

**WVU ENVIRONMENTAL  
HEALTH & SAFETY**

Laboratory Safety

Hazard Communication Standard

Hazardous Waste Management



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**OBJECTIVES**

- How to work around chemicals safely
- How to work with chemicals safely
- How to manage hazardous waste



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**WHICH GOVERNMENT  
AGENCIES REGULATE US?**



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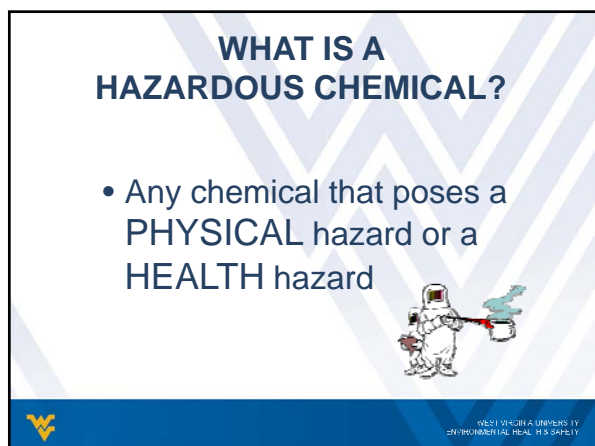
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### PHYSICAL HAZARDS

- Explosives
- Flammable gases, aerosols
- Gases under pressure
- Flammable liquids, solids
- Self-reactive substances
- Pyrophoric liquids, solids



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### PHYSICAL HAZARDS

- Self-heating substances
- Substances that emit flammable gases on contact with water
- Oxidizing liquids, solids, gases
- Organic peroxides
- Substances corrosive to metal



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### HEALTH HAZARDS

- Acute toxicity
- Skin or eye irritants
- Skin or eye corrosion
- Respiratory sensitizer
- Skin sensitizer



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## HEALTH HAZARDS

- Germ cell mutagens
- Carcinogens
- Reproductive toxins
- Target Organ Systemic Toxicity (TOST)
- Aspiration hazard

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## HAZARD CLASSIFICATION - GHS

- Conflicts with NFPA
  - GHS classification is opposite
  - NFPA & HMIS: 4 = greatest hazard
  - GHS: 1 = greatest hazard



HMIS / NFPA	Health Hazard	Flammability Hazard	Reactivity Hazard
0	Minimal	0	0
1	Low	1	1
2	Medium	2	2
3	High	3	3
4	Very High	4	4

NEW GHS	Health Hazard	Flammability Hazard	Reactivity Hazard
1	Very High	1	1
2	High	2	2
3	Medium	3	3
4	Low	4	4
5	Minimal	5	5

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## NFPA 704 DOOR POSTING


### CAUTION



**CHEMICAL STORAGE AREA**



**NO EATING OR DRINKING**



**WEAR PROTECTIVE CLOTHING**

ADMITTANCE TO AUTHORIZED PERSONNEL ONLY  
SPECIAL PROCEDURES OR INFORMATION

NAME	DATE	INITIALS	DATE	INITIALS

Health Hazard	Flame Hazard
4 - Deadly 3 - Extreme Danger 2 - Hazardous 1 - Slightly Hazardous 0 - Not Hazardous	4 - Serious Fire 3 - Serious Fire 2 - Serious Fire 1 - Serious Fire 0 - Not a Fire
Specific Hazard	Reactivity
ADD - Acid ALK - Alkali COR - Corrosive OXY - Oxidizer RAD - Radioactive W - Water Reactive	4 - May Detonate 3 - Shock/Heat May Detonate 2 - Violent Chemical Change 1 - Unstable if Heated 0 - Stable

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## GHS FLAMMABLE LIQUIDS

- Flashpoint (FP)  $\leq 93^{\circ}\text{C}$  ( $200^{\circ}\text{F}$ )  
– Use SDS



Category	Criteria
1	FP < 23 C (73 F), BP $\leq$ 35 C (95 F)
2	FP < 23 C (73 F), BP > 35 C (95 F)
3	FP > 23 C and $\leq$ 60 C (140 F)
4	FP > 60 C (140 F) and $\leq$ 93 C (200 F)



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## GHS TOXICS

Acute toxicity	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Category 5
Oral (mg/kg)	$\leq 5$	$> 5$	$> 50$	$> 300$	<b>Criteria:</b> • Anticipated oral LD50 between 2000 and 5000 mg/kg; • Indication of significant effect in humans;* • Any mortality at class 4;* • Significant clinical signs at class 4;* • Indications from other studies.* *If assignment to more hazardous class is not warranted.
Dermal (mg/kg)	$\leq 50$	$> 50$	$\leq 1000$	$> 1000$	
Gases (ppm)	$\leq 100$	$> 100$	$\leq 500$	$> 500$	
Vapors (mg/l)	$\leq 0.5$	$> 0.5$	$\leq 2.0$	$> 2.0$	
Dust & mists (mg/l)	$\leq 0.05$	$> 0.05$	$\leq 0.5$	$> 0.5$	



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## LABELS

- Product name, identifier
- Symbols (Pictograms)
- Signal Words – Danger, Warning
- Hazard statements
- Precautionary statements
- Supplier identification
- Supplemental information

Product Name or Identifier



Signal Word

Physical, health, environmental hazard statements


Supplemental Information

Precautionary Measures

First Aid Statements

Name & Address of Company

Telephone Number



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**The Basic Parts of A GHS-Compliant Label**

1 **n-Propyl Alcohol**  
UN No. 1274  
CAS No. 71-23-8

2 **DANGER**

3 Highly flammable liquid and vapor. Causes serious eye damage. May cause drowsiness and dizziness.

4 Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/vapors/sprays. Wear protective gloves/protective clothing/eye protection/face protection. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.

5 Acme Chemical Company • 711 Roadrunner St. • Chicago, IL 60601 USA • www.acmechem.com • 1-23-444-5567

6

1. **Product Identifier** - Should match the product identifier on the Safety Data Sheet.  
2. **Signal Word** - Either use "Danger" (severe) or "Warning" (less severe).  
3. **Hazard Statements** - A phrase assigned to a hazard class that describes the nature of the product's hazards.  
4. **Precautionary Statements** - Describes recommended measures to minimize or prevent adverse effects resulting from exposure.  
5. **Supplier Identification** - The name, address and telephone number of the manufacturer or supplier.  
6. **Pictograms** - Graphical symbols intended to convey specific hazard information visually.

Sample label courtesy of Wilson Packaging Solutions - www.wilsonpackaging.com

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**PICTOGRAMS**

- Explosives
- Flammable liquids, gases, solids, organic peroxides
- Gases Under Pressure
- Oxidizers
- Corrosive to metal, skin, and eyes

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**PICTOGRAMS**

- Acutely Toxic or Fatal
- Irritants or Toxic
- Respiratory sensitizers, carcinogens, reproductive toxins, aspiration hazards
- Aquatic Toxicity

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### CHEMICAL SAFETY LABELS IN THE LAB

- Lab workers must use original chemical names on labels and refer to the appropriate SDS



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### CHEMICAL LABELS



INCORRECT

CORRECT



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- All chemicals, no exceptions



- Labels must be on every bottle



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**KEEP ALL CHEMICALS  
LABELED**



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**SAFETY DATA SHEETS - SDS**

- What is in the product
- What are the hazards
- How to protect yourself
- Exposure limits
- First aid
- Fire, spill response
- Compatibility
- Storage precautions



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**HOW DO I GET AN SDS?**

- You must get a SDS for every chemical in your lab and keep it on file for 30+ years
- Manufacturer's web site
- Lab worker or PI

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## CHEMICAL INVENTORY

- Use Provided EHS Template
- Use NFPA Hazard Information
- Lab worker
  - Give to CHO by July 1 of each year or before they leave for summer
  - CHO sends electronically to EHS by July 15<sup>th</sup> of each year
  - ehs\_chemicals@mail.wvu.edu



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## OSHA Lab Standard

29 CFR 1910.1450

Lab Workers have the Right to Know

- Hazard identification
- Information and training
- Personal protective equipment (PPE)
- Chemical hygiene plan



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## CHEMICAL HYGIENE PLAN

- What is it?  
Procedure for the OSHA Lab Std.
- Copy should be available in lab
- Why is it important to you?  
Contains information on your safety



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**CHEMICAL HYGIENE PLAN  
LAB-SPECIFIC PROCEDURES**

- Required content
  - Hazard controls
  - Personal protective equipment
  - Health & safety information
  - Decontamination, waste disposal

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**CHEMICAL HYGIENE PLAN  
LAB-SPECIFIC PROCEDURES**

- Lab workers write them: specific to experiments
- Give to Chemical Hygiene Officer for review
- Must be available in the lab
- Revise if chemicals or procedures change
- Review with students and lab workers

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**SAFE WORK PRACTICES**

1. Engineering controls
  - Fume hoods, exhaust
2. Administrative controls \*\*
3. Personal protective equipment
  - Gloves, lab coat, respirator
4. Response equipment
  - Eye wash, safety shower, spill kit, first aid kit

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**SAFE WORK PRACTICES**

What is the #1 **CAUSE** of Laboratory Safety issues?  
**Too Little Space and Too Much Clutter!**

**HOARDING:  
BURIED ALIVE**

TLC

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**SAFE WORK PRACTICES**

Phone/communication device

Eyewash

Shower

Spill Control Equipment

Fire Extinguisher

First Aid Kit (Recommended)

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### EQUIPMENT TESTING

All Safety Showers and Eyewash Stations are tested for flow and operation annually by EHS.

Lab Workers are responsible for "Bump" Testing eyewash stations on a regular basis (weekly recommended)

This removes stagnant water and debris



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### CHEMICAL FUME HOODS PROTECT YOU



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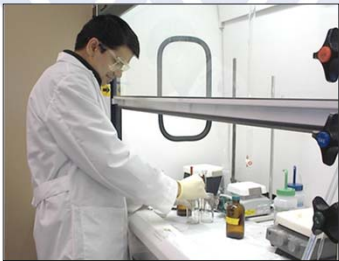
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### CHEMICAL FUME HOOD USE

- Set sash at correct height
- Wear PPE
- Work towards middle of hood
- Keep hood uncluttered



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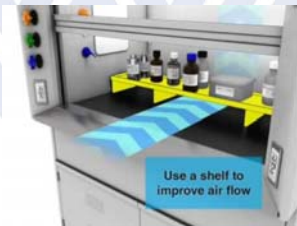
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### CHEMICAL FUME HOOD USE

- Don't block air flow
- Large equipment should be on blocks or racks to allow air flow



Use a shelf to improve air flow

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- Excess storage and clutter reduces air flow - increases the risk of exposure and accidents



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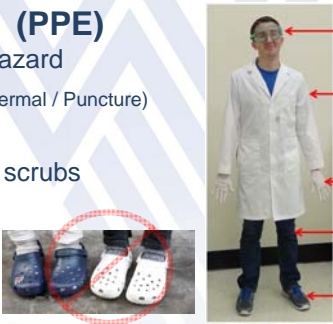
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### PERSONAL PROTECTIVE EQUIPMENT (PPE)

Appropriate for the hazard

- Gloves (Chemical / Thermal / Puncture)
- Eye Protection
- Lab coats, aprons, scrubs
- Long Pants
- Closed Shoes



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## GLOVES

- Appropriate for specific chemicals
- Check for leaks
- Double glove if necessary
- Be alert to unusual sensations in hands
- Don't touch your face, phone
- Remove gloves before leaving lab



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## EYE PROTECTION

Required in any area where there is a potential for eye injury

- Must be ANSI approved (Z87+ stamped)
- If prescription glasses are not ANSI approved, wear safety glasses, safety goggles, or a full face shield over them
- See your CHP for Specific PPE Requirements



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## GAS CYLINDERS MUST BE SECURED



**⚠ DANGER**

**Keep All Cylinders Chained.**





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**SEPARATE INCOMPATIBLES**

- Do not store acids with bases
- Do not store nitric acid with other acids
- Do not store flammable solvents with oxidizers

WVU logo and 'WEST VIRGINIA UNIVERSITY ENVIRONMENTAL HEALTH & SAFETY' at the bottom.

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**SEPARATE INCOMPATIBLES**

- Do not store cyanides with acids
- Store Water reactives alone
- Store Flammables with very low flashpoints in an explosion proof refrigerator

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### TIME SENSITIVE MATERIALS

- Peroxide Forming Chemicals:
- Ethers, Tetrahydrofuran, Dioxanes, etc.
- Mark on Bottle: Date Received, Date Opened,  
6-month Test Result
- Submit as Waste <1 year from receive date
- Assessments:

**CAUTION**  
TIME SENSITIVE  
MATERIAL



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- All Flammables  
MUST be Stored in  
Flammable  
cabinet(s)
- WV State Fire  
Marshal



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### NO FOOD/DRINK IN LAB

- No Water Bottles
- No Soda / Coffee / Coke
- No Food / Lunch / Meals
- No Candy / Energy Bars / Mints
- Never eat or drink ANYTHING in Labs
- Do Not Take Above Items Into Lab



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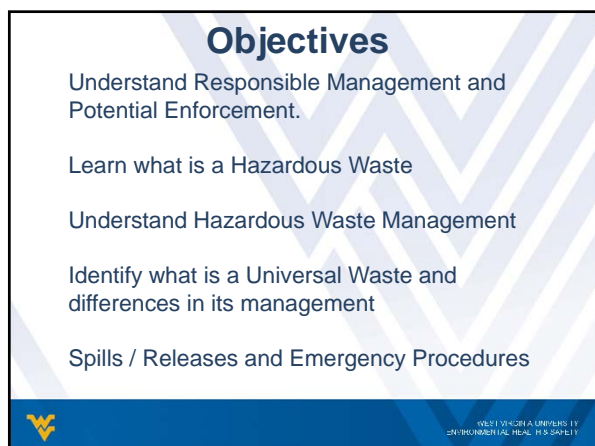
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## RCRA ENFORCEMENT OPTIONS



- Administrative
- Civil
- Criminal



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## ENFORCEMENT


### Administrative Order

- Violations of any RCRA requirement for any past or current violation
- Up to \$37,500 per day per violation



### Civil Action

- Violations of any RCRA requirement for any past or current violation
- Up to \$37,500 per day per violation



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## CRIMINAL ACTIONS

There are **seven acts** identified in the law which carry **criminal penalties**, ranging from a fine of \$50,000 per day or a prison sentence of up to five years to a total fine of \$1,000,000



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### CRIMINAL VIOLATIONS

- Transport to a non permitted facility
- TSD without a permit
- Falsifying manifest, labels, documents
- Conceal or destroy documents
- Transport w/o a manifest
- Export w/o consent of receiving country
- Placing persons in imminent danger of death or serious bodily injury



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### WHAT IS A WASTE?

- At WVU, you are not at home.
  - Household Waste is Excluded from RCRA
- It is a "Waste" if discarded
  - It does not have to be in the trash or dumpster ...



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### WHAT IS A WASTE?

- EPA Definitions:
  - Discarded: Any material that is abandoned, recycled, or inherently waste-like
  - Abandoned: Accumulated or stored instead of being disposed



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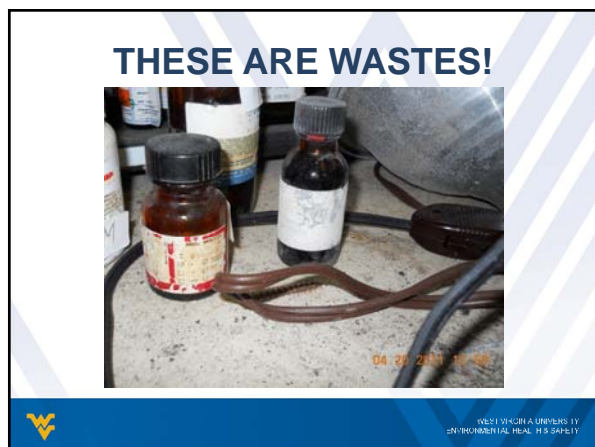
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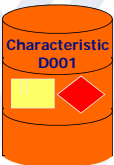
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## HAZARDOUS WASTE

- Characteristic waste
- Listed waste
- Hazardous waste mixtures


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## CHARACTERISTIC WASTE



Ignitable



Reactive



Corrosive



Toxic


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## CHARACTERISTIC HAZARDOUS WASTE

### Ignitable D001

- Liquid with FP < 140° F
- Non-liquid, at standard temperature & pressure: can cause fire through friction, absorption of moisture or spontaneous chemical changes and when ignited burns so vigorously and persistently it creates a hazard
- Flammable gases, oxidizers


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### CHARACTERISTIC HAZARDOUS WASTE

#### Corrosive D002

- $\text{pH} \leq 2$
- $\text{pH} \geq 12.5$
- A liquid that can corrode steel at a rate  $> 0.25''$  per year


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### CHARACTERISTIC HAZARDOUS WASTE

#### Reactive D003

- Unstable and reacts violently without detonating
- Reacts violently with water
- Forms explosive mixtures with water
- Generates toxic gases, vapors, or fumes when mixed with water
- Explosive or detonates if heated under confinement




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### Characteristic Hazardous Wastes

#### Toxicity Characteristic



EPA HW Number	Contaminant	Regulatory Level (mg/l)	EPA HW Number	Contaminant	Regulatory Level (mg/l)
D004	Arsenic	5.0	D032	Hexachlorobenzene	0.13
D005	Barium	100.0	D033	Hexachlorobutadiene	0.5
D018	Benzene	0.5	D034	Hexachloroethane	3.0
D006	Cadmium	1.0	D008	Lead	5.0
D019	Carbon Tetrachloride	0.5	D013	Lindane	0.4
D020	Chlordane	0.03	D009	Mercury	0.2
D021	Chlorobenzene	100.0	D014	Methoxychlor	10.0
D022	Chloroform	6.0	D035	Methyl Ethyl Ketone	200.0
D007	Chromium	5.0	D036	Nitrobenzene	2.0
D023	o-Cresol	200.0	D037	Pentachlorophenol	100.0
D024	m-Cresol	200.0	D038	Pyridine	5.0
D025	p-Cresol	200.0	D010	Selenium	1.0
D026	Cresol	200.0	D011	Silver	5.0
D016	2,4-D	10.0	D039	Tetrachlorethylene	0.7
D027	1,4-Dichlorobenzene	7.5	D015	Toxaphene	0.5
D028	1,2-Dichloroethane	0.5	D040	Trichloroethylene	0.5
D029	1,1-Dichloroethylene	0.7	D041	2,4,5-Trichlorophenol	400.0
D030	2,4-Dinitrotolene	0.13	D042	2,4,6-Trichlorophenol	2.0
D012	Endrin	0.02	D017	2,4,5-TP (Silvex)	1.0
D031	Heptachlor (& its hydroxide)	0.008	D043	Vinyl Chloride	0.2


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- Non-specific source waste (F-list)
- Commercial chemical products (P & U lists)



Ethanol and Isopropyl is not Listed



## U-Toxic

Index	Chemical abstract no.	Substance	Haz- ardous No.	Chemical ab- stract No.	Substance
P002	107-00-0	Acetophenone	U034	30558-43-1	AD213
P003	181-09-2	Acetophenone, <i>N</i> -methylacetophenyl-	U001	75-27-0	Acetophenone
P004	640-10-2	Acetophenone, <i>N</i> -butyl-	U034	75-27-0	Acetophenone
P005	62-16-4	Acetic acid, <i>n</i> -butyl-, sodium salt	U001	75-27-0	Acetophenone
P006	100-06-6	Acetic acid, <i>n</i> -butyl-, sodium salt	U001	75-27-0	Acetophenone
P007	116-06-0	Adipic acid	U187	62-44-2	Acetophenone, trichloro-
P008	100-06-6	Adipic acid	U001	53-36-3	Acetophenone, trichloro-
P009	330-10-2	Adipic acid	U001	194-75-7	Acetophenone, trichloro-
P010	330-10-2	Adipic acid	U001	141-78-6	Acetic acid, <i>n</i> -butyl ester (s)
P011	330-10-2	Adipic acid	U001	301-42-4	Acetic acid, <i>n</i> -butyl ester (s)
P012	20619-74-9	Aluminum phosphide (s)	U142	562-46-8	Acetic acid, <i>n</i> -butyl ester (s)
P013	7782-84-7	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P014	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P015	131-74-4	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P016	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P017	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P018	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P019	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P020	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P021	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P022	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P023	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P024	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P025	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P026	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P027	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P028	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P029	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P030	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P031	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P032	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P033	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P034	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P035	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P036	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P037	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P038	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P039	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P040	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P041	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P042	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P043	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P044	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P045	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P046	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P047	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P048	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P049	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P050	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P051	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P052	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P053	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P054	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P055	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P056	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P057	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P058	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P059	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P060	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P061	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P062	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P063	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P064	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P065	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P066	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P067	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P068	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P069	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P070	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P071	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P072	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P073	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P074	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P075	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P076	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P077	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P078	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P079	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P080	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P081	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P082	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P083	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P084	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P085	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P086	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P087	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P088	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P089	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P090	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P091	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P092	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P093	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P094	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P095	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P096	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P097	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P098	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P099	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P100	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P101	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P102	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P103	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P104	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P105	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P106	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P107	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P108	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P109	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P110	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P111	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P112	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P113	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P114	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P115	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P116	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P117	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P118	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P119	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P120	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P121	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P122	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P123	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P124	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P125	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P126	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P127	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P128	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P129	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P130	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P131	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P132	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P133	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P134	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P135	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P136	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P137	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P138	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
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P145	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P146	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P147	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P148	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
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P151	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P152	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P153	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P154	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P155	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P156	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P157	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P158	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P159	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P160	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P161	100-06-6	Aluminum phosphide (s)	U142	99-79-5	Acetic acid, <i>n</i> -butyl ester (s)
P162	100-06-6	Aluminum phosphide (			



### **P LIST – CHEMICAL AND CONTAINER ARE HAZARDOUS WASTES**

- Do Not Rinse empty container
- Do Not put in Trash
- Do Not put in Broken Glass Boxes
- Submit a Hazardous Waste Disposal Form for all P-Listed Wastes and Containers



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### **COMMERCIAL CHEMICAL PRODUCTS (P AND U LISTS)**

- Commercially pure
- Technically pure
- Sole active ingredient in a formulation



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### **HAZARDOUS WASTE AREAS**



**Satellite Accumulation Areas**

**90 Day Areas**



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## SATELLITE ACCUMULATION

- Containers must be
  - **At or near** the point of generation where the waste is initially accumulated.  
(In the lab where it is generated)
  - **Under the control** of the operator of the process generating the waste



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## SATELLITE ACCUMULATION POINT

- Maximum amount allowed
- 1 quart (~1 **Liter**) of P-waste  
OR
- 55 Gallon (~220 Liters) of  
Non-Acutely Toxic Waste



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## SATELLITE ACCUMULATION POINT

Containers **MUST** be

- In good condition
  - Has a cap with good seal
  - No cuts, rust, or damage
- Compatible with the waste
  - Ex. No Acids in Metal Containers



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### SATELLITE ACCUMULATION POINT

Containers **MUST** be

- Kept closed
  - Must be sealed unless actively adding to container
  - Must be original screw caps
  - NO Foil, Parafilm, or Plastic Wrap
- Marked **"WASTE"** AND identify all **contents** (Acetone, Hexane)



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### WVU HAZARDOUS WASTE LABEL

This information is to be on every container of hazardous waste

**HAZARDOUS WASTE**

Contains:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date when full: \_\_\_\_/\_\_\_\_/\_\_\_\_

For Disposal: [ehs.wvu.edu](http://ehs.wvu.edu)



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### SATELLITE ACCUMULATION POINT REQUIREMENTS

- Date must be marked on container when full
- More than 1 quart (~1 liter) of P-waste must be removed by EHS within **3 calendar days**

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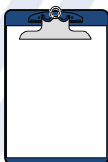
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## INSPECTIONS - FOR SATELLITE AREAS

**Lab Workers: Complete Weekly Inspections of Satellite Areas**

- ☐ Satellite Inspection Form
- ☐ Available @ [ehs.wvu.edu](http://ehs.wvu.edu)
- ☐ Submit to CHO
- ☐ CHO correct deficiencies
- ☐ Contact EHS for assistance
- ☐ Assure Lab is in compliance





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## INSPECTIONS - FOR SATELLITE AREAS

West Virginia University Environmental Health and Safety  
Weekly Satellite Container Checklist

Building: \_\_\_\_\_ Room number: \_\_\_\_\_  
Date: \_\_\_\_\_ Inspector's full name: \_\_\_\_\_

Ins/No	Regulation	Regulatory Citation
<b>Satellite Accumulation Area</b>		
	Is each waste accumulated at or near the point of generation?	262.34(c)(1)
	Is each waste container under the control of the generator?	262.34(c)(1)
	Is each waste container marked with the words "Waste" (chemical name) to clearly identify the contents as waste and what chemicals are in it?	262.34(c)(1)
	Does the area have less than 55 gallons of waste present?	262.34(c)(1)
	Does the area have less than 1 liter (qt) of acutely hazardous waste present?	262.34(c)(1)
	Are waste containers in good condition? (no deterioration or deformation)	262.171
	Are waste containers free of leaks?	262.171
	Are the wastes compatible with the containers?	262.172
	Are containers closed except when actively adding or removing waste?	262.173(a)
	Has an EHS Waste Form been submitted for the container?	
	Forms available at <a href="http://ehs.wvu.edu">ehs.wvu.edu</a>	
	Do all containers have a date marked on them?	262.34(c)(1)
	If the answer is no to any of these questions, call EHS at 304-293-3792.	

Please submit completed form to your Chemical hygiene Officer (CHO).



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**No Label.  
Not Closed.  
Unknown Contents**



**OK?**

**Not Labeled Hazardous Waste.  
Not Closed. (no seal)**





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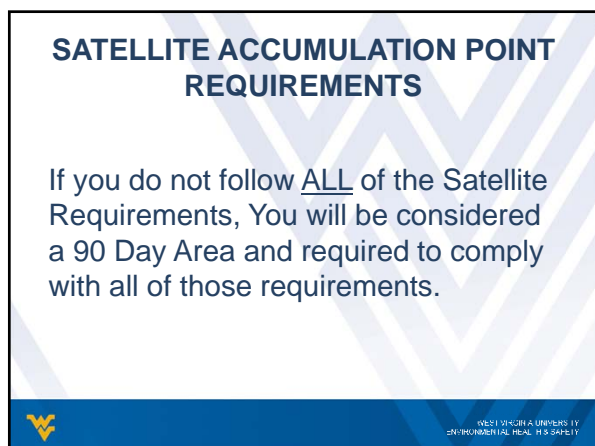
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## 90 DAY AREA

- **Unlimited Volume of Waste**
- **Up to 90 days to ship offsite**


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### Satellite

- Containers in good condition
- Compatible w/waste
- Container closed
- Mark "Waste" and list the chemical contents
- No date until full
- 1qt (1L) P-waste MAX



### 90 Day Area

- Containers in good condition
- Compatible w/waste
- Container closed
- Mark "Hazardous Waste" and contents
- Date first drop
- 90 day time limit
- Plus...


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## 90 DAY AREAS

### Regulatory Requirements

- Handle in a manner to avoid ruptures or spills
- Written Weekly Inspection
- Ignitable or reactive wastes must be 50 ft. from property boundary
- Separate incompatible wastes and materials



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### 90 DAY AREA REQUIREMENTS

- The words “Hazardous Waste” must be visible on all containers
- Adequate aisle space
  - Inspection
  - Emergency access



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### 90 DAY AREAS

Regulatory Requirements

- Date each container, if not already dated
- Emergency equipment
- Contingency plan
- Train personnel potentially exposed to or who handle hazardous waste



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### 90 DAY AREAS MUST BE EQUIPPED WITH

- Devices for communications
- Fire control equipment
- Spill control equipment



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## INSPECTIONS- FOR 90 DAY AREAS

WVU Environmental Health & Safety  
Weekly RCRA Waste Container Checklists

**CHOs or Designee:**  
Complete Weekly  
Inspections of 90  
Day Areas

**EHS Designee or  
Area Manager:**  
Complete 90 Day  
High Hazard areas  
on a weekly basis

Building	Room	Room number	Inspector's Full Name	Regulatory Division
<b>90-Day Container Storage Areas</b>				
<b>Container Requirements - Part 261</b>				
a. Each container marked with the appropriate label				
b. Each container marked with the words "Corrosive Waste"				
<b>Container Requirements - Part 261 Subpart F</b>				
a. All containers in good condition and no leakage				
b. Are the contents compatible with the container?				
c. Are containers closed except when adding or removing material?				
d. Are containers stored in a way that could cause them to spill?				
e. Are vents, if present, functional?				
f. Are liquids and reaction vessels stored 50 ft from the property line?				
<b>Preparation and Protection - Part 261 Subpart G</b>				
1. Is the area maintained in a manner to prevent fire, explosion & spill?				
2. Are containers for disposal with labels clearly marked and legible?				
3. Internal communication to signal emergency by facility personnel?				
4. Communication device to detect emergency response personnel?				
5. Fire extinguishers?				
6. Are appropriate adequate water supply or foam producing equipment?				
7. Is emergency equipment tested and maintained as required?				
8. Is there immediate access to communication equipment when handling hazardous waste?				
9. Are there adequate exits open for movement of emergency equipment?				

Comments:

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## OK?



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## HOW TO HAVE WASTE REMOVED

- ehs.wvu.edu – Click Here -> 
- VERY IMPORTANT!! – SAVE FIRST!**
- Fill out form on your computer.
- Save again and attach to an email to [ehs\\_chemicals@mail.wvu.edu](mailto:ehs_chemicals@mail.wvu.edu)

Form: [ehs.wvu.edu/r/download/196702](http://ehs.wvu.edu/r/download/196702)

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## UNIVERSAL WASTE

- Batteries
- Pesticides
- Lamps
- Mercury Containing Equipment (Sealed)








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## UNIVERSAL WASTE REQUIREMENTS

- Label containers
  - Used Battery
  - Used Lamps
  - Used Mercury-Containing Equipment
  - Universal Waste - Pesticide
- Pesticides
  - Also, original label required



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## HANDLER REQUIREMENTS

1. Keep containers **CLOSED**, good condition
2. Store to **minimize releases** to environment
3. Place **Label** or **Mark** appropriately
4. Place **Date** on the Closed, Labeled Container

-Universal Waste can be kept onsite for 1 year max.  
-Releases are Hazardous Waste; manage accordingly



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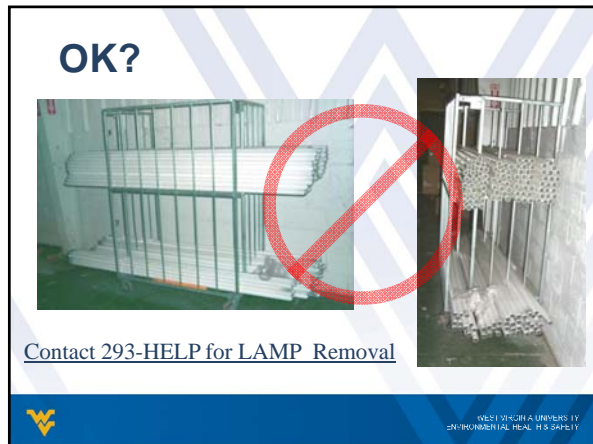
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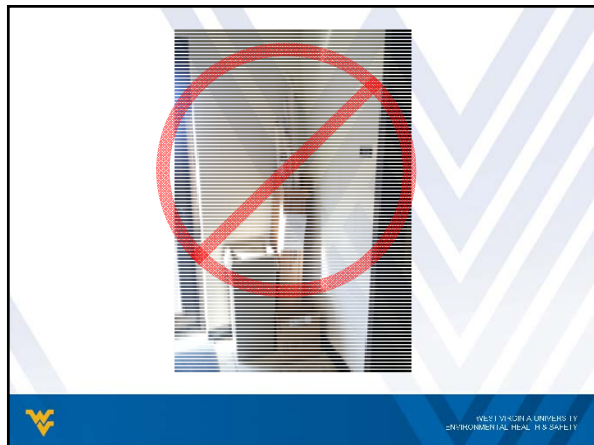
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**UNIVERSAL WASTE  
EMERGENCY PROCEDURES**

- Clean-up released universal waste immediately
- Place waste and debris into structurally sound sealable container
- **Mark container "Hazardous Waste" with the date**
- Submit a hazardous waste form at [ehs.wvu.edu](http://ehs.wvu.edu)
- If it is a large spill follow Hazardous Waste Emergency Procedures – Contact EHS

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### HAZARDOUS WASTE EMERGENCY PROCEDURES CONTINGENCY PLAN



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### MAJOR SPILLS / FIRES

- Dial 9-911 from campus phones or 911 from other phones
- Contact your Emergency Coordinator
- Notify your CHO

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### REPORT TO YOUR EMERGENCY COORDINATOR

- Your location (Building & Room #)
- Injuries, if any
- What happened: spill, fire, explosion, release
- What wastes or materials are involved
- Estimated amount
- Potential off-site contamination
- Name of your CHO



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## WHAT SHOULD I DO NOW?

- Lab Workers: Segregate chemicals, check spill kit, first aid kit and eyewash, on weekly basis. Submit waste slips for hazardous waste/old chemicals
- PI/Supervisor: Keep CHP up to date, compile chemical inventories
- CHO: Review chemical inventories, complete weekly inspections (90 day)-forward to EHS, Check NFPA 704 Door Postings, Inspect and Initial Eyewash inspections; submit any issues or concerns to EHS



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## WVU EHS CONTACTS

- <http://ehs.wvu.edu>
- [EHS\\_Chemicals@mail.wvu.edu](mailto:EHS_Chemicals@mail.wvu.edu)
- Joyce Addison, Manager, Hazardous Materials
- Paul Porter, Hazardous Materials Specialist
- Jennifer Scheuch, Hazardous Materials Specialist
- William "Bill" Graham, Hazardous Materials Tech



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## QUESTIONS AND DISCUSSION

Before Leaving Please Make Sure  
You Have Signed The Sign-in Sheet.



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