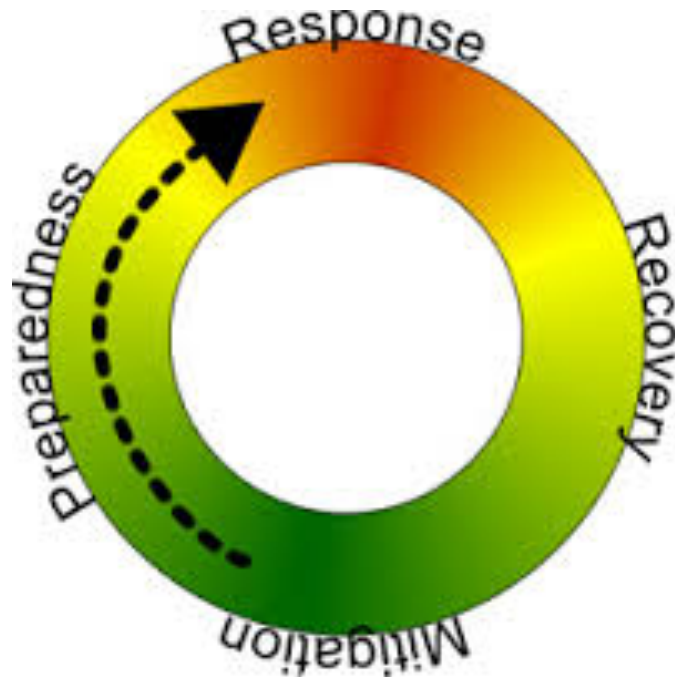


Emergency, Fire and Chemical Spill Preparation and Response

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Center for Innovative Material and
Architectures
Ho Chi Minh City, Vietnam
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Outline



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After this training, you will know how to:

- Implement and execute an emergency response plan
- Understand how to handle chemical spills and fires
- Be familiar with emergency response equipment

Emergency Response Guide

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Two Classifications of an Emergency:

1. MAJOR Incident: Immediate Procedures

- Remain calm
 - Initiate life-saving measures if required
 - Alert people in the immediate area to evacuate
 - For fire: pull the fire alarm
 - Call for Emergency Response
-

Emergency Response Guide

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Two Classifications of an Emergency:

2. Minor Incident: “Non Life-Threatening”

- These include: power failure, water failure, non-hazardous chem. spill, etc.
 - Report to Hoang, Hai, or Kyle immediately
 - Notify all people in the immediate area that are affected by the emergency
 - Details for fire, chemical, spill will be explained next.
-

FIRE DANGERS: Need for a Plan

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Explosion and Fire at Ohio State University in 2005. Quick actions by the students, as a result of their preparation and training, saved all of their lives.



Explosion and Fire at Texas Tech University in 2001. A 4-L bottle of ether broke inside a fume hood and spilled onto a hot plate. The researcher was unable to extinguish the fire with two fire extinguishers and quickly exited safely.

FIRE: Immediate Procedures

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In general, small fires can be extinguished without evacuation. However, an immediate readiness to evacuate is essential in the event the fire cannot be controlled.



SMALL FIRE

- Alert people in lab and activate alarm.
- Smother fire with sand or use correct fire extinguisher (discussed in a few slides)
- Aim extinguisher at base of fire
- Always maintain accessible exit
- Avoid smoke or fumes



FIRE: Immediate Procedures

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MAJOR FIRE

- Alert people in area to evacuate.
- Activate nearest fire alarm
- Close door and windows to confine fire
- Evacuate to safe area
- Call Emergency Response number *from a safe area* to provide details of the incident
- Binh, or Huy will assist emergency responders



FIRE: General Information

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Evacuation Plan!!

1. Prepare your evacuation route before it becomes necessary, be familiar with it, and always have alternate routes in mind.
 2. When the fire alarm sounds, you are required to evacuate. – If you are carrying out a procedure that would result in a hazardous condition by your immediate evacuation, then you are allowed to take a *very brief* time to bring your area to a safe condition before leaving.
 3. **YOUR SAFETY AND THE SAFETY OF YOUR NEIGHBORS SHOULD BE CONSIDERED AT ALL TIMES.**
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FIRE: General Information



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Evacuation Plan!!

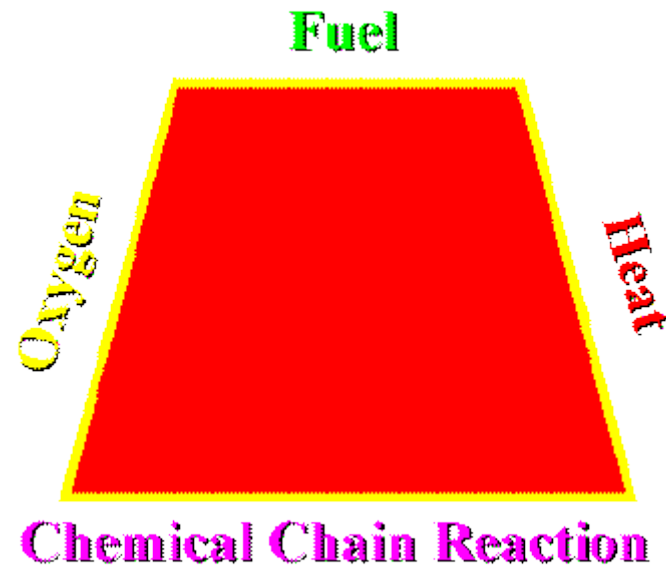
4. **DO NOT USE ELEVATORS!**
 5. **Use two stairwells located at the center of INOMAR or the stairwell located in between common room and stock room.**
 6. **When you get out of INOMAR safely, please move to the open “parking lot” located on the left of the building. This is essential because a “head count” will take place to ensure no one is trapped inside – This is called the Emergency Assembly Area.**
 7. **DO NOT RE-ENTER THE BUILDING, EVEN IF THE FIRE ALARM IS SILENCED**
-

FIRE Fighting: Basics

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- In order for fire to occur, four things must be present:
 1. Oxygen
 2. Fuel
 3. Heat
 4. Chemical Chain Reaction
- **When any of the four items are removed, the fire will go out.**
- **Fire extinguishers function by removing one of these four components**



Fuel Classifications

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- Fuels are classified according to the type of fuel that is burning.
- If you use the wrong type of extinguisher on the wrong type of fire, you might make the situation more dangerous.
- **Therefore, it is very important to understand the four different fire (fuel) classifications.**

Fuel Classifications

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- **Class A**: Wood, paper, cloth, trash, plastics, combustibles – solids that are not metals.



- **Class B**: Flammable liquids, including flammable gases



- **Class C**: Electrical equipment – the rule is, “as long as it’s plugged in”



- **Class D**: Metals – potassium, sodium, aluminum, magnesium. These require special extinguishing agents.

Types of Fire Extinguishers

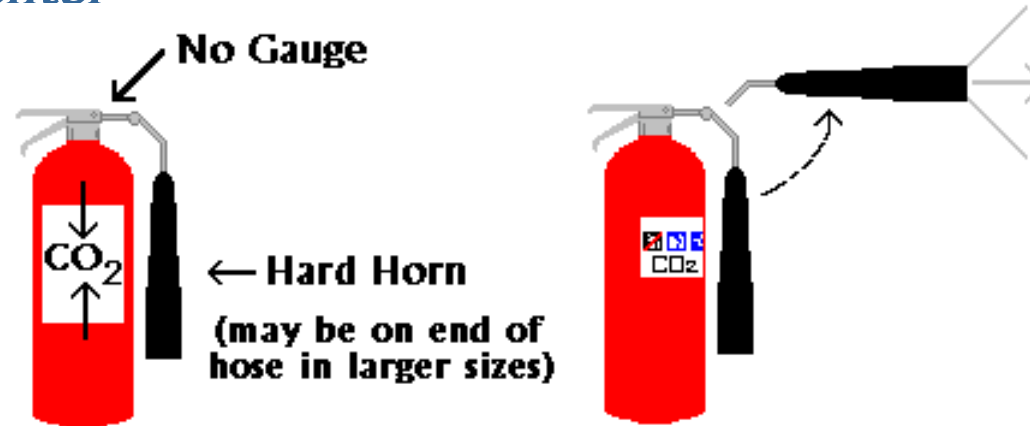
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- **There are three main types of fire extinguishers that are meant to fight the different classifications of fires.**
 1. **Water (APW)**
 - Air-pressurized water; essentially large squirt guns; extinguish fire by taking away heat.
 - Can use only on Class A fires
 - If used on a flammable liquid, fire can spread
 - If used on electrics, the risk is electrocution
 2. **Carbon Dioxide (CO₂)**
 3. **Dry Chemical (ABC, BC, DC)**
-

Carbon Dioxide Fire Extinguishers

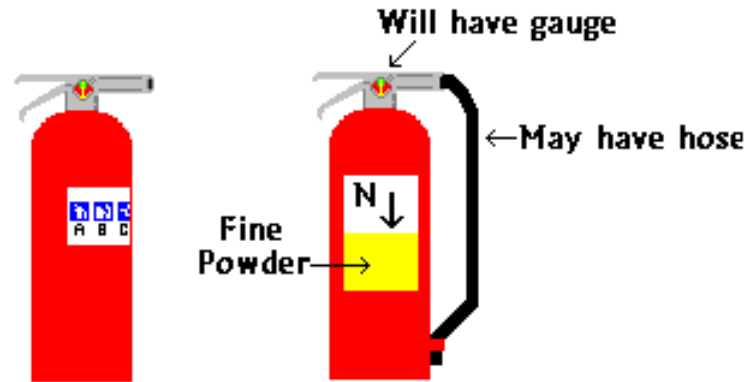
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- High pressure, dry ice may shoot out, be cautious
- Typically are red in color and are designed for **Class B (flammable liquids)** and **C (electrical sources)** fires only!!
- Functions by taking away the oxygen of the fire. It also is very cold, so it takes away heat component.
- Ineffective against **Class A** - may not be able to displace enough oxygen and may only smolder the fire (possibly re-ignite later)

Dry Chemical (ABC) Fire Extinguishers

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- Puts out fires by coating the fuel with a thin layer of dust (monoammonium phosphate) – separates oxygen from the fuel; also interrupts chemical reaction of fire
- VERY EFFECTIVE for **Class A, B and C** fires – These are the extinguishers we have in lab.



How to Use a Fire Extinguisher

All you have to remember is the **PASS** word....

- **P**ull
- **A**im
- **S**queeze
- **S**weep



How to Use a Fire Extinguisher

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- **Pull the pin...**

This is a safety device and when it is removed, you can discharge the extinguisher



How to Use a Fire Extinguisher

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- **Aim at the base of the fire...**

Hit the fuel, not the flames. If you aim at the flames, the extinguisher will go right through and do no good.



How to Use a Fire Extinguisher

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- **Squeeze the top handle...**

This depresses the button that releases the pressurized extinguishing agent



How to Use a Fire Extinguisher

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- **Sweep from side to side...**

Do this until the fire is completely out. Start using the fire extinguisher from a safe distance away (>3 m), then slowly move forward. Once the fire is out, watch the area in case it re-ignites



Rules for Fighting Fires



— *INOMAR Center*

Fires are very dangerous and you should always be certain that you will not put yourself or others in danger when attempting to put out a fire.

REMEMBER: It is not your responsibility to put out a fire regardless of whether it is big or small. Whenever you feel uncomfortable or in danger: tell your neighbors, locate and push the fire alarm, and evacuate immediately!!!

Rules for Fighting Fires

— *INOMAR Center*



If you feel that you can fight fire (no matter the size), consider these things *first*:

1. What is burning? If you do not know, then you do not know what extinguisher to use.
2. Even if you have easy access to ABC fire extinguisher, there may be something in the fire that is going to explode or produce toxic fumes.

Rules for Fighting Fires

— *INOMAR Center*



If you feel that you can fight fire (no matter the size), consider these things *first*:

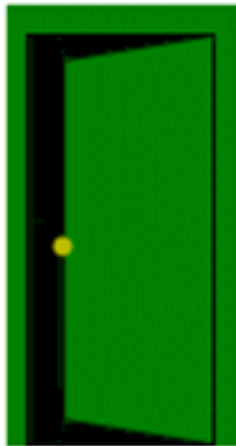
3. Is the fire spreading rapidly beyond where it started? You have to use fire extinguisher at the beginning stages of the fire for it to be effective.
4. If fire is spreading quickly, simply evacuate and push fire alarm.
 - As you evacuate, close doors and windows behind you. This will slow down spreading.

Final Rule!!

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ALWAYS POSITION YOURSELF WITH AN EXIT OR MEANS OF ESCAPE AT YOUR BACK BEFORE YOU ATTEMPT TO USE AN EXTINGUISHER TO PUT OUT A FIRE!!



Chemical Spills

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Chemical Emergencies are classified as:

Simple Spill – Something that you can safely clean up yourself

- Notify your neighbors and Hoang, Hai, or Kyle
- Control Access to the area, prevent contact or spread of spill
- Example: 500 mL of Nitric Acid

Major Hazard Spill – Something that you can not safely clean up yourself.

- **Follow same protocol as if it were a major fire**

Mercury Spills

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- **Mercury spills should be treated very seriously, especially if they are near a heat source (mercury vapor)**
- List of what can be used to clean up a mercury spill:
 - latex or nitrile gloves,
 - plastic bags
 - tape
 - eyedropper (to suck up beads)
 - Sulfur powder
- **Dispose of properly (not in normal trash) and make it very clear that mercury is inside, DANGER!!!**



First Aid for Chemical Splashes: Eyes

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For chemical splashes to the eye (this should never happen.... why?):

- **Flood eyes with water from the emergency eye wash, IMMEDIATELY!**
- **Keep your eyes under running water for at least 15 minutes.**
- Seek medical attention (i.e. go to doctor with a friend or call ambulance)
- MSDS should always be consulted and provided to doctor!



First Aid for Chemical Splashes: Body

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For chemical splashes on clothes/skin (this should never happen.... why?):

- **Go under safety shower, IMMEDIATELY!**
- **Remove all contaminated clothing immediately.**
- **Stay under running water for at least *15 minutes*.**
- Seek medical attention (i.e. go to doctor with a friend or call ambulance)
- MSDS should always be consulted and provided to doctor!



First Aid for Cuts and Puncture Wounds

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While using a syringe, you accidentally poked yourself. What should you do?

- Wash the injury very thoroughly with soap and water for several minutes
- Encourage bleeding
- Obtain medical attention
- Consult MSDS



Final Words of Wisdom

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The best way to minimize damage to life and/or property is to plan and prepare for chemical emergencies!

- Know where fire extinguishers (and what classes they belong to), emergency showers and eyewash stations are located – Also, know how to use them!
- Know how the emergency plan and the routes you will take if something major were to happen.
- **PLAN AND PREPARE!!!**

Field Trip!!!

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