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# Chemical Safety Awareness

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Curriculum and Social Media Plan for  
National Farm Safety Week 2017



Developed by: Mississippi State University and Texas A&M University

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*Funded by: The Southeast Center for  
Agricultural Health & Injury Prevention*



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# Introduction

**#ChemicalAwareState: Enhancing farm chemical safety usage in Mississippi through an interdisciplinary educational and social media outreach campaign** is funded by the University of Kentucky Southeast Center for Agricultural Health and Injury Prevention. The Center's mission is to develop and sustain an innovative program of research, education, and health promotion to prevent work-related illness and injury and to improve the health and safety of agricultural, forestry and fishing workers and their families in the southeastern United States. For more information on the Center and its mission, goals, and priorities, visit <https://www.uky.edu/scahip/>.

#ChemicalAwareState was created with a goal of teaching Mississippi middle and high school students about the importance of chemical safety, particularly in agriculture settings.

This curriculum can be used as stand alone lessons and activities to help spread chemical safety awareness. However, the most ideal use of the curriculum will take place during **National Farm Safety Week, September 17-23, 2017**. During this week there will also be an active social media campaign highlighting chemical safety awareness, as well as two contests for students to show off their chemical safety knowledge.

Even if you have covered these lesson topics with your students, we encourage you to at least engage your learners in the social media contests and campaign as a review of the material. Also, if you are not able to fit in all the lesson materials, we tried to lay out a brief opening activity for each lesson so you can celebrate National Farm Safety Week in your classroom.

## Acknowledgements

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The initial concept for the curriculum and social media campaign was based on a Southeast Center for Agricultural Health and Injury Prevention, Safety Outreach grant as part of a larger CDC/NIOSH-funded research program led by the University of Kentucky.

Our team consisted of Mississippi State University and Texas A&M University faculty and students. The following individuals contributed information or expertise to the project:

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# Social Media Campaign

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During Farm Safety week social media content will be distributed through Facebook, Twitter, and Instagram. To view the content please follow and like the following organization's social media platforms:

**Facebook Content:** Southeast Center for Agricultural Health & Injury Prevention <https://www.facebook.com/SCAHIP/>

**Twitter Content:** @SCAHIP

**Instagram Content:** Mississippi State University School of Human Sciences, search- humansciences

**Hashtags:** #ChemicalAwareState      #FSHW17      #AgSafety

Please share these sites and hashtags with your students so they can all be engaged with the dissemination of content.

New content will be posted each day starting on Sunday and running through Saturday. The majority of the social media content is also tied to the lessons provided, it is recommended that you utilize the social media content during the classroom discussions throughout the week.

In addition to the content being released through the above platforms you students can also participate in two different contests, an Instagram photo contest and a Twitter 'Dad Jokes' contest, see details for both below. You may even consider making this a bonus activity they can complete.

## #ChemicalAwareState Instagram Photo Contest

Farm safety is an increasing concern for citizens, agricultural producers, and agricultural educators. Therefore, we seek to enhance safe farm chemical usage by disseminating social media content during the National Farm Safety and Health Week. You can help us showcase farm chemical safety by posting photographs on your Instagram or Twitter using the hashtag #ChemicalAwareState.

### *Official Rules*

1. Photographs must be uploaded to Instagram or Twitter using the hashtag #ChemicalAwareState.
2. Photographs must be uploaded between 12 a.m. on Sunday, Sept. 17 and 11:59 p.m. on Saturday, Sept. 23, 2017.

3. Photographs must be uploaded in public posts.
4. By entering an image, you grant unlimited, non-exclusive licensed use of the image to the Southeast Center for Agricultural Health and Injury Prevention and its subsidiaries, sub-awardees, and contractors.
5. All images entered must be your original work or creation.
6. A panel of communication experts will judge the contest.
7. Winners will be announced on social media, no later than Oct. 15, 2017.
8. Prizes, in the form of gift cards to local restaurants, will be given to first, second, and third place.

## **#ChemicalAwareState “Dad Joke” Contest**

Farm safety is an increasing concern for citizens, agricultural producers, and agricultural educators. Therefore, we seek to enhance safe farm chemical usage by disseminating social media content during the National Farm Safety and Health Week. You can help us showcase farm chemical safety by posting “Dad Jokes” on your Instagram or Twitter using the hashtag #ChemicalAwareState.

### *Official Rules*

1. Dad Jokes must be uploaded to Instagram or Twitter using the hashtag #ChemicalAwareState.
2. Dad Jokes must be uploaded between 12 a.m. on Sunday, Sept. 17 and 11:59 p.m. on Saturday, Sept. 23, 2017.
3. By entering a video, you grant unlimited, non-exclusive licensed use of the video to the Southeast Center for Agricultural Health and Injury Prevention and its subsidiaries, sub-awardees, and contractors.
4. Videos with licensed material (e.g., copyrighted music) in the background or anywhere else will be disqualified.
5. All videos entered must be your original work or creation.
6. A panel of communication experts will judge the contest.
7. Winners will be announced on social media, no later than Oct. 15, 2017.
8. Prizes, in the form of gift cards to local restaurants, will be given to first, second, and third place.

# Lesson 1: Introduction to Chemical Awareness

*Bringing awareness to chemical safety at school and on the farm*

## Learning Objectives:

Define the term chemical and list side effects of chemical exposure

Investigate the need for chemical safety

## References, Materials, Equipment, and Other Resources

Student devices (i.e. phone, computer) with internet access

Prezi Presentation [http://prezi.com/rkvebzuiqur/?utm\\_campaign=share&utm\\_medium=copy&rc=ex0share](http://prezi.com/rkvebzuiqur/?utm_campaign=share&utm_medium=copy&rc=ex0share)

## Opening Activity

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- Engage students in an open discussion about previous experiences with chemical safety. Possible discussion questions: *Who can remember working with chemicals before? What safety measures did you use as you handled those chemicals? If you have witness someone using chemicals unsafely, what was that individual doing? How could they have properly handled those chemicals?*
- Use the following statistics or others you find to help establish the importance of practicing chemical safety

### Agriculture related safety statistics

- ▶ In 2015, 8 people were fatally injured in their Agriculture-related job in the state of Mississippi (OSHA)
- ▶ In 2010, there were 621 fatal occupational injuries in the agriculture industry (U.S. Bureau of Labor Statistics)

### Chemical related safety statistics

- ▶ From 1988-2008, 57,975 chemical incidents were reported by nine states (Colorado, Iowa, Minnesota, New York, North Carolina, Oregon, Texas, Washington, and Wisconsin). Of these incidents, 15, 506 people were injured. Among them, 354 deaths occurred. The most frequent health effects experienced as a result of these incidents include respiratory irritation, dizziness or central nervous system problems, and headaches. The three chemicals associated with the largest number of persons injured were carbon monoxide, ammonia, and chlorine (Duncan, Wu, New, & Orr, 2015).

- Connecting discussion to content:

*This is National Farm Safety Week and we are going to celebrate by exploring safe chemical practices. We are all exposed to chemicals here at school, in our homes, on the farm, and within the agriculture industry. It is important that we remind ourselves of chemical safety procedures so we avoid injury when handling chemicals.*

*Throughout the week we will identify side effects of chemical exposure, create safe storage plans for chemicals, identify proper personal protective equipment, read chemical labels and locate important information for handling those chemicals, evaluate Material Safety Data Sheets, and Escape chemical hazards in our classroom.*

- Introduce social media contests, details can be found on pages 5-6.

## Lesson Outline

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Define the term chemical and list side effects of chemical exposure

- **What is a chemical?**

- ▶ Chemical: a compound of substance that has been purified or prepared, especially artificially
- ▶ Discussion: What are some common chemicals that we might find in our homes or on the farm? *Common chemicals: bleach, disinfectants, detergents, insect repellents, fertilizers, insecticides, pesticides, herbicides*

- **Overall Chemical Awareness & Side-effects to Exposure**

- ▶ Why should we practice safety around chemicals?
  - ▶ Vapors or direct exposure can lead to acute and chronic health effects including headaches, poisoning, burns, birth defects, nervous system disorders, and some cancers
  - ▶ Additional short term side-effects include: nausea, vomiting, diarrhea, pinpoint pupils, dizziness, fine muscle twitching, skin rashes and irritation



- ▶ Additional long term side-effects include: diseases of the lungs, liver, or kidneys
- ▶ Safety measures to keep in mind when handling chemicals
  - ▶ Hazardous materials are required by law to include a Safety Data Sheet and label, which provides information on proper handling and care procedures
  - ▶ Hazardous chemicals can occasionally be replaced with less toxic options. Sometimes, a safer form of the product is available.
  - ▶ *As we work through the activities this week we will take a closer look at Safety Data Sheets and dig deeper into proper handling and care procedures when working with AgriChemicals or other chemicals we may come in contact with.*

Investigate the need for chemical safety

**Why should we practice safety around chemicals?**

- Student activity: Using their devices, students individually or in small groups will research an accident caused by chemicals. Students should take notes on what caused the accident, how the accident occurred, how many fatalities/injuries occurred, and when the accident occurred. Have students report/discuss their research to the class

Lesson debrief

- Today we defined the term chemical, listed side effects of chemical exposure and investigated accidents associated with chemical exposure. Based off of our discussions today, why is chemical safety education needed? What can happen when proper handling procedures are not followed when working with chemicals? What can we do to prevent accidents from happening? Throughout the rest of the week we will continue to look at safety procedures related to handling chemicals, and at the end of the week you will all have a chance to apply what we discuss during an "Escape Room" activity.*

**Note to teacher:** Look ahead to Lesson 2, there is a Project-Based activity that can be given as homework either after this lesson or Lesson 2 can be delivered over two days. Either of these options will allow students time to complete a visual to share with their peers for a carousel sharing activity.

# Lesson 2: Safe Storage of Common Chemicals used in Agriculture

*Bringing awareness to chemical safety at school and on the farm*

## Learning Objectives:

Identify common chemicals used in agriculture

Distinguish between safely and non-safely stored chemicals

Create a safe storage plan for chemicals around the school, home, and farm

## References, Materials, Equipment, and Other Resources

[Prezi Presentation](#)

[Common Chemicals used in Agriculture Notes Guide](#)

[Chemical Product Scavenger Hunt Sheet](#)

Student electronic devices or classroom set of computers

Suggested supplies for visual aspect of student project: Markers/colored pencils/crayons; Poster board/butcher paper; Old magazines; Craft supplies; Glue; Scissors

*References: Food and Agricultural Materials Inspection Center*

## Opening Activity

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- Engage students in an open discussion about where they would find chemicals around their home (anticipated responses- keeping detergent under the sink, cleaner in the bathroom, fertilizer in the garage, etc.). Possible discussion questions: *Are these chemicals easily accessible? Could coming in contact with these chemicals cause injury?*

- Connecting discussion to content:

*Today we are going to take a closer look at where we might find chemicals in the school building, at home, and on the farm. As well as, discuss ways to safely store chemicals so we can help avoid injuries.*

# Lesson Outline

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Identify common chemicals used in agriculture

## □ Student Project-Based Activity

- ▶ This lesson can be completed as a homework assignment (assigned either at the end of lesson 1 or during this lesson) to allow more time for the carousel activity and class discussion
- ▶ Students will be assigned one type of chemical (list provided under last bullet) found on farms to research. Students will create a visual including the following information:
  - Type of chemical they are researching,
  - What the chemical does,
  - Where the chemical can be found (on the farm and/or at home),
  - How to safely store the chemical,
  - How to safely transport the chemical,
  - Consequences for failing to handle this chemical safely (exposure risks), and
  - Examples
- ▶ Projects should contain the information above in a visual format (poster, model, graphic, etc.)
- ▶ When completed, visuals will be placed around the room and students will do a carousel activity, rotating to get the information from other students' projects.
- ▶ Students will fill out the **notes guide** during this activity.
- ▶ Types of chemicals to use for project: (assign these chemicals to students to research)
  - Insecticides: agents for controlling harmful insect pests that damage field crops
  - Fungicides: agents for controlling diseases that damage field crops
  - Insect-fungicides: agents that simultaneously control harmful insect pests and diseases that damage field crops
  - Herbicides: agents for controlling weeds
  - Rodenticides: agents for controlling rats and other rodents

- Plant Growth Regulators: agents to promote or inhibit the growth of field crops
- Attractants: agents that attract mainly harmful insect pests by odor or other means
- Repellents: agents for having repellent action on harmful mammals and birds that damage field crops
- Spreaders: agents that are mixed with other agricultural chemicals to enhance the adherence of these chemicals
- Fuels: material such as coal, gas, or oil that is burned to produce heat or power
- Fertilizers: a chemical or natural substance added to soil or land to increase its fertility
- Veterinary Chemicals: veterinary medicine and animal care workers are at risk of exposure to many different chemical hazards including hazardous drugs, latex, pesticides, and waste anesthetic gases

Distinguish between safely and non-safely stored chemicals

### **☐ Safe storage and transport general tips: (Class notes)**

#### ▶ Safe Storage

- Always follow the manufacturer's instructions for proper storage
- Keep chemicals in their original containers and do not pour into smaller bottles
- Do not remove labels from containers
- Store chemicals in a locked, well-ventilated shed with floors that will contain spills
- Store chemicals and appropriate PPE in different locations
  - Store the filter(s) from masks separately to contaminated protective equipment when not in use
- Do not store liquid chemicals above solids
- Separate different classes of chemicals to prevent reactions
  - Store animal feeds, seeds, and fertilizers separately from other chemicals
- Have mop-up materials on hand such as sand, soil, or DrySorb
- Keep ignition sources well away from chemicals
- Keep a record of the chemicals you buy, store, and use

- ▶ Safe Transport
  - Transport chemicals separately from food, water, animal feeds, seeds, and fertilizers. This applies to transport of household and home garden quantities of the chemical as well as bulk transport
  - Drums of agricultural chemicals should not be transported in enclosed cabins with the driver and passengers
  - Secure the load
  - Carry a written record of the chemicals you are transporting
  - Take all appropriate protective gear with you
- ▶ *These are all general safety tips for storing and transporting chemicals. To know for certain how each chemical should be stored and transported always refer to the product label and the Material Safety Data Sheet (MSDS). We will now go on a scavenger hunt around the classroom to locate chemical based products. During this scavenger hunt in addition to basic information about the products, we will also record how the product is currently being stored and determine if it is safely or unsafely stored.*

#### □ Scavenger Hunt Activity

- ▶ Hand each student a Chemical Product Scavenger Hunt Worksheet. Allow them to explore the classroom and lab areas to find chemically based products. *\*If all of your products are already stored correctly, you may want to unsafely store a few products to see if the students will be able to identify them as unsafe.\**
- ▶ As homework or an extension to this scavenger hunt, have the students find other chemicals around the school while they are attending their other classes (i.e. science class). They can also take the sheet home and find products around their home.

Create a safe storage plan for chemicals around the school, home, and farm

#### □ Class discussion and safe storage plan creation

- ▶ Using the information gathered during the scavenger hunt, have students explain which chemicals were safely and unsafely stored

- ▶ Once the unsafely stored products are identified, lead a class discussion on where and how to properly store those products
  - Have students use MSDS information and product labels to come up with appropriate plans
- ▶ If students were asked to locate products in their home/on the farm, have them create a storage plan to put in action during this week to help make their home/farm safer
  - Have students take before and after pictures of the chemicals unsafely stored versus safely stored. *\*They could enter these photos in the Instagram photo contest\**

#### Lesson debrief

- *Through our activities today, we were able to identify common chemicals used in agriculture, and began to identify where these chemicals should be stored. As you go home and investigate chemical storage in your homes, think back to the material covered today and use the resources on the social media sites I introduced yesterday to plan out a better storage system for the chemicals found in your home. Remember, as you carry out your plan of action take be sure to take before and after pictures to document the changes you made.*

## Common Chemicals Used in Agriculture Notes Guide

Name: \_\_\_\_\_

Chemical: What is it used for/ Where it is found	How to store safely?	How to transport safely	Consequences for failing to handle safely?	Examples: Brands/ Products
Insecticides:				
Fungicides:				
Insect-fungicides:				
Herbicides:				
Rodenticides:				
Plant growth regulators:				

Chemical: What is it used for/ Where it is found	How to store safely?	How to transport safely	Consequences for failing to handle safely?	Examples: Brands/ Products
Attractants:				
Repellents:				
Spreaders:				
Fuels:				
Fertilizers:				
Veterinary Chemicals:				



## Chemical Product Scavenger Hunt

Name: \_\_\_\_\_

Chemical Product:	Current storage description	Safe or Unsafe	New storage plan
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	
		<input type="checkbox"/> Safe <input type="checkbox"/> Unsafe	

# Lesson 3: Reading and Understanding Chemical Labels

*Bringing awareness to chemical safety at school and on the farm*

## Learning Objectives:

Locate and decipher important information on chemical labels

Recognize signal words on chemical labels

## References, Materials, Equipment, and Other Resources

Chemical Labels: Pesticides, Herbicides, Fertilizers, etc.

Label Images Note Sheet

[Prezi Presentation](#)

References: <https://extension.psu.edu/what-you-need-to-know-about-reading-a-pesticide-label-2?>

## Opening Activity

- Show the class a bottle of pesticides/herbicide/other chemical with the label stripped from the container. Ask them if they feel comfortable using it, why or why not?
  - ▶ *How can we be sure what it is used for? do we know the toxicity level or what personal protective equipment should be used? What should you do if you come into contact with this chemical?*
- Connecting discussion to content:

*The label on any product contains all the necessary information to keep us safe. Without this information we could seriously injure ourselves or others, and possibly pollute the environment around us. Today we are going to read chemical labels to practice deciphering all the important information to safely use the product.*

# Lesson Outline

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Locate and decipher important information on chemical labels

## ☐ **Provide each student with chemical product label; Facilitate class discussion**

- ▶ Give each student an example of a chemical label. They can be different or the same. Facilitate a class discussion on what they see and what each part means
- ▶ Possible questions to ask during discussion: *What do you think is the most important section? Is anything unclear? Is anything unnecessary? Is there any additional information you would add?*
- ▶ Talking points to guide discussion:
  - Labels are legal documents that provide directions on how to mix, apply, store, and dispose of a chemical product. Using a chemical in a manner inconsistent with its labeling is a violation of federal law.
  - **What can be found on a chemical label?**
    - **Brand Name**
    - **Product Type**
    - **EPA Registration Number**
    - **EPA Establishment Number**
    - **Manufacturer Name and Address**
    - **Ingredient Statement:** Provides the common and/or chemical name and amount of each active ingredient and the total amount of inert ingredients in the container.
    - **Active Ingredient:** the chemical(s) responsible for controlling the pest. Individually listed on the label by common name and/or chemical name and percentage in the product.
    - **Common Name:** a simpler name given by the EPA to a chemical name for easier recognition
    - **Chemical Name:** The complex name identifying the chemical components and structure of a chemical
    - **Inert Ingredients:** Not required to be individually listed, but their percent of content must be.
    - **Net Contents:** The amount a full container holds

- **Signal Words:** Indicate the relative acute toxicity of the product to humans and animals
  - If two products will control the same pest, signal words can help you choose the least toxic of the two
  - Danger Poison: highly toxic by any route of entry into the body
  - Danger: can cause severe eye damage or skin irritation
  - Warning: moderately toxic either orally, dermally, or through inhalation; causes moderate eye or skin irritation
  - Caution: slightly toxic either orally, dermally, or through inhalation; causes slight eye or skin irritation
- **Precautionary Statement:** information about possible hazards and how to protect yourself. (Examples to the left)



- Health Hazard: Carcinogen, mutagenicity, reproductive toxicity, respiratory sensitizer, target organ toxicity, aspiration toxicity
- Flame- flammables, pyrophorics, self-heating, emits flammable gas, self-reactives, organic peroxides
- Exclamation Mark- irritant (skin and eye), skin sensitizer, acute toxicity, narcotic effects, respiratory tract irritant, hazardous to ozone layer (non-mandatory)
- Gas Cylinder- gases under pressure
- Corrosion- skin corrosion/burns, eye damage, corrosive to metals
- Exploding Bomb- explosives, self-reactives, organic peroxides
- Flame Over Circle- oxidizers
- Skull and Crossbones- acute toxicity (fatal or toxic)
- Environment- Aquatic toxicity
- **The Blue Section: Health Risks**
  - 4- The substance is a severe health risk if the substance is not handled safely. Substances carrying a four in the blue section could cause death or irreversible injury.
  - 3-The substance could cause serious temporary or irreversible injury.
  - 2-The substance could cause temporary incapacitation
  - 1-The substance could cause irritation.
  - 0-There is no health hazard.

- **The Red Section- Fire Risks**
  - 4- A flammable vapor or gas which burns readily.
  - 3- A flammable liquid or solid which can be readily ignited.
  - 2- The substance must be heated for ignition.
  - 1- The substance must be preheated before ignition can occur
  - 0- There is no fire hazard
- **The Yellow Section- Reactivity Hazards**
  - 4- The substance is readily capable of detonation or explosive reaction.
  - 3- The substance may detonate when exposed to heat or an ignition source.
  - 2- The substance is readily capable of non-explosive reaction.
  - 1- The substance may become unstable at high temperatures.
  - 0- The substance is stable.
- **The White Section- Special Hazards**
  - OX- Oxidizer
  - ACID- acid
  - ALK- Alkali
  - COR- Corrosive
  - Use no Water (image to left)
  - Radioactive (image to left)



- Example:



- **Signal Words:** Indicate the relative acute toxicity of the product to humans a
- **Hazards to Humans and Domestic Animals:** describes the potential hazards to people and pets, and actions you can take to reduce those hazards, for example, wearing gloves. These statements may also provide extra information on how to protect children and pets.

- **Environmental Hazards:** describes the product's potential to harm wildlife, fish, endangered plants and animals, wetlands, or water
- **Physical and Chemical Hazards:** describes any special fire, explosion, or chemical hazards the product may pose
- **First Aid or Statement of Practical Treatment:** Details what to do if someone is accidentally poisoned by a pesticide. ALWAYS call the National Poison Center Hotline (1-800-222-1222) for further medical instructions. Since the label has specific instructions and information the physician will need, it is important to have the pesticide label available when calling the hotline or when taking someone to the hospital.
- **Directions for Use:** *It is a violation of federal law to use any pesticide in a manner inconsistent with its labeling.* This section on the label tells you how to properly use a product to get the best results without harming yourself, others, and the environment. The label's directions for use will tell you:
  - What pests the product is registered to control
  - Where the product can be used (plants, animals, locations)
  - How to apply the product
  - How much product to use
  - When the product should be applied
  - How often to apply the product
  - How soon the crop can be used or eaten after an application
  - When people and animals can re-enter a treated area after application
  - Make sure the product is labeled for use against the pest(s) that you are trying to control. (For example, a product labeled only for termites may not be labeled to control fleas.) Also, make sure the product is only used where (plants, animals, locations) the label indicates. (For example, a pesticide labeled for use in an azalea bed may not be labeled for use in an annual flower bed.) Use only the amounts recommended, and follow the directions exactly.
- **Storage and Disposal:** Explains how to best store the product and what to do with the unused portion of the product and the empty container. Always keep products in original containers, out of the reach of children, and in a locked storage area. Be aware that temperature can affect product quality and environmental safety. Do not contaminate food or foodstuffs. To dispose of the container, triple-rinse, puncture, and dispose of it according to your local solid waste authority's requirements.

Recognize signal words and images on chemical labels


**☐ Memory game using images and terms from chemical labels**

- ▶ Print a copy of the Memory Game cards on colored or card stock paper so students cannot see the images/words from the backside
- ▶ Make multiple sets depending on the number of groups you would like to create for your class
- ▶ Cut each set up and place in groups for student groups
- ▶ Have each student group use the Memory Game card sets to match the terms or images to their definitions
  - Student will place all cards face-down on the the table
  - They will take turns in the group flipping over 2 cards at a time, if the cards are a match they will pick both of them up. If the cards are not a match they will flip them back over

Lesson debrief

- ☐ *Today we identified the many areas holding important information on chemical labels. Using a chemical label is the first step to using that product safely. What were some of those areas, lets hear 5 of them. We learned that the label can inform us how to store, transport, and handle the chemical. We will continue to use this information as we begin talking about personal protective equipment tomorrow.*

Lesson 3: Memory Game Cards

<p><b>Danger Poison</b></p>	<p>Highly toxic by any route of entry into the body</p>
<p><b>Danger</b></p>	<p>Can cause severe eye damage or skin irritation</p>
<p><b>Warning</b></p>	<p>Moderately toxic either orally, dermal, or through inhalation; causes moderate eye or skin irritation</p>
<p><b>Caution</b></p>	<p>Slightly toxic either orally, dermal, or through inhalation; causes slight eye or skin irritation</p>
	<p>Skull and Crossbones: acute toxicity (fatal or toxic)</p>





Flame Over Circle:  
Oxidizers



Exploding Bomb:  
Explosives, self-reactives,  
organic peroxides



Corrosion: skin corrosion/  
burns, eye damage,  
corrosive to metals



Gas Cylinder: gases  
under pressure



Exclamation Mark: irritant (skin  
and eye), skin sensitizer, acute  
toxicity, narcotic effects,  
respiratory tract irritant,  
hazardous to ozone layer



Flame: Flammables, pyrophoric, self-heating, emits flammable gas, self-reactive, organic peroxides



Health Hazard: Carcinogen, mutagenicity, reproductive toxicity, respiratory sensitizer, target organ toxicity, aspiration toxicity



Environment- Aquatic toxicity



Use no water



Radioactive

OX	Oxidizer
ACID	Acid
ALK	Alkali
COR	Corrosive

## Lesson 4: PPE like a VIP

*Bringing awareness to chemical safety at school and on the farm*

### Learning Objectives:

Identify proper PPE for handling chemicals

Illustrate awareness of proper PPE for chemical handling

### References, Materials, Equipment, and Other Resources

Gloves: Cotton, Latex, Rubber, Nitrile

Clothing: Long Sleeve Cotton Shirt, Long Pants, Short Sleeve Shirt, Shorts, Closed-toe Shoes/Boots, Sandals, Rubber Boots

Respirator

Eye Protection: Goggles, Safety Glasses, Sun Glasses

Head Protection: Waterproof Disposable Hood or Plastic Wide Brim Hat, Baseball Cap

[Prezi Presentation](#)

Coloring utensils (crayons, colored pencils, markers)

Blank paper for each student

## Opening Activity

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- Show students pictures of eye damage caused from not wearing proper protection found in the Prezi
- Discuss- *How do you think they ended up with this eye damage? What do envision was going through their mind before the accident? What precautions should they have taken?*
- Connecting discussion to content:

*Today we are going to focus on Personal Protective Equipment needed when handling chemicals. As you saw in the photos accidents can happen to anyone, and we have to take precautions, like using PPE, to help ensure our safety with chemicals.*

# Lesson Outline

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Identify proper PPE for handling chemicals

## □ **Why PPE is needed?**

- ▶ Different parts of the body absorb chemicals at different rates. For example, the forehead absorbs chemicals 4.2x faster than the forearm
- ▶ Chemicals enter the body through the mouth, nose, skin, and eyes
- ▶ Certain chemicals can accumulate in the body, damaging the respiratory and nervous systems

## □ **Types of PPE, show examples while talking about each and describe situations when each piece of equipment would be needed**

- ▶ Head protection
  - Waterproof disposable hood
  - Plastic wide brim hat
- ▶ Gloves
  - Unlined, chemical resistant gloves (neoprene and nitrile are best)
  - NO cotton or leather
- ▶ Chemical resistant apron
- ▶ Unlined rubber neoprene or PVC boots/shoes
  - Willing to discard
  - Leave outside
  - Designated spot outside the house for changing clothes/shoes
- ▶ Eye protection
  - Goggles with indirect vent and fog-free lenses
  - Should not wear contact lenses. Inhibits the effect of emergency water and may become fused to the eyeball
- ▶ Disposable coveralls such as Tyvex or long sleeved shirts and pants

- ▶ Respirators
  - If label says to wear a respirator, wear an approved one
  - Maintain and clean respirators
  - Replace outdated canisters
- ▶ Clothing
  - Long sleeve cotton shirt
  - Long pants
  - Closed-toe shoes/boots

#### ☐ **Additional tips and precautions**

- ▶ Shower immediately after applying fumigants
- ▶ If you have a splash, change clothes immediately
- ▶ Avoid others (children, family, pets) until clothes have been changed
- ▶ PPE should be stored in a central location

#### ☐ **Safe Handling of Chemicals**

- ▶ Store in a safe place in labeled container
- ▶ Always wash your hands after handling chemicals
- ▶ Remove soiled clothing before entering home
- ▶ Do not eat or drink where chemicals are used
- ▶ Ensure anyone using agricultural chemicals is suitably trained to use both the chemical and any equipment required for application
- ▶ Use chemical decanting kits to reduce the risk of spills and splashes while mixing chemicals
- ▶ Only mix the quantity of chemical required for the task at hand
- ▶ Make sure the decanting and mixing are in well ventilated. If this is not possible, ensure that recommended personal protective equipment is worn for enclosed environments
- ▶ Follow the manufacturer's instructions on the label
- ▶ Always wear recommended protective clothing such as chemical-resistant gloves, overalls, goggles, and appropriate P2 facemasks or a P3 respirator (respirator cartridges should provide multi-level gas protection)

- ▶ Avoid exposing non-target animals or plants
- ▶ Triple rinse equipment after chemical application and dispose of the rinse water appropriately. Rinse water contains low concentrations of the chemical from the cleaning process

#### ☐ **General Tips for Safe Disposal**

- ▶ Always follow the manufacturer's instructions for proper disposal of both chemicals and rinsate (rinse water) from equipment
- ▶ Thoroughly triple rinse and then puncture empty containers to prevent reuse for other purposes
- ▶ Return empty containers to the manufacturer or check with your local council about proper disposal methods
- ▶ Audit your chemical store on a regular basis and dispose of any excess or outdated chemicals in the appropriate manner
- ▶ Seek emergency assistance if someone has been exposed to chemicals
- ▶ Call Poison Control if exposed

#### ☐ **Additional Safety Tips**

- ▶ Chemicals should always be stored in the manner which the manufacturer has indicated
- ▶ Never mix chemicals
- ▶ Never use chemicals past their expiry date. Return them to a safe disposal site
- ▶ Follow all label directions and MSDS information
- ▶ Do not allow children to handle/mix chemicals
- ▶ Do not allow anyone to use chemicals/applicators until they have been properly trained in their use
- ▶ Ensure applicators and mixers are in good condition before using them
  - Check all hoses, gauges, wires, and containers
- ▶ In the case of an emergency, take a photo of the label, read the emergency treatment notes, call 9-1-1 or transport to the hospital. Call poison control and have the SDS available for the emergency medical workers. ALWAYS call the National Poison Center Hotline

(1-800-222-1222) for further medical instructions. Since the label has specific instructions and information the physician will need, it is important to have the pesticide label available when calling the hotline or when taking someone to the hospital

Illustrate awareness of proper PPE for chemical handling

**Draw proper use of PPE and label each item**

- Student activity: Using a blank sheet of paper and coloring utensils, ask students to draw a scene on the farm where chemicals would be used. Have them illustrate a person wearing proper & complete PPE for that situation. Students should label what the individual is wearing and explain why they believe that equipment is needed for the situation they drew
- Once students have completed their illustrations, facilitate a class discussion of the scenes the students depicted

Lesson debrief

- Today we identified proper Personal Protective Equipment that is generally needed when working with chemical products. Name 4 of acceptable PPE items we discussed today. What are some general safety practices you should keep in mind when handling chemicals? Excellent, we always need to keep these practices in mind when working with chemical products to help ensure our safety.*



# Lesson 5: Chemical Safety Escape Room

*Bringing awareness to chemical safety at school and on the farm*

## Learning Objectives:

Utilize knowledge on chemical safety to successfully escape the room

## References, Materials, Equipment, and Other Resources

Coded Numbers: [19-1-6-5-20-25 4-1-20-1 19-8-5-5-20]=[SAFETY DATA SHEET]

15 Unsafe chemical situations planted around the room/lab (recommendations below)

Increase difficulty by placing safe chemical situations around the room/lab as well

Classroom timer that will be set for 35 minutes (<http://www.online-stopwatch.com/classroom-timers/>)

## Escape Room Scenario

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- You all have just been locked in a storage room located on "Chemical Disaster Farm" and you now have 35 minutes to escape this unsafe situation before the exposure to chemicals does irreversible damage.*
- Around the room/lab you will need to locate all 15 unsafe chemical situations. Once you have located an unsafe situation, explain to me why that is a safety infraction. If you correctly identify the infraction, you will be provided one clue to help you solve the code for your escape.*

## Escape Room Set Up

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Utilize knowledge on chemical safety to successfully escape the room

- Possible unsafe chemical situations to place around room/lab**
  - ▶ Mixed chemicals on the counter/chemical poured into an old chemical bottle w/label scratched out
  - ▶ Chemical past its expiry date
  - ▶ Cotton gloves stored with PPE (should not use cotton when applying chemicals)

- ▶ Bottle with no label and "Bleach" written on the outside, or simply cover up the label on a bottle
- ▶ Damaged hoses
- ▶ Have two boots (PPE) with the number two in the left boot and the number five in the right boot
- ▶ Sunglasses stored with other safety glasses
- ▶ Animal feed stored by chemicals
- ▶ Liquid chemicals stored above solid chemicals
- ▶ Food and drinks stored/consumed near chemicals
- ▶ Chemicals stored in an unlocked case with no ventilation
- ▶ Place bottle with funnel next to a chemical product, put the name of the chemical on the smaller bottle
- ▶ Simulate a chemical spill by putting a puddle of water beside a chemical bottle, and have just paper towels there to clean it up
- ▶ Chemicals not stored as the manufacturer has indicated
- ▶ Eye wash center covered or missing first aid box

#### Lesson debrief

- *Congratulations, you managed to escape this potentially harmful situation by identifying all the unsafe situations around the classroom! Hopefully the activities we did this week, reminded you of how important it is to handle chemicals carefully and safely. Accidents happen all the time and negligence on our part increase can increase our chance of being injured. Always take the time to read the chemical label and find out what PPE you should wear, as well as how you should handle the product.*

Lesson 5: Clues to hand students after they locate an unsafe situation

19 (1)

1 (1)

6 (1)

5 (1)

20 (1)

25 (1)

4 (2)

1 (2)

20 (2)

1 (2)

19 (3)

8 (3)

5 (3)

5 (3)

20 (3)