTo ensure that students remain safe while they engage in experimentation, teachers must offer instruction on standard lab safety procedures.<http://www.ehow.com/how_6452786_teach-lab-safety.html>
* Safety in the Food LabFood lab safety is very similar to regular lab safety. However, there are some variations due to some differences in equipment and materials being used in the work.<http://www.ehow.com/facts_6395709_safety-food-lab.html>

**Reading Strategy**Encourage students to “visualize” as they read. Many students are visual learners and will benefit from making sketches or diagrams on scrap paper as they read. Providing students with graphic organizers to help them organize their thoughts is also helpful. |
| **Quotes** | It would be nice if the Food and Drug Administration stopped issuing warnings about toxic substances and just gave me the names of one or two things still safe to eat.**-Robert Fuoss**We may find in the long run that tinned food is a deadlier weapon than the machine-gun. **-George Orwell**Food safety involves everybody in the food chain. **-Mike Johanns** |
| **Writing Strategies****Journal Entries + 1 Additional Writing Strategy** | **Journal Entries:*** It is important to be familiar with the use of safety equipment because …
* Playing in the food science lab is not safe because …
* Personal protective clothing is important because …

**Writing Strategy:*** RAFT (Role/Audience/Format/Topic) writing strategy:
	+ Role: safety inspector
	+ Audience: lab manager
	+ Format: informal letter
	+ Topic: concerns regarding safety conditions

You have just completed a walk-through of a food research lab. Write a letter to express your concerns citing examples of hazardous situations you observed in the lab. |
| **Communication****90 Second Speech Topics** | * What are the proper procedures for dealing with a burner or open flame?
* What should be done if an accident occurs in the lab?
 |
| **Other Essential Lesson Components** |
| **Enrichment Activity**(e.g., homework assignment) | Listen to the Podcasts from the Centers for Disease Control (CDC) and discuss with class.* Protect the Ones You Love from BurnsThis podcast, developed as part of the Protect the Ones You Love initiative, discusses steps parents can take to help protect their children from burns, one of the leading causes of child injury. Created: 12/10/2008 by National Center for Injury Prevention and Control (NCIPC). Date Released: 12/10/2008.<http://www2c.cdc.gov/podcasts/player.asp?f=10539>

**TED Talk:**TED-Ed’s commitment to creating lessons worth sharing is an extension of TED’s mission of spreading great ideas. This allows users to take any useful educational video, not just TED’s, and easily create a customized lesson around the video.The video below is related to this lesson. Allow students to view the video and lead a discussion concerning the TED Talk.Top 10 Rules of Science Lab SafetyThe rules for science lab safety should always be followed to keep students and teachers out of harm. The lab safety rules should always be reviewed before starting every lab. The rules should be posted on the wall of the lab in order for them to be readily accessible for students to review. <http://ed.ted.com/on/UmXt0Q4T> |
| **Family/Community Connection** | Have students share their knowledge of safe practices in the kitchen (heat, electricity, sharp objects, and bacteria) with family members and neighbors. |
| **CTSO connection(s)** | **Family Career and Community Leaders of America (FCCLA)**[http://texasfccla.org](http://texasfccla.org/)* STAR Events:
	+ Applied Technology – An individual or team eventRecognizes participants who develop a project using technology that addresses a concern related to Family and Consumer Sciences and/or related occupations. The project integrates and applies content from academic subjects.
	+ Illustrated Talk – An individual or team eventRecognizes participants who make an oral presentation about issues concerning Family and Consumer Sciences and/or related occupations. Participants use visuals to illustrate content of the presentation.
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| **Service Learning Projects** | Successful service learning project ideas originate from student concerns and needs. Allow students to brainstorm about service projects pertaining to lesson. For additional information on service learning see:[http://www.ysa.org](http://www.ysa.org/)Possible idea:Create an informational pamphlet including safe practices for the kitchen. Students may include tips on cross-contamination, fire safety, basic first aid and proper disposal of wastes.Also see Family/Community connections |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)