Within UCR

Chemical Hazard Classes & Packing for Transportation

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Introduction

Transporting Hazardous Materials

This course is for moving hazardous materials entirely within the ‘private’ boundaries of the UCR Main Campus. We will use the Department of Transportation (DOT) hazardous Materials Categories for segregation but will not pack to the DOT shipping requirements.
Safety & Environmental Management

- **Scope** – packing, transporting, unpacking and storing hazardous materials
- **Hazards** – mixing incompatibles, fires, explosions, spills, exposure, injury, death
- **Controls** – segregate hazard classes, pack to prevent breakage, use safe lifting techniques, wear PPE, label storage areas and unpack & store by hazard class
- **Work** – Use right equipment, pay attention, be careful, get help, only transport 8-5 M-F
Don’t move waste!

› Get rid of the stuff now

› Use the on-line waste tag system to label and remove waste [http://otp.ucop.edu](http://otp.ucop.edu)

› Remember to ‘Modify your User Profile’ to change your storage (and pick-up) locations

› Bio & Rad waste

[www.ehs.ucr.edu/services/waste.html](http://www.ehs.ucr.edu/services/waste.html)
Overview

1. **Identifying Categories**
   Chemical hazard classes, temperature sensitive & radioactive materials

2. **Segregating by Hazard**
   Only group compatibles together

3. **Packing & Moving**
   Avoiding disaster

4. **Responding to Emergencies**
   Preparing for spills
Major Hazmat Classifications

(3) Flammable Liquids

(4) Flammable Solids (Spontaneously Combustible Material, and Material that is Dangerous When Wet)

(5) Oxidizers and Organic Peroxides

(6) Poisonous Materials and Infectious Substances

(7) Radioactive Materials

(8) Corrosive Materials
Flammable & Combustible Liquids (*DOT Division 3*)

- Flammable liquid, or any material in a liquid phase having a flashpoint between 100° F (37.8 C) and 141° F (60.5 C)

- Combustible liquid (*DOT*) any liquid that does not meet the definition of any other hazard class and has a flashpoint between 141° F (60.5 C) and 200° F (95 C)
Where to find out?

- The Container Label

- The Catalogue

- The Material Safety Data Sheet
  - Google Search “chemical name + MSDS”
  - From UCIP address:
    - [www.ehs.ucr.edu/services/msds.html](http://www.ehs.ucr.edu/services/msds.html)
  - Look at Section 3. Hazards Identification, Emergency Overview for “Flammable, Poison, Oxidizer, etc.”
Flammable Solids (DOT Class 4.1)

Three types:

1. desensitized explosives;
2. self-reactive materials (materials that are thermally unstable and can undergo a strongly exothermic decomposition without air);
3. readily combustible materials such as certain metal powders, or materials that can cause fire through friction (such as matches) or that have an accelerated burn rate.
Spontaneously Combustible
*(DOT Class 4.2)*

- Two types:
  - Pyrophoric material & self heating material

1. **Pyrophorics** ignite within five minutes of coming into contact with air
2. **Self heating** gets hot when in contact with air
Dangerous when Wet (DOT Class 4.3)

- Contact with water makes it spontaneously flammable or give off a flammable or toxic gas at a rate greater than 1 liter per kilogram of the material per hour.
Oxidizers & Organic Peroxides
(DOT Class 5.1 & 5.2)

- **Oxidizers**, generally by yielding oxygen, cause or enhance the combustion of other materials.

- **Organic peroxides** are organic compounds containing oxygen in the bivalent O-O structure where the oxygen atoms are separately bound to carbon.
Poisonous & Infectious Materials
(DOT Class 6)

Does not include gases

- **Poisons** are known or presumed to be so toxic to humans as to afford a hazard to health during transportation (Class 6.1)

- **Biohazard materials** including infectious substances, diagnostic specimens, biological products, and regulated medical wastes (Class 6.2)
Radioactive Material *(DOT Class 7)*

- Radioactive means any material having a specific activity greater than 70 Becquerel (Bq) per gram
- Place into a plastic bag
  - need to be kept cold? use ice & cooler
- Radiation safety personnel must be present during the transfer of your isotopes to your new location
- Need Radiation Safety to store your isotopes?
  - Contact Karen at x2-5748 or Ondra at x2-5529
Corrosives (Acids & Bases) *(DOT Class 8)*

- Liquids or solids that cause full thickness destruction of human skin at the site of contact
- Liquids that can have a severe corrosion rate on steel or aluminum
- Strong bases have a pH greater than 10.5
- Strong acids have a pH less than 2
- *Do not package, transport or store strong acids and strong bases together*
# Chemical Hazard Compatibility

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Class</th>
<th>Flammable Liquic</th>
<th>Flammable Solid</th>
<th>Spontaneously Combustible</th>
<th>Dangerous When Wet</th>
<th>Oxidizer</th>
<th>Organic Peroxide</th>
<th>Extremely Poisonous Liquid</th>
<th>Extremely Poisonous Inhalation Hazard</th>
<th>Corrosive Liquid Acidic</th>
<th>Corrosive Liquid Caustic</th>
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<td><strong>3</strong> Flammable Liquids</td>
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<td><strong>4</strong> Spontaneously Combustible</td>
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<td><strong>4</strong> Dangerous When Wet</td>
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Shaded areas indicate that the hazard classes are **incompatible. Do Not place** these in the same secondary container, box or drum.  
Source: US Department of Transportation URL: [http://www.dot.gov](http://www.dot.gov)  
Normal Combustible Solids and Liquids can be transported with most hazard categories (best to not place organics with Class 5 oxidizers)
Examples

› Can I pack Acetone & Nitric acid together?
› What are the hazards?
  › Acetone…
    › Flammable – so it is class 3.1
  › Nitric acid…
    › Corrosive Acid – Class 8 acid
    › Strong Oxidizer – Class 5.1

› Look at the chart
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Normal Combustible Solids and Liquids can be transported with most hazard categories (best to not place organics with Class 5 oxidizers).
Packing & Moving

Use only leak-resistant sturdy boxes
Pack by hazard class compatibility
Pack absorbent material around each liquid
Move on capable, sturdy carts
Use 2-person lifts & proper techniques
Use the Buddy System & wear PPE

- Safety Glasses (or goggles)
- Lab Coat (or apron, or coveralls)
- Durable gloves
- Close-toed shoes
Avoid Common Accidents:

- Knocking bottles against each other--the bottom of the containers often drop out.
- Attempting to **lift containers or bottles by the cap**. Caps may be loose or not fit correctly, causing the container to drop.
- Placing bottles in boxes **without adequate packing**.
Avoid Common Accidents:

- Trying to save trips by stacking boxes too high on carts or trying to move too much at once.
- Not supporting the bottom of the box while lifting.
- Use of makeshift carts (stacking boxes on chairs with wheels).
Walk your route first

- Before rolling your most hazardous materials to the new building map out your path…
  - A small step walking can be an insurmountable barrier with a 300 lb load
  - Always have at least TWO people together when rolling chemicals to the new building
Responding to Emergencies

ONLY Transport Chemicals after 8 AM and before 5 PM
Best to work in the morning before it gets **hot**

Emergency Assistance

- Call 911 (or 951-827-5222 from your cell)
- Chemical Spills: 951-827-5528

Review your departmental Chemical Hygiene Plan “Spills and Accidents” section
Summary

1. Get rid of unwanted materials
2. Pack by Hazard Class
3. Use absorbent and boxes your Lab Safety Officer
4. Plan your path, use a buddy system & PPE