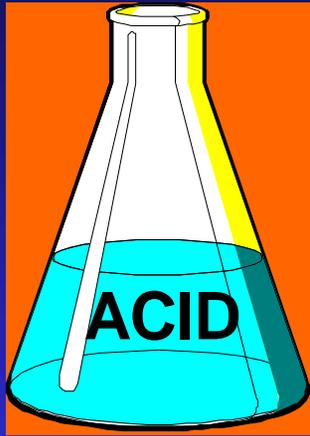


Used Oil Recycling/HHW 2005 Conference



Practical Chemistry For HHW Program

City of San Diego
Environmental Services
Cheryl Lester & Nora Varner

Today's Topics

- Introductions
- Chemistry Basics
- Identification Methods
- Hands-On Scenarios
- Special Situations



Getting To Know You

Share with the Group:

- Your Name and HHW Responsibility



- What was the scariest chemical you had to deal with at home, work, or at an HHW activity?



What Do HHW's Have In Common?

- Substances, due to their characteristics, can cause harm to humans, animals, & the environment.



- Can be purchased at retail stores
- Can be brought from work to the home

Common HHW Wastes

- Waste Oils
- Oil filters



Paints
Paint Thinner

- Garden Pesticides
- Driveway cleaners



- Partially Used Spray Cans
- Drain openers

■ Gasoline



- Cleaning Products
- Oven Cleaners

■ Personal Care Products

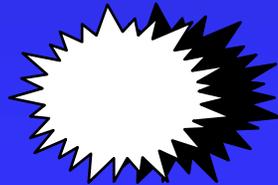


Identifying the Product Hazard

- Determining the product hazard decides:
 - customer safety issues for transportation
 - packaging requirements at residence, event, or at a facility
 - need for any special services



Toxic



Reactive



Ignitable



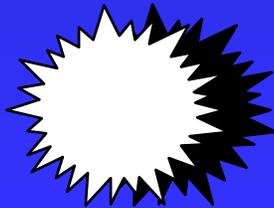
Corrosive

How to Identify Product Hazard

- Ask product owner to identify
- Review product use &/or label info
- Use reference materials
- Perform HazCat testing



Toxic



Reactive



Ignitable



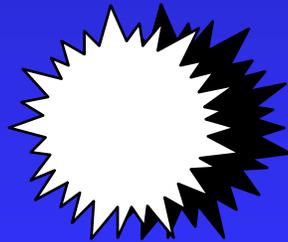
Corrosive

How to Identify Product Hazard

All questions will aid in
determining product category:



Toxic



Reactive



Ignitable



Corrosive

Chemical Building Blocks

Group												III	IV	V	VI	VII	VIII
I	II																
1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds								
		58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
		90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

Legend

Li Solid	Cs Liquid	H Gas	Tc Synthetic
Alkali metals	Alkali earth metals	Transition metals	Rare earth metals
Other metals	Noble gases	Halogens	Other nonmetals



Periodic Table Information

- ◆ Columns Group atoms that react in same way (electrical energy available)
- Atoms will exist either as Solid, Liquid, or Gas (S, L, G) when on Earth (standard temperature/pressure)



Understanding Product Ingredients

- Products ingredients:
 - one element –
Thermometer - Mercury (Hg)
 - multiple-elements combined
(compounds)
Salt Water (NaCl + H₂O)



Understanding Product Ingredients

- Atoms & Compounds are picked for specific products to carry out a task.

What dictates their use in a product?

- How exists naturally on Earth (S, L, G)
- How reacts in the body (toxicity)
- Amount of energy needed to work (reactivity)
- Atoms strongly attracted to (electrical properties)
- Natural properties (corrosive, flammable, oxidizer)



Understanding Product Ingredients

- Natural Properties: Corrosivity

A compound's Hydrogen atom reacts in WATER with other atoms or compounds

- Reaction measured by a device:

Acid : pH 0-5 (toilet cleaners)

Neutral: pH 5-9 (hand soaps)

Caustic: pH 9-13 (drain openers)

Corrosive HHW Examples



Understanding Product Ingredients

- Natural Properties: Flammability

A quick reaction of OXYGEN and other atoms/compounds, where heat, light, and a continued reaction occurFire

- Oxidizers: Atoms or compounds with Oxygen. Need additional energy to create heat & light....Fire

Flammable HHW Examples



Understanding Product Ingredients

- Natural Properties: Toxicity

The ability to be harmful, destructive, deadly, or poisonous in or near the body.

- Pesticides: Roundup, Raid, snail bait



- Poisons: arsenic, cyanide

- Irritants: ammonia, hydrochloric acid

- Carcinogens/Teratogens: benzene, TCE

Toxic HHW Examples



Understanding Product Ingredients

- Natural Properties: Water/Air Reactives

Reacts when exposed to Water or Air (looking for oxygen to stabilize atom) usually a fire results.

- Column 1 Metals: Sodium (Na), Lithium (Li)
(rxn water/air - covered w kerosene)



Sulfuric Acid: (rxn water) heat, ignites hydrogen

- White/Yellow Phosphorus: (rxn air-covered H₂O)
- Calcium Carbide: (rxn water-air tight containers)

Water/Air Reactive HW Examples

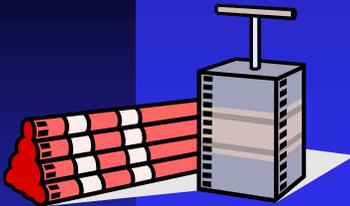


Understanding Product Ingredients

■ Natural Properties: Explosions

A sudden & violent release of energy from a confined area. A quick reaction with energy/heat.

- Unstable molecules (acetylene gas)



- Rapid Oxidation (fireworks, picric acid)
- Pressure Release (bulging drum gasoline)
- Polymerization (plastics ingredients)

Explosive HHW Examples



Tools for Identification: Labels



- Chemical Name
- Manufacturer's ID & Address
- Emergency Tel. No.
- Physical Hazards
- Storage & Handling
- Personal Protective Equipment, and Safe Working Procedures

Tools for Identification

Signal Words

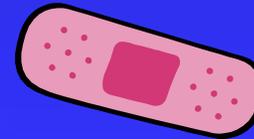
- **Danger** = Death



- **Warning** = Serious Injury



- **Caution** = Mild Injury

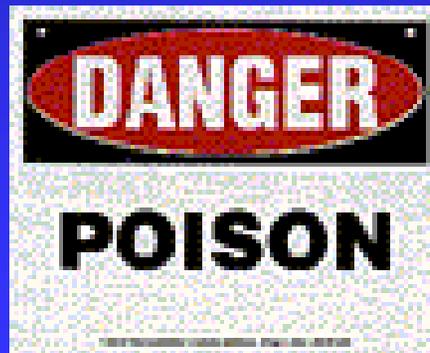


Example Labels

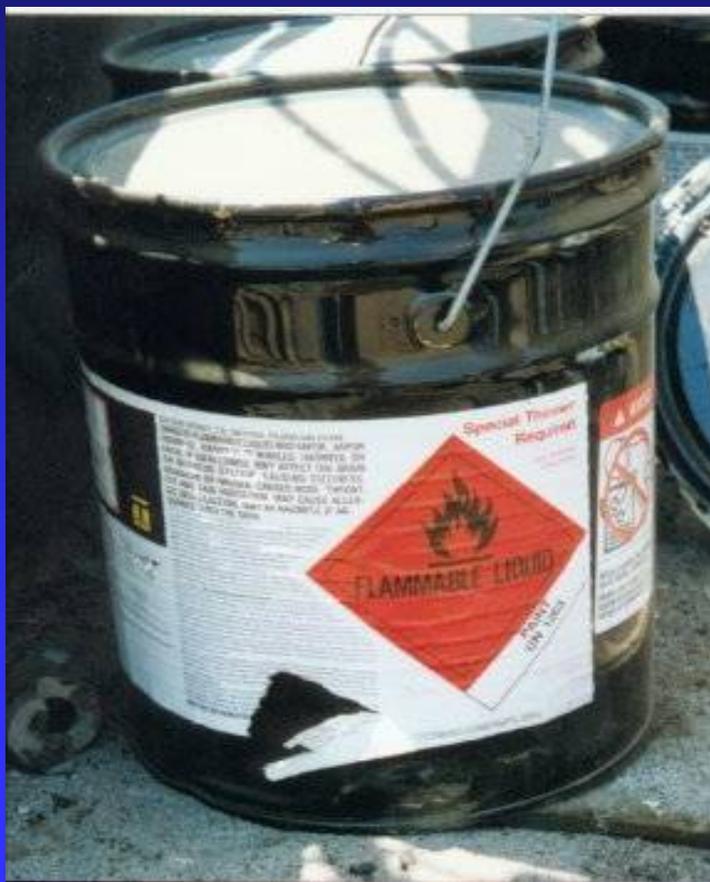


Tools for Identification

Other Labels



Examples Labels



Tools for Identification Publications

- Materials Safety Data Sheets
- Emergency Response Guide
- DOT Guide (49 CFR)
- Reference Guides
 - Common Sense Approach Hazmat
 - Sittig's Handbook
 - Sax Reference Guides

Practicing HHW Identification

- Identify HHW Product Hazards using:
 - Customer information
 - HHW container/Picture
 - Product label
 - Reference materials
 - MSDS



Troubleshooting Situations

- Evaluate the Scenario and determine plan of action:
 - Transportation issues
(facility, event or door-to-door pickup)
 - Safety for resident and others
 - Special Assistance



Special Situations

What is the plan of action when these HHW's arrive?

- Explosives
- Extremely Toxic >>>
- Peroxides
- Picric acid
- Nitrocellulose film
- Radioactives
- Unknowns



Special Situations

- Smoke detectors
- Medical wastes
- Rx's bottles
- Lead paint chips
- Asbestos ceiling/tiles, A/C pipe
- Contaminated Soils with oils/gasoline
- Contaminated fuel – boats/RVs



Now You Are Ready When This Rolls Up To Your Center

