PERSONAL PROTECTIVE EQUIPMENT (PPE)

Why do you need it?

- Protect from chemicals entering the body
  
  **Ingestion**  
  ![Ingestion Image]

  **Injection**  
  ![Injection Image]

  **Skin Absorption**  
  ![Skin Absorption Image]

  **Inhalation**  
  ![Inhalation Image]
PPE - SAFETY GLASSES

• Made with metal/plastic safety frames
• Prescription glasses do not replace the need for safety glasses when experimentally required
• Used for moderate impact from particles, splash and vapor protection
PPE - FACE SHIELDS

- Full face protection
- Protects face from dusts and splashes or sprays of hazardous liquids
- Does **not** protect from impact hazards
- May need to wear safety glasses or goggles underneath
PPE - GLOVES

• Nitrile:
  – protects against solvents, harsh chemicals, fats and petroleum products and also provides excellent resistance to cuts and abrasions.

• Cleanroom Rubber Gloves (Butyl or Latex)
  – Protects against acids, bases, and strong solvents.

• Cryogenic:
  – protects against hazardous ultra-low temperatures and cryogenic burns

• Autoclave
EYEWASH & SHOWER STATIONS

• When using the eyewash:
  • The first few seconds after exposure are critical
  • Keep eyes open & rotate in all directions
  • Flush for 15 minutes
  • Bring SDS with you to the doctor (if there is time to retrieve it)

• When using the shower:
  • The first few seconds after exposure are critical
  • Wash the affected area with copious quantities of water for at least 15 minutes
  • Remove contaminated clothing, jewelry and shoes (forget modesty)
PROVIDE ASSISTANCE

• If you see a user in the lab run to the eyewash station or shower, what do you do?
  – Make sure they are using the eyewash/safety shower properly.
  – Make sure they use the device for the allotted time.
  – Make sure they are okay, or call 911 for medical assistance.
  – Contact the facility manager.
CHEMICAL STORAGE

- Chemicals must be stored in airtight sealed containers
- All chemicals must be properly labeled and approved before entry into any Shared Research Facility laboratory
- All chemicals must be stored appropriately according to their hazard code (see the diamond) and segregated by compatibility
- Keep flammables, acids and bases in separate closed cabinets
- Nitric Acid must be kept separate from other acids
CHEMICAL STORAGE

• Material Tracking Form
  – srf.wvu.edu> InfoCenter> Safety>

• Shared Research Facilities Labeling System:
  – green: acid
  – yellow: solvent
  – pink: photoresists
  – white: developer
  – orange: base
  – blue: biological
TOXIC CHEMICALS

- Carcinogens
  - Carcinogens are cancer causing compounds.

- Mutagens
  - Mutagens cause genetic mutations. These mutations can cause birth defects or may lead to cancer in the exposed person.

- Reproductive Toxins
  - Chemicals that have a negative effect on reproduction or the reproductive system. These include both chemicals that induce chromosomal damage (mutagens) and birth defects (teratogens/fetomutagens).
CORROSIVE CHEMICALS

- Acids and bases are common corrosive chemicals
- Corrosive chemicals are capable of damaging skin, eyes and the respiratory system when inhaled
- The extent of skin damage depends on how long the corrosive is on the skin and how concentrated the corrosive is
- Wear appropriate PPE
CORROSIVE CHEMICALS
If you have been exposed to corrosives

- Water (for splashes on the skin)
- Shower
- Eyewashes
CHEMICALS - MIXING

• Always add acids to water, never add water to acids.
• Never mix solvents and acids.
• Use extreme caution if mixing acids and bases. Very few processes require a mix of the two, Piranha Bath.
• Check for appropriate chemical ratios. Improperly mixed chemicals may create dangerous reactions or dangerous fumes.
• Use the appropriate PPE and type of gloves for chemical usage.
CHEMICALS – HOOD USAGE

- Always work inside a fume hood.
- Never place your head inside the fume hood.
- User should work in the back half of the hood or at arms length.
- Where sashes are present, keep them open less than 50%.
- Never remove an open chemical vessel from the fume hood.
- Keep the work area inside the hood clean and free from obstructions.
- Always work in appropriate hood and use appropriate vessels.
- Never heat solvents in closed beakers.
- Do not store items in the hood.
- Do not leave unlabeled chemicals unattended in a hood.
- Always properly label beakers.
FLAMMABLE LIQUIDS / HAZARDOUS METALS

• Flammable Liquids
  – The vapor of a flammable liquid ignites and causes fire or explosion – not the liquid itself

• Hazardous Metals
  – Some metals can ignite and explode – magnesium, or dusts/filings of other metals such as aluminum
  – Some metals are almost non-toxic – iron, aluminum
  – Others are very toxic – lead, cadmium, mercury, beryllium
NFPA Concerns

• Proper storage of flammables
• What happens if there is a fire
• Unit (Fire Walls)
• Proper ventilation

Door Placards

• NFPA – 704 Posting
• Assign highest number contained inside room to the placards
• Emergency contacts listed on door
EMERGENCY GUIDE—HAZARD SIGNALS

HEALTH HAZARD*
4—DANGER: May be fatal on short exposure. Specialized protective equipment required.
3—WARNING: Corrosive or toxic. Avoid skin contact or inhalation.
2—WARNING: May be harmful if inhaled or absorbed.
1—CAUTION: May cause irritation.
0—No unusual hazard.
*Health hazard describes short-term contact or inhalation hazard only.

FIRE HAZARD
4—DANGER: Flammable gas or extremely flammable liquid.
3—WARNING: Flammable liquid flash point below 100°F.
2—CAUTION: Combustible liquid flash point of 100°F to 200°F.
1—Combustible if heated.
0—Not combustible.

REACTIVITY HAZARD
4—DANGER: Explosive material at room temperature.
3—DANGER: May be explosive if shocked, heated under confinement, or mixed with water.
2—WARNING: Unstable, or may react if mixed with water.
1—CAUTION: May react if heated or mixed with water.
0—Stable. Not reactive when mixed with water.

HAZARD RATING

Lab Safety Supply Inc.
Reorder No. 610
LABELING: SHOULD INCLUDE

- Chemical’s name
- Concentration
- Purity
- Hazards

- Date it was packaged
- Owner
- Date of receipt

SRF Material Tracking Form
http://sharedresearchfacilities.wvu.edu/forms/srfForms.html
SDS – WHAT IS IT?

• Safety Data Sheet (SDS)
• Always comes with purchased chemicals
• Available on many internet sites
• SDS’s & inventories are included in the Laboratory Chemical Hygiene Plan
• You are responsible to know the information on the SDS of chemicals you work with
ACETONE

1. Product Identification
   Synonyms: Dimethylketone; 2-propanone; dimethylketal
   CAS No.: 67-64-1
   Molecular Weight: 58.08
   Chemical Formula: (CH3)2CO

2. Composition/Information on Ingredients

3. Hazards Identification
   DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH
   FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND
   RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
   Health Rating: 2 - Moderate
   Flammability Rating: 3 - Severe (Flammable)
   Reactivity Rating: 0 - None
   Contact Rating: 3 - Severe
   Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES;
   CLASS B EXTINGUISHER
   Storage Color Code: Red (Flammable)
WASTE

• Most chemicals **can not** go down the drain.
• Waste must be captured in chemical waste jars.
• Labeling a waste jar: (best if original label), clearly marked waste, chemical name (no abbreviations or formulas), date bottle is full.
• Solid waste are items that are contaminated with a chemical. Example: pipette or cleanroom wipe. Place item in clearly in appropriate waste container.
• **DO NOT THROW IN TRASH RECEPTICALS**
• “Sharps” should be placed in proper sharps container.
CHEMICAL HYGIENE PLAN (CHP)

Reminder: you are required to read the CHP before use of the laboratory.
CHEMICAL SPILLS

Spills May Cause
- Fire
- Explosion
- Release of toxic vapors
- Contamination of water supplies
- Injury to self and neighboring laboratory workers

What to do to Avoid
- Know the substance
- Read Labels and MSDS
- Use Protective Equipment
- Inspect Chemical Containers & Beakers
- Be conscious of any hazards present
SMALL SPILLS VS. LARGE SPILLS

• In case of large spills → EVACUATE
• In case of small spills, you can use a “spill kit”.
• After proper cleaning and containment of the spill contact the lab manager.
• Do not throw away the spill kit. Leave it for the lab manager to properly dispose of.
EVACUATION
BE SMART, BE SAFE

• Notify other users of unsafe practices before they hurt themselves or others.
• Contact a facility manager if there is a dangerous situation
• Don’t be afraid to ask for help