

CHEMICAL POISONS

MANAGING CHEMICAL SPILLS

Potentially Hazardous Spills

Spills of:

- -greater than 4L
- Smaller spills of materials of
 - *Low LD₅₀
 - *Carcinogens
 - *Flammable liquids or metals
 - *Compounds of unknown toxicity

CAUSTIC CHEMICAL HAZARDS

- **Any liquid or solid that can destroy human skin or tissue or any liquid that has a **severe corrosion rate on metals****
- Acids and Bases (organic and inorganic) e.g. HCl, NaOH, phenol, triethylamine
- Skin burns
- Permanent eye damage
- Inhalation hazards

Know the differences in hazards between concentrated vs. dilute solutions

REACTIONS WITH WATER OR AIR

- Some substances have a positive heat of solution
- Other substances may ignite, evolve flammable gases or otherwise react violently when in contact with water
- Knowledge of the reactivity of any substance with water is especially important when water is present in the spill area or a fire takes place

CHEMICAL SPILLS

- A minor spill is one that lab staff is capable of handling without the assistance of safety and/or emergency personnel
- Spill kits with instructions, absorbents, reactants and protective equipment should be available to clean up minor spills
- **All other chemical spills are considered MAJOR**

THE CHEMICAL SPILL RESPONSE

- The range and quantity of hazardous substances used in laboratories require preplanning to respond safely to chemical spills
- It is important for workers to understand the acute and the chronic effects of the chemicals that they are likely to be exposed to

THE MINOR SPILL RESPONSE

- Alert personnel in immediate area of spill
- Confine spill to small area
- Wear protective equipment
- Use appropriate neutralizer for inorganic acids and bases. Absorb neutralized spill, collect residue and dispose of as chemical waste
- For other chemicals, absorb spill with vermiculite or dry sand
- Clean spill area with detergent and water
- Collect all contaminated absorbent, gloves and residue
- Label and dispose of properly

CHEMICAL SPILL-KITS

- Every lab that uses chemicals must have access to spill control kit
- The key to an effective spill kit are location and content
- Should be in a fixed position and strategically located so that it is easily accessible
- Spill kits should be checked periodically and restored after each use

ABSORBENTS

- Universal spill Absorbent-1:1:1 mixture of Flor-Dri (or unscented kitty-litter), sodium bicarbonate and sand
- Acid Spill Neutralizer
- Alkali (Base) Neutralizer
- Solvents/Organic Liquid Absorbent
- Bromine Neutralizer-5% solution sodium thiosulphate
- Hydrofluoric Acid- HF neutralize with lime and transfer to a polyethylene container

PERSONAL PROTECTIVE EQUIPMENT

- Goggles and Face Shield
- Heavy Neoprene gloves
- Disposal Lab Coat (long sleeve) and corrosive Apron
- Plastic Vinyl Booties
- Dust mask/Respirator
- *Plastic dust pan and scoop
- * Plastic bags
- * One Plastic Bucket

SPIILLS REQUIRING SPECIAL PROCEDURES

- **Acid chlorides**

- use Oil-Dri or dry sand

- Avoid water and sodium bicarbonate

- **Alkali metals** (lithium, sodium, magnesium, potassium)

- Smother with dry sand and cover with contents from a class "D" fire extinguisher

- **White or yellow phosphorus (pyrophoric)**

- Blanket with wet sand or wet absorbent

Hydrofluoric Acid Contamination

- **Skin contact**

- Immediately flush with copious amount of water under an emergency shower
- Remove all clothing while under the shower
- Apply calcium gluconate (2.5%)

- **Eye contact**

Immediately flush eyes with water under an eyewash for 15 minutes

- **Inhalation**

- Remove victim to fresh air

SEEK MEDICAL ATTENTION IMMEDIATELY!

SYSTEMIC vs NON-SYSTEMIC

- HCl results in the immediate sensation, the exposed tissues will burn and decompose until acid is flushed away or neutralized
- 2% Hydrofluoric acid will not burn away skin instead **the chemical will move to bone and decompose bone**
- Effect will be systemic as the acid lowers calcium levels
- Lowering of Ca levels will cause confusion, dizziness and fainting
- **Results in extreme pain and without medical attention, the victim will die**

MAJOR SPILLS

- Involves the release of a type or quantity of chemical that poses an **immediate** risk to health
- Evacuate the building by activating the nearest fire alarm
- Call the emergency services and give details of the accident including location, types of hazardous materials involved and whether there has been personal injury

FIRST RESPONDERS

- The first person on the scene should make sure adequate resources are on the way
- Such resources must be able to:
 - * Isolate the area
 - * Stabilize the scene
 - * Decontaminate
 - * Treat and support any victims
 - * Protect property and environment
 - * Evacuate the surrounding area

PREVENTING SPILLS

- Eliminate clutter
- Know the proper work practices for chemical materials you use
- Use unbreakable secondary containers
- Store chemicals properly
- Dispose of waste and excess chemicals in a timely manner