



Environment, Safety and Health Bulletin

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Working Safely With Acids

Special Operations Reports are issued to initiate management actions in response to events whose subject matter represents significant Departmental safety concerns.

Environment, Safety and Health Alerts are issued to initiate immediate action on potentially significant safety issues.

Environment, Safety and Health Bulletins are issued to share information and recommend actions on potential safety issues.

Safety Advisories are issued to provide information to the DOE Complex on potentially significant safety or health issues.

PURPOSE

This Bulletin provides information on a safety concern that may impact operations at Department of Energy (DOE) facilities. Specifically, the concern is the safe handling of acids.

BACKGROUND

DOE records show that there have been 40 safety incidents involving acids over the past 5 year period. Half of those occurrences resulted in acid burns and exposures to acid mists, including four incidents where the acid burns and respiratory injuries were serious enough to require hospital treatment. The remaining cases were acid spills or leaks, unexpected exothermic reactions, and unsafe conditions that had the potential for exposure.

WHAT ARE THE HAZARDS?

All acids are corrosive and some are toxic. Exposures can occur through direct skin contact, skin exposure to mists in the air, ingestion, and inhalation of mists. Symptoms of exposure include irritation or burns of the skin, eyes, nose, throat or lungs, and difficulty breathing.

Acids are incompatible with many materials. Contact of acids with water can be highly exothermic and can result in splatter and generation of mists. Mixing acids with incompatible materials such as alkali solutions, carbides, chlorates and nitrates could result in violent exothermic reactions and possible explosive conditions. Acids can react with some metals to generate flammable hydrogen gas and toxic fumes. Oxidizing acids (e.g. nitric and perchloric) are incompatible with organic materials.

ACID EXPOSURE DEMANDS IMMEDIATE ATTENTION

- Never try to neutralize an acid on living tissue.
- Wash off splashes immediately with plenty of water.
- Eye wash fixtures or safety showers must be used within 15 seconds after exposure for at least fifteen minutes to prevent serious injury.

CONTROLLING THE HAZARDS

Ensure that all users and bystanders are properly trained in the hazards of handling acids and observe the following good practices:

- Obtain and read the Material Safety Data Sheets.
- Recognize the hazards (fire, explosive, health, reactivity).
- Know how to handle the emergencies (fires, spills, personal injury).
- Wear the proper personal protective equipment.
- Use smallest possible amounts and avoid vapors.
- Keep containers closed except when dispensing acids.
- Never add water to acid and stir acid slowly into cold water in an ice bath when necessary.
- Post instructions for emergency treatment and spill control in plain view in areas where acids are used or stored.
- Store, handle, and use acids in well ventilated areas following recognized guidelines.
- Use suitable receptacles for handling acids.
- Store acids properly and in labeled containers.
- Use secondary protective containers to carry acids.
- Never return contaminated acid to original container.
- Immediately report leaks, spills, or ventilation failure.
- Use neutralizer or adsorbent pillow (not water) to clean spills.

ADDITIONAL SOURCES OF INFORMATION

- Your Safety and Health Office
- Information on the web:

http://www.llnl.gov/es_and_h/hsm/doc_14.08/doc14-08.html

<http://www.ccohs.ca/oshanswers/prevention/corrosi1.html>

SUMMARY

- Acid exposures, injuries, and spills can be avoided.
- Keep alert and take proper precautions when handling acids.

If you have any questions, please call Dr. Bill McArthur at 301-903-9674 or e-mail him at bill.mcarthur@eh.doe.gov.



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PREVENT EVENTS

Learning from Industry Experience

PREVENT EVENTS is intended for use by personnel during morning meetings, pre-job briefings, and work unit meetings to communicate key industry experience.

Management:

1. Have we established central ownership for chemical safety at the site where employees know where to go to find consistent analysis and advice on the hazards of acids specific to the job?
2. Have we assured that the site has the expertise or access to resources to cope with the complex aspects of chemical safety?
3. Have we made available to our workforce safety equipment such as PPE, showers, and eye wash facilities, and are such equipment inspected per regulations?
4. What training have we provided laboratory personnel and other workers that handle acids?

Supervisors and Workers:

1. Do we know what good practices are when working with acids?
2. Have we been adequately trained to recognize, identify, mitigate, and control hazards associated with acids?
3. Which group is responsible for chemical safety at the site if we need to consult with them?
4. Who are the individuals to contact for expert opinion regarding the hazards of acids?
5. Do we have the appropriate PPE to handle acids?
6. Where are the closest deluge showers and eye wash facilities?
7. Where can we find guidelines for storing acids and for disposing acid wastes properly?
8. What are the correct ways to transport acids?

