



## Objective

- Basic Hazmat Chemistry overview
- Recognition of Hazards and Potentials
- Proper Identification and Segregation
- Avoidance of Incompatible Situations
- Recognition clues to waste identification
- Simple chemical testings

### Periodic Table

IUPAC Periodic Table of the Elements

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

### The Periodic Table

metals  
non-metals  
noble gases

### Chemical Symbols

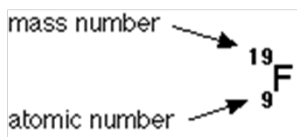
Oxygen	O
Hydrogen	H
Carbon	C
Sodium	Na
Chlorine	Cl

### Atom Nucleus

	relative mass	relative charge
proton	1	+1
neutron	1	0
electron	1/1836	-1

## Atomic Number

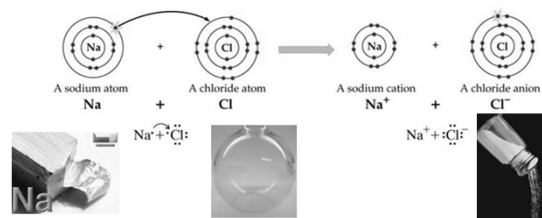
- Atomic number = number of protons
- Atomic mass = protons + neutrons



- Protons = 9
- Neutrons = 19 - 9 = 10

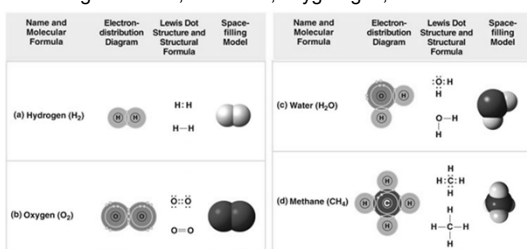
## Chemical Bonding - Ionic Bonds

- Formed by taking of electrons
- creating anions (-) and cations (+)

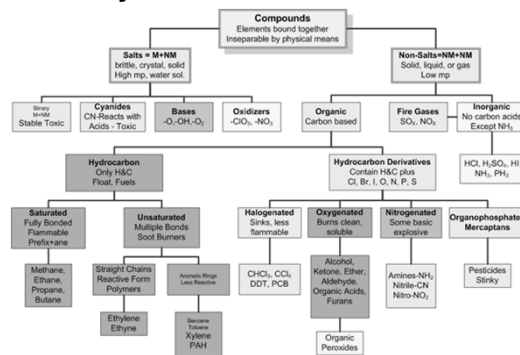


## Chemical Bonding - Covalent Bonds

- Formed by sharing of electrons
- E.g. methane, ammonia, oxygen gas, water

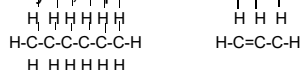


## Major Chemical Families



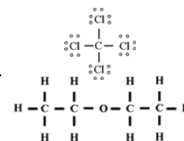
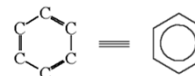
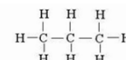
## Naming Organic Chemicals

- Name tells you the structure
- Prefix
  - Meth-, eth-, prop-, but-, pent-, hex-, hept-, oct-
- Suffix
  - -ane, single bond, saturated
  - -ene, double bonds
  - -yne, triple bonds



## Hydrocarbons

- Aliphatics
  - methane, propane, hexane
- Aromatics
  - benzene, xylene, toluene
- Halogenated Hydrocarbons
  - CFC's, PCB's
- Oxygenated Hydrocarbons
  - alcohols, aldehydes, ketones, ethers






Ethyl Ether  
C<sub>2</sub>H<sub>5</sub>OC<sub>2</sub>H<sub>5</sub>

## Slide 8

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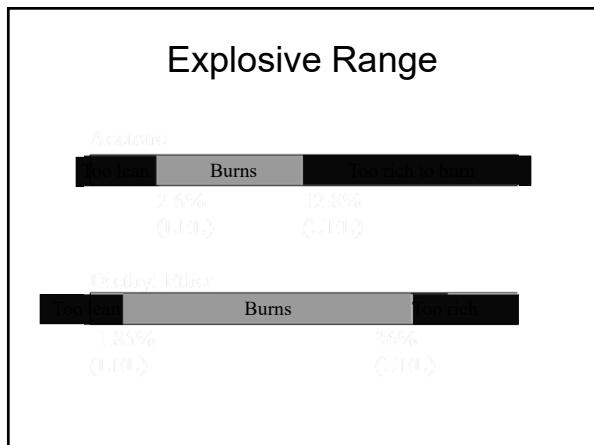
**LS1**      Removed second periodic table after  
Sweetser, 3/29/2009

### Functional Groups

Functional Groups	Class of Molecules	Formula	Example
Hydroxyl OH	Alcohols	R-OH	 Ethanol
Carbonyl CHO	Aldehydes		 Ethanal
CO	Ketones	 R-C-R	 Acetone CH <sub>3</sub> -O-CH <sub>3</sub>
ROR	Ether	R-O-R	Dimethyl ether

### Flash Point

- Is the minimum temperature at which a substance gives off vapor sufficient to form an ignitable mixture with air
- Lower the flash point, higher the flammability


### Waste Identification

- Determining the classification of a hazardous waste to allow for safe storage and packaging.
- Required Waste Analysis Plan, Title 22
  - §66262.11 Hazardous Waste Determination.
  - §67450.25(A) (2) (A) PHHWCF Requirements

### Waste Identification Steps










- Symbols
- Read product label
  - Signal words
- View container type
- Ask customer
- Testing

### Sample container label




Chemical manufacturer, importer,  
or other responsible party.

### GHS pictograms


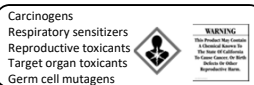



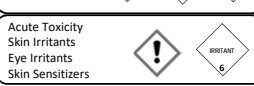



<p><b>Flame Over Circle</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Flame</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Exploding Bomb</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Skull and Crossbones</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Corrosion</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>
<p><b>Gas Cylinder</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Health Hazard</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Environment</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	<p><b>Exclamation Mark</b></p>  <p>EPS JPG PNG Dimensions: 1017(n) x 1017(n) Resolution: 300 dpi</p>	

### DOT Hazard Classes

- Explosives Class 1
- Gases, Class 2
- Flammable, Class 3
- Flammable, Class 4
- Oxidizers, Class 5
- Poisonous, Class 6
- Radioactive, Class 7
- Corrosives, Class 8
- Other, Class 9






### Symbols – GHS vs DOT

<p>Explosives Self-reactive Organic peroxides</p> 	<p>Carcinogens Respiratory sensitizers Reproductive toxicants Target organ toxicants Germ cell mutagens</p> 
<p>Flammables Self-reactives Pyrophorics Self-heating Emits flammable gas in contact with water Organic peroxide</p> 	<p>Acute Toxicity</p> 
<p>Oxidizer</p> 	<p>Acute Toxicity Skin Irritants Eye Irritants Skin Sensitizers</p> 
<p>Contents under pressure</p> 	<p>Eye corrosion Skin corrosion Corrosive to metal</p> 
	<p>Aquatic Toxicity Environmental hazard</p> 


### Hazardous Waste Classes

- Corrosive
- Toxic
- Flammable
  - Oxidizers
- Reactives
- Other


### Common Hazardous Wastes

<p>■ Flammable</p> <ul style="list-style-type: none"> <li>– Propane</li> <li>– Gasoline</li> <li>– Solvents</li> </ul> 	<p>■ Poison/Toxic</p> <ul style="list-style-type: none"> <li>– Pesticide</li> <li>– Weed killer</li> <li>– Metals</li> </ul> 
<p>■ Corrosive</p> <ul style="list-style-type: none"> <li>– Car batteries (acid)</li> <li>– Muriatic acid</li> <li>– Alkaline batteries</li> <li>– Drain cleaner</li> </ul> 	<p>■ Reactive</p> <ul style="list-style-type: none"> <li>– Ammunition</li> <li>– Flares</li> <li>– Hydrogen Cyanide</li> </ul> 

### HW - Corrosive



- (1) liquid with a pH less than or equal to 2 or greater than or equal to 12.5
- (2) it is a liquid and corrodes steel
- (3) solid that, when mixed with an equivalent weight of water, produces a solution having a pH less than or equal to 2 or greater than or equal to 12.5
- (4) solid, when mixed with an equivalent weight of water, produces a liquid that corrodes steel



CCR, Title 22 § 66261.22

## Identifying Acids



- Have pH less than 7
  - Hazardous waste is  $\leq 2$
  - Practical  $< 4$
- Turns pH paper red
- Taste tart
- React with metal to form hydrogen gas
- Often have "acid" in the name
- Often have a chemical formula that begins with "H"



## Acid Containers Caps

- Nitric Acid-----Red
- Acetic Acid-----Brown
- Hydrochloric Acid-----Blue
- Phosphoric Acid-----White
- Sulfuric Acid-----Yellow

## Acids

- |   |                          |
|---|--------------------------|
| ■ Car batteries                             | ■ Hydrochloric Acid      |
| ■ Muriatic acid                             | ■ Hydrofluoric Acid      |
| ■ Hydrochloric acid                         | ■ Metal Cleaners         |
| ■ Flux                                      | ■ Muriatic Acid          |
| ■ Metal cleaner                             | ■ Navel Jelly            |
| ■ Rust removers                             | ■ Phosphoric Acid        |
| ■ Boric Acid                                | ■ Pool Acid              |
| ■ Car Battery Acid                          | ■ Sheep Dip              |
| ■ Copper Cleaners                           | ■ Sodium Bisulfate       |
| ■ Etching Solutions                         | ■ Sulfuric Acid          |
| ■ Ferric Chloride                           | ■ Toilet Bowl Cleaners * |
| ■ Drain cleaners can be either acid or base |                          |

\* Check Ingredients for proper classification

## Identifying Bases



- Have a pH greater than 7
  - Hazardous waste is  $\geq 12.5$
  - Practical  $> 10$
- Turn pH paper blue
- Taste bitter
- Have a slippery, soapy feel
- May have "hydroxide", or "alkali", or "caustic" in the name
- Often has "OH" in the chemical formula





### Base/Alkaline/Caustic



■ Alkaline batteries	■ Caustic Soda
■ Bleach	■ Cesspool Cleaners *
■ Sodium hydroxide (Lye)	■ Household cleaners *
■ Drain cleaners can be either acid or base *	■ Lime
■ Ammonia and Ammonia Based Cleaners	■ Oven Cleaners *
■ Battery Terminal Cleaner	■ Window Cleaners

\* Check Ingredients for proper classification

### Neutral

■ Examples

- Flammable
  - Gasoline
  - Solvents
  - Pesticides
- Poison
  - Pesticides
  - Oil
- Non flammable
  - Latex paint



### HW - Flammable/Ignitability

(1) it is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, and has a flash point less than 60 °C (140 °F),

(2) solid capable of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard;

(3) it is an ignitable compressed gas

(4) it is an oxidizer


CCR, Title 22 §66261.21

### Neutral/Flammable


■ Acetone	■ Glues *	■ Power Steering Fluid
■ Adhesives *	■ Grease	■ Roofing Cement
■ Aerosol	■ Household Waxes	■ Roofing tar
■ Alcohols	■ Isopropyl Alcohol	■ Sealers
■ Artificial Snow	■ Kerosene	■ Silicone Sprays
■ Automotive Oils	■ Lacquer Thinner	■ Spot Remover/Dry Cleaning Fluids
■ Automotive Waxes	■ Lacquer Paint (unsolidified)	■ Thinner
■ Bar-B-Que Lighter Fluid	■ Linseed Oil	■ Tire Black
■ Benzene	■ Liquid Waxes *	■ Toluene
■ Brake Fluid	■ Liquid Butane	■ Turpentine
■ Diesel Fuel	■ Methanol	■ Windshield Wiper Fluid
■ Enamel/Oil Base Paint	■ Paint Thinners	■ White Gas
■ Ether	■ Paint Strippers *	■ Wood Filler/Putty
■ Ethylene Glycol	■ Petroleum Distillates	■ Wood Stain
■ Fingernail Polish and Remover	■ Wood Stain	■ Xylene
■ Floor/Furniture Polish *	■ Xylene	
■ Gasoline		

\* Check Ingredients for proper classification

### HW - Toxic



- Acute Oral Toxicity Criterion - LD50 <5,000 mg/kg body weight
- Acute Dermal Toxicity - - LD50 <4,300 mg/kg body weight
- Acute Inhalation Toxicity - - LD50 <10,000 g/kg in air
- Acute Fish Toxicity - 96 hour <500 mg/l of water
- Carcinogenicity - > 10 ppm
- Specific Compounds greater than limit



CCR, Title 22 § 66261.24

## Neutral/Flammable - Poisons

- Ant and Roach Killer
- Anti-Freeze
- Arsenic Compounds
- Automotive Cleaners
- Bacterial Pipe Cleaners
- Bordeaux Mix
- Boric Acid
- Bug Remover
- Chlordane
- Chrome-Silver Polishes \*
- Chromium
- Copper Sulfate
- DDT
- Diazinon
- Dimethylamine Salts
- Disinfectants \*
- Dog Repellent
- Ethylene Glycol
- Fertilizers
- Flea Spray/Powder
- Fungicides \*
- Gopher Killer
- Insect Sprays
- Lead Compounds
- Lice Powder
- Lindane
- Malathion
- Mercury
- Methylene Chloride
- Mole Killer
- Moth Crystals
- Pentachlorophenol
- Pesticides
- Pharmaceuticals
- Plant Food
- Pruning Paint
- Pyrethrins
- Rat Poison
- Rose Dust
- Sheep Dip
- Snail/Slug Killer
- Strychnine
- Tar Remover
- Weed and Grass Killer
- Windshield Wiper Fluid\*

\* Check Ingredients for proper classification

## Oxidizers

- Compounds which are capable of reacting with and oxidizing (giving off oxygen) other materials
- Usually contain O<sub>2</sub>
- May cause or enhance the combustion of other materials
- Copper Wire test



## Oxidizer

- All pH ranges
- Bases/ Alkaline
  - Bleach
  - Pool chlorine
- Neutral
  - Hydrogen peroxide
- Acid
  - Nitric, concentrated
  - Sulfuric, concentrated



## Common Signal Words for Oxidizers

### Oxidizer Identification

Store away from other materials

Oxidizer Key Word	Examples
Prefix or Suffix	
-ate	Ammonium nitrate
	Potassium permanganate
-ite	Calcium hypochlorite
-peroxide	Methyl ethyl ketone
-peroxy	peroxide

## HW - Reactive



- (1) it is normally unstable and readily undergoes violent change without detonating;
- (2) it reacts violently with water;
- (3) it forms potentially explosive mixtures with water;
- (4) when mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
- (5) it is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment;
- (6) it is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement;
- (7) it is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure;
- (8) it is a forbidden explosive, Class A explosive, or Class B explosive



CCR, Title 22 § 66261.23



## Other Chemical Characteristics

### Pyrophoric

- Materials that ignite spontaneously in air

### Water Reactive

- Materials that react violently with water

### Explosives

### Radioactive



## Explosive HHW Examples



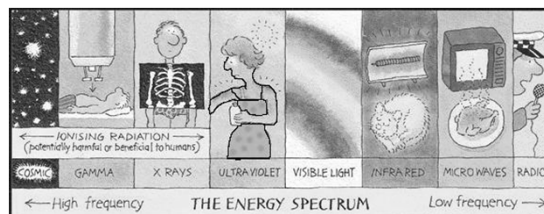
## “Empty” means:



- Container must be 5 gallons or less in size
- No hazardous material can be poured or drained ... when the container or inner liner is held in any orientation (e.g., tilted, inverted, etc.)
- No hazardous material remains in or on the container that can feasibly be removed by physical methods (A thin uniform layer or dried material or powder is considered acceptable)
- Emptied household hazardous material and pesticide container, of five gallon or less in capacity  
(Not including used oil filters and PCB containers)
- A compressed gas cylinder is exempt from regulation ... when the pressure in the container approaches atmospheric pressure.
- Aerosol containers are exempt from regulation ... if the aerosol container was emptied of the contents and propellant to the maximum extent practical under normal use

CCR Title 22, §66261.7. Contaminated Containers.

## Radiation is Energy

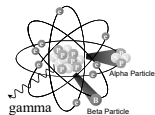


- The energy is given off by unstable (radioactive) atoms and some machines.

## Radioactives



- Natural and manmade sources
- Some smoke alarms, mantles, medicine
- Photo = Fiesta ware plate, radioactive rocks, heliarc welding rods, and KCl salt substitute
- Decommissioned wastes
- SWRCB Landfill Study - Tritium



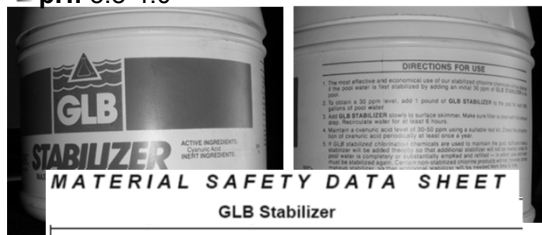
## Pool Chemicals



- Caution – Can be many hazard classes
- Many incompatibles
- Types
  - Disinfecting agent (Many are Oxidizers)
    - Chlorine, calcium hypochlorite, sodium hypochlorite
  - Stabilizing agents
    - Cyanuric acid
  - pH Adjustment
    - Acids - muriatic acid or sodium bisulfate
    - Bases - sodium carbonate (soda ash) or sodium bicarbonate

### Not All Pools Chems are Equal

- Active ingredient = 99% cyanuric acid
- pH: 3.8-4.0

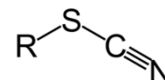
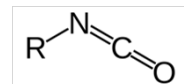
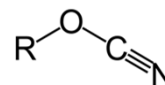


**Handling And Storage Precautions**

Keep out of reach of children. Do not store with acids. I

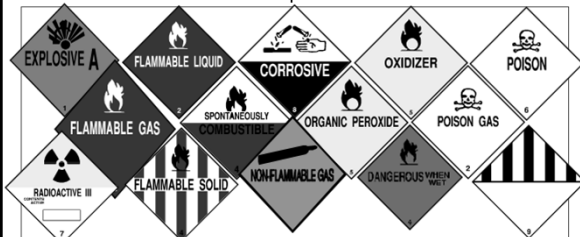
### Cyanide – Like Groups

- Nitrile (Cyanide)
- Cyanate
- Isocyanate
- Thiocyanate



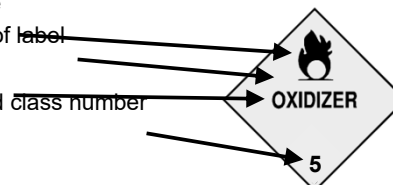
### DOT Label

- The various Department of Transportation (DOT) Labels for hazardous materials shipments look like this:



### DOT Label

- Each label has four means of determining the hazard classification
  - Picture
  - Color of label
  - Name
  - Hazard class number



### NFPA Hazard Rating - Fire Diamond



### Hazardous Materials Information System (HMIS)

Product Name	
<input type="radio"/>	HEALTH
<input type="radio"/>	FLAMMABILITY
<input type="radio"/>	REACTIVITY
<input type="radio"/>	PROTECTIVE EQUIPMENT
Chronic Health Hazards	

**Hazard Index**

- 0 = Minimal Hazard
- HEALTH = Slight
- 2 = Moderate
- 3 = Serious
- 4 = Severe

**Personal Protection Index**

- A thru K, Standard Equipment
- L thru Z, Custom

## Lab Chemical Label

## Laboratory Acid and Base Chemical Cap Color Chart

IF YOU SEE THESE BOTTLES LOOK FOR THE CAP COLOR

Lab Chemical Bottles

Store → Separate ←

## How to Read a Label

- Ingredients
- Warnings
- Usage
- Cleanup

**Sample Label**

Signal Word Principal Hazard Other Hazards Precaution for Use First Aid Storage, Spills, and Other Statements	<p style="text-align: center;">DANGER</p> <p style="text-align: center;">▶ FLAMMABLE LIQUID AND VAPOR</p> <p>Caution: (Specific ingredients that contribute substantially to the product's hazard) VAPOR HAZARDOUS. MAY AFFECT THE BRAIN OR NERVOUS SYSTEM. CAUSING DIZZINESS, HEADACHE OR NAUSEA. CAUSES EYE, SKIN, NOSE AND THROAT IRRITATION.</p> <p>NOTICE: Reports have associated repeated and prolonged occupational exposures with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.</p> <p>Keep away from heat, sparks and flame. VAPORS MAY CAUSE FLASH FIRE. Do not smoke. If inhaled, all items and job clothes, and turn off smokes, heaters, electric motors and other sources of ignition during use and until all vapors are gone. Prevent buildup of vapors by opening all windows and doors to achieve room-ventilation.</p> <p>Use only with adequate ventilation. Do not breathe vapors or spray mist. Rinse hands at every filling application and drying. If you experience eye watering, headache or dizziness or if any respiratory discomforts reported, leave area above applicable limits, wear an appropriate, properly fitted respirator (NIOSH/MSHA approved) and use after application. Follow respirator manufacturer's directions for respirator use. Close container after each use. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.</p> <p>First Aid: If you experience difficulty in breathing, leave the area to obtain fresh air. If you continue difficulty or experience, get medical assistance immediately. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention immediately.</p> <p>If spilled, contain spilled material and remove with inert absorbent. Dispose of contaminated absorbent, container and unused contents in accordance with local, state and federal regulations.</p> <p style="text-align: center;">KEEP OUT OF REACH OF CHILDREN Company name and address</p>
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## Signal Words

- Signal words (warnings listed on the container label) can assist with identification of a chemical and provide important clues for compatible storage of that container.
- Common signal words include:
  - “Flammable”
  - “Keep away from flames”
  - “Causes burns”

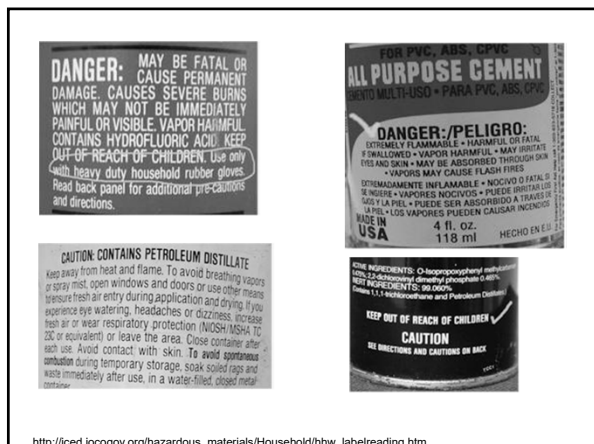
## Signal Words

- Caution
  - Mild to moderately hazardous
- Warning
  - Moderately hazardous
- Danger
  - Extremely flammable, corrosive or highly toxic
- Poison
  - Highly toxic

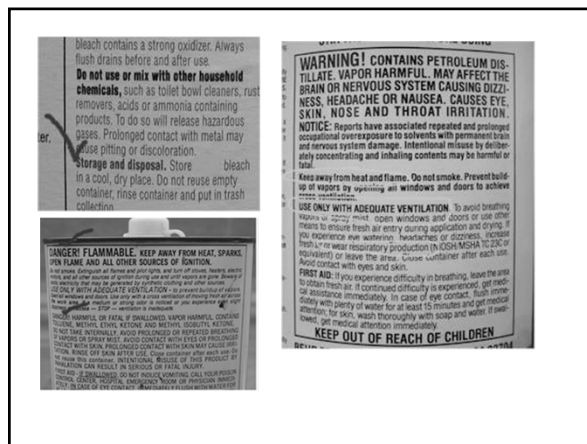
## Paint

- Latex Paint
  - Water
  - Acrylic
  - Alcohol
- Cleanup
  - Water and soap
- Also
  - Mercury fungicide
  - PCBs

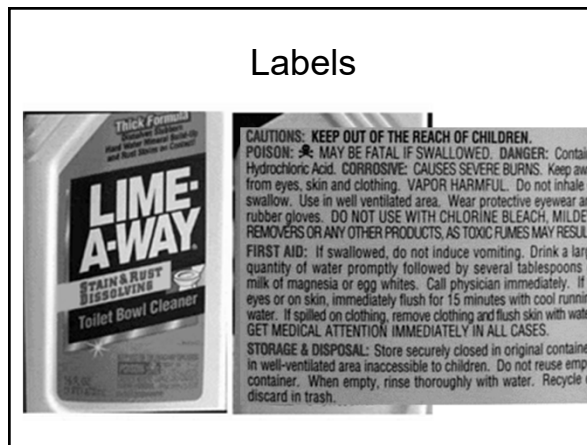
- Oil-Based Paint
  - Flammable
  - Inflammable
  - Alkyd
- Cleanup
  - Mineral spirits
  - Turpentine



[http://iced.icogov.org/hazardous-materials/Household/hhw\\_labelreading.htm](http://iced.icogov.org/hazardous-materials/Household/hhw_labelreading.htm)



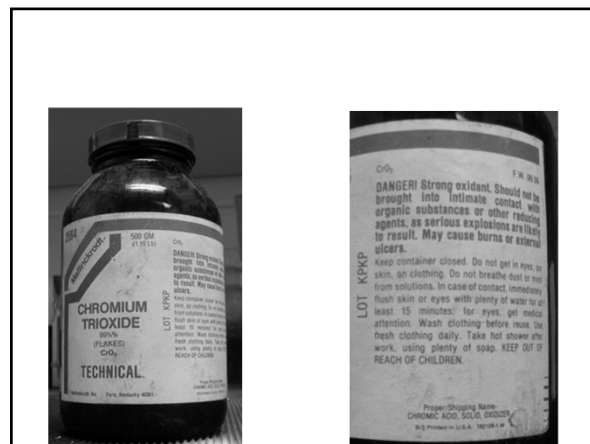
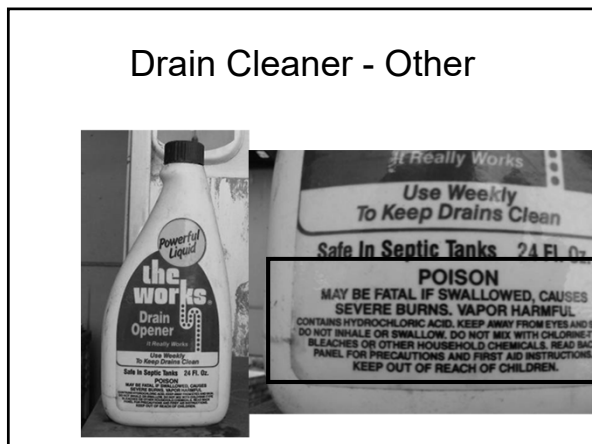
Labels



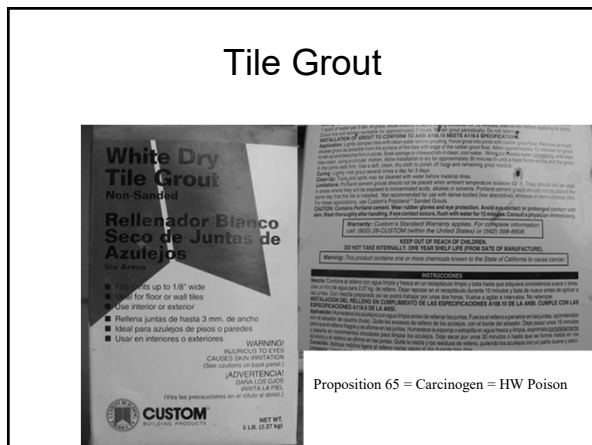
Cleaners



## Drain Cleaner - Other



## Tile Grout



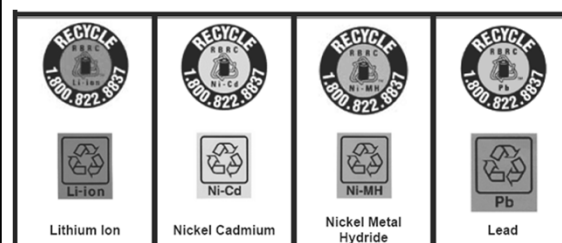
Proposition 65 = Carcinogen = HW Poison



## Lab Chemicals & Labels



## Rechargeable Batteries



RBRC Rechargeable Battery Recycling Corporation  
<http://www.rbrc.org/call2recycle/index.html>

### Danger from Batteries



### Not what they seem



### Waste Identification Methods

- HAZCAT
- WICT
- Papers
- Iodine Crystal
- Flame & Copper Wire Test
- Draeger Tube
- Instruments
- Laboratory
- Basic tests – pH, Oxidizer, water solubility

### HazCat

- Developed by Robert Turkington
- HazMat spills
- Solid and Liquid Chart



### HAZTECH SYSTEMS, INC.

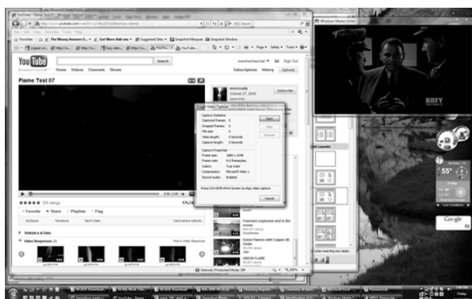
3919 Bootjack Lane  
 P.O. Box 929  
 Mariposa, CA95338  
 (800 543-5487)  
 or 209-966-8088  
 Fax 209-966-8089  
<http://www.hazcat.com/main.html>

### Papers

- pH
- Oxidizer
- Peroxide
- Nitrate-Nitrite
- Sulfite



### Flame test



### Copper Wire Flame test

- Belstein test for Halogens
  - chlorine, bromine, iodine or fluorine
  - Decomposition reaction
  - $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$
  - $\text{CuO} + \text{X} \rightarrow \text{CuX} + \text{H}_2\text{O}$ 
    - X = Halogen
    - CuX = Green Flame

### Draeger Tubes

- Colorimetric indicator tubes, over 200
  - Ammonia
  - Benzene
  - Methyl bromide
  - Phenol



### Draeger Tube Color Change

Order No. 67 33231	<b>Ammonia 2/a</b>
<b>Standard Measuring Range</b> : 2 to 30 ppm <b>Number of Strokes (n)</b> : 5 <b>Time for Measurement</b> : app. 1 min <b>Standard Deviation</b> : ± 10 to 15 % <b>Colour Change</b> : yellow → blue	
<b>Ambient Operating Conditions</b> <b>Temperature</b> : 10 to 50 °C <b>Absolute Humidity</b> : < 20 mg H <sub>2</sub> O / L	
<b>Reaction Principle</b> NH <sub>3</sub> + pH Indicator → blue reaction product	
<b>Cross Sensitivity</b> This tube indicates other basic gases (e.g. organic amines). No interference by 300 ppm nitrous fumes, 2,000 ppm sulphur dioxide or 2,000 ppm hydrogen sulphide.	

### Instruments



### Lab testing



## Basic Identification Tests

## General Rules

- Do not mix chemicals
- Keep incompatible materials away from each other
- Segregate unknowns in a plastic tub away from all other materials
- When examining a container, be extremely careful
- Watch for danger signs



### ■ Danger signs include:

- Rotting containers
- Bulging containers
- Missing or poor fitting lids
- Old military containers
- Reactions in the container
- Crystals in or round the container
  - May indicate the presence of an unstable or explosive chemical

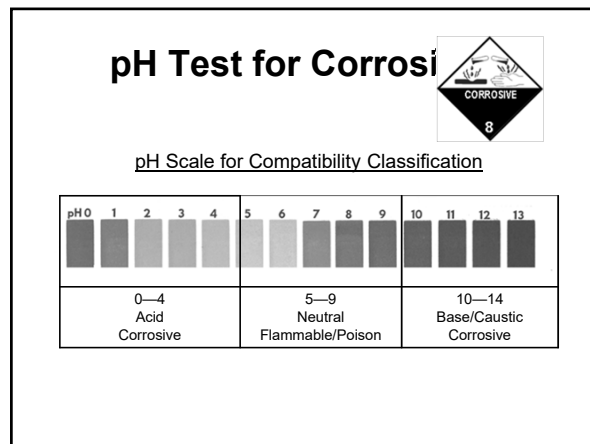





### Hazard Classes

■ Basic segregations


Acid pH 0-4	Neutral/ Flammable pH 5-9	Base pH 10-14	Other
Corrosive	Flammable Poison	Corrosive	Dangerous When Wet
Acid Oxidizer	Neutral Oxidizer	Base Oxidizer	Explosives
	Nonflammable gas		Trash




### Water Solubility Test




Reacts	Emulsion (milky suspension)	Sinks or Floats
Violent = Water Reactive Hot = Acid/Base Cold = Base/Oxidizer Boils = Strong Base/Acid Soluble = check pH	Pesticide/Poison	Neutral/Flammable Liquid sinks = Chlorinated solvent Floats = Hydrocarbon



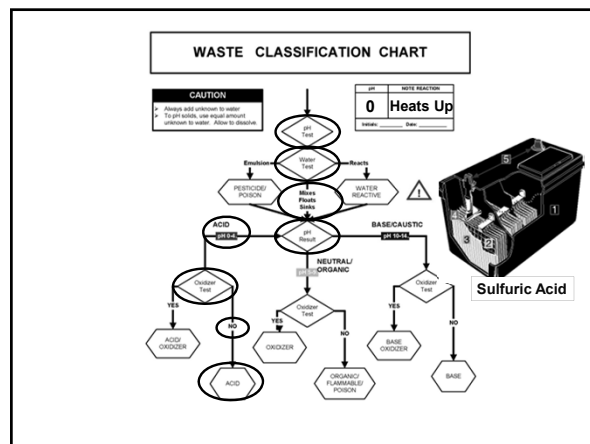
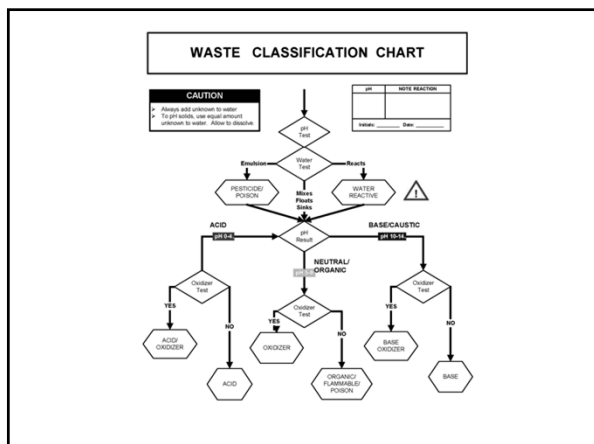
### Oxidizer Test



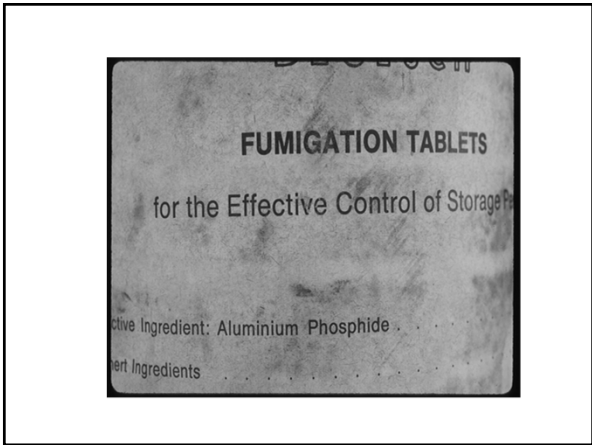
Color change



**CAUTION**  
A reaction with the acid indicates possible water reactive or base (e.g. Calcium carbonate)



# Practice Testing



## Asbestos

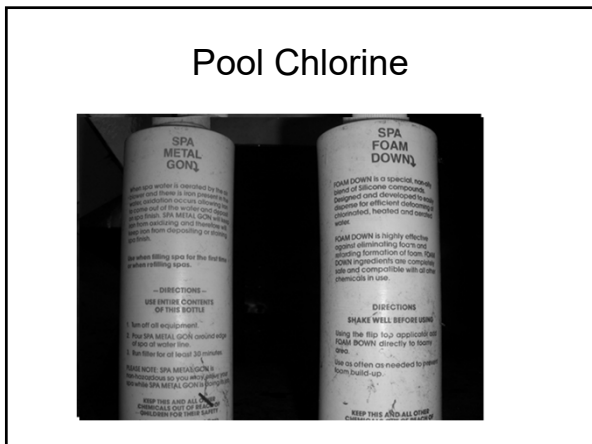
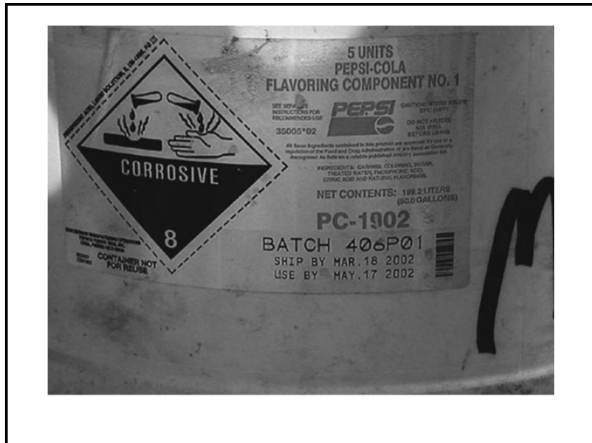
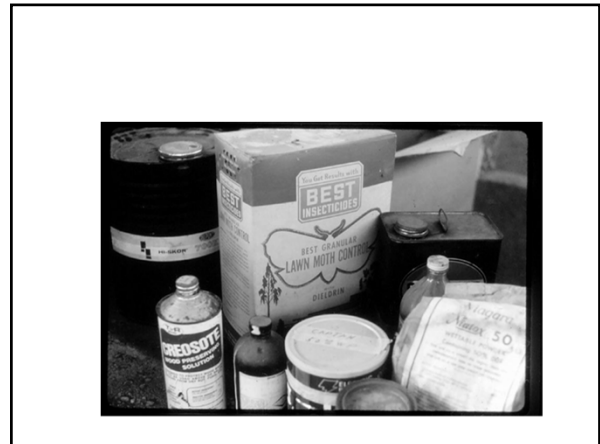
A collage of images illustrating asbestos removal. It includes a worker in a full-body protective suit, a worker using a vacuum to clean a surface, a worker using a brush to remove material from a wall, and a worker using a specialized tool to cut through a pipe. The images are numbered 15, 19, and 20.

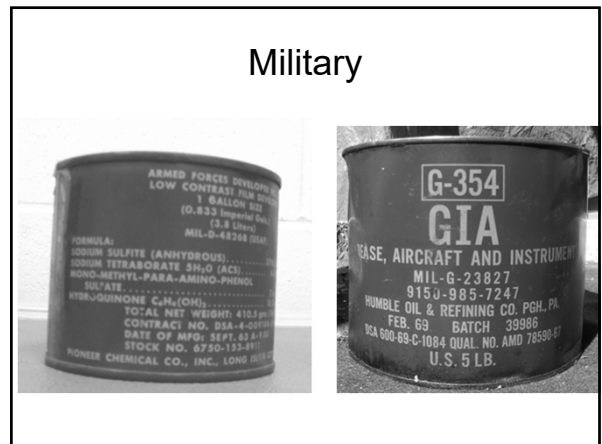
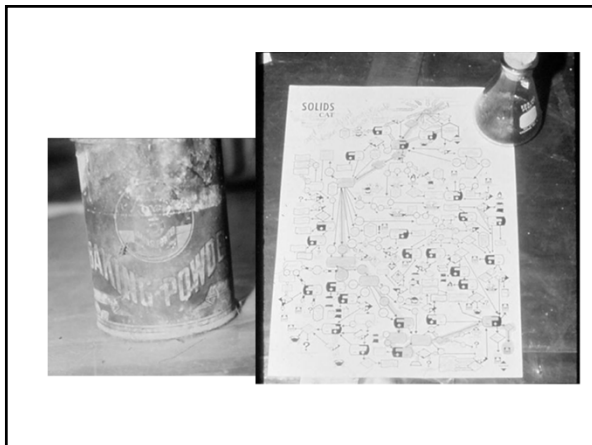
## Drug lab chemicals

A collage of images showing various chemicals and equipment used in a drug lab. It includes bottles of "SUDAFED NASAL DECONGESTANT", "CAMP FUEL", and other substances. There are also images of a person in a protective suit and various pieces of laboratory equipment.

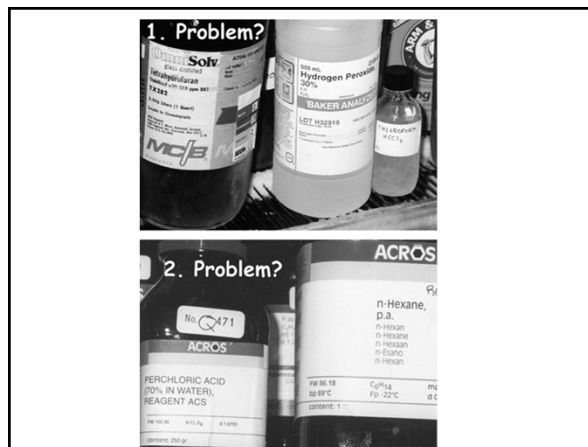
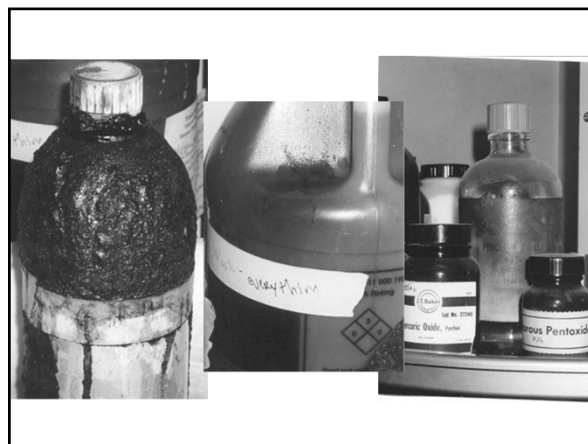
## Brown Vapor

A collage of images showing various bottles and containers, likely containing chemicals used in a drug lab. The text "Brown Vapor" is overlaid on the image. The bottles are of various shapes and sizes, some with labels.

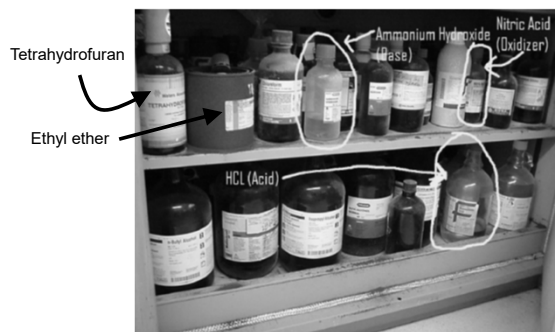




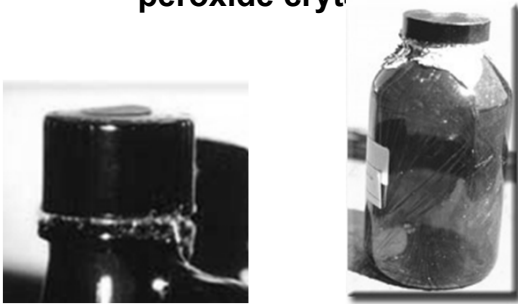
### Lab Chemicals



### How NOT to Store Chemicals



### REAL pictures of dangerous peroxide crystals



### Battery



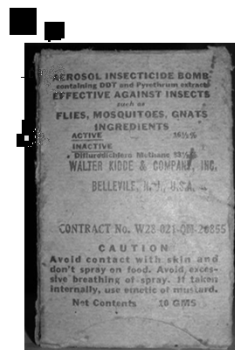
### Weedone, New Improved



### Ice Cream Syrup?



### Head Scratcher



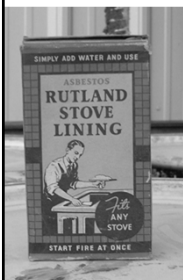
### Health Solution



### No Joke!



### Asbestos



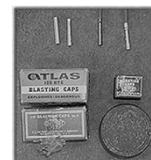
### BLASTING CAPS



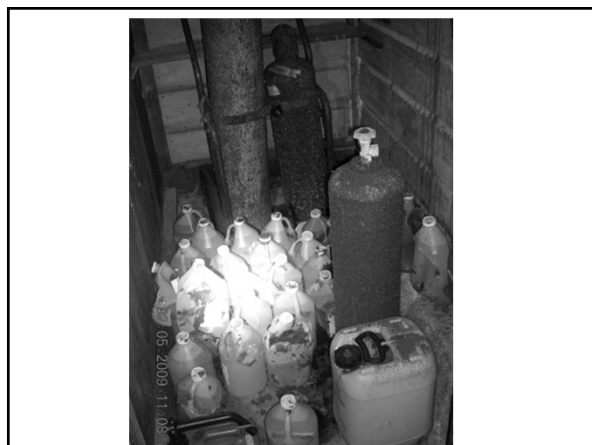
Electric Caps



Blasting caps are dangerous,  
PLEASE DO NOT HANDLE!



### Asbestos



### Juice Jar



### Before/After

- 3 ounces Ethyl Ether
- 250 ml container
- 15 years old



Ignited with small initiating device... all 28 ft high and 22 ft wide

### Fuming Nitric Acid

