

JoVE: Science Education
Handling Chemical Spills
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Overview: Since chemicals are commonly used for laboratory research purposes, it is extremely important to be adequately prepared to handle chemical spills or accidental release of hazardous chemicals, which can happen at any time. No matter how minor a spill may be, the inability to respond in an emergency situation could severely endanger public health or the environment. All chemical spills must be properly disposed of satisfying diverse regulations and standards such as those of Resource Conservation and Recovery Act (RCRA) and the Emergency Planning and Community Right to Act of 1986, which are administered by the US Environmental Protection Agency (EPA).

Principles: In the case of a chemical spill, the sooner it is controlled, the less damage it can cause. As the spill is controlled, the spill should also be contained in as small an area as possible. The spill must then be cleaned and the area decontaminated or neutralized as required.

Procedure:

1. Spill Control

- 1.1. Before attempting to control a chemical spill, put on proper personal protective equipment (PPE), including but not limited to chemical-resistant gloves and safety goggles with side shields. Your organization's Environmental Health & Safety (EHS) Office should have the protective clothing required. Do not attempt to rescue someone else without appropriate knowledge of the environment and proper PPE.
- 1.2. Respond immediately to control the spill and minimize the damage by stopping the flow of the material being spilled.
- 1.3. Isolate the spill site by marking or roping the area.
- 1.4. If the spill is large or involves an acutely dangerous chemical, evacuate the area immediately and seek help by dialing 911. Make sure someone is near the scene to provide information to the responders. Have the product information and the safety data sheet (SDS) available.
- 1.5. All spills, minor or large, must be reported to the proper regulatory agencies. Environmental Health and Safety (EHS) performs all regulatory notifications and verifies that the spill clean-up meets regulatory requirements and standards.

2. Spill Containment

- 2.1. Contain the spilled material to the smallest possible area in order to minimize it from spreading. Spill kits often contain sorbent which can be used directly on or around the spill to form a barricade. EHS often has an inventory of spill control materials.

- 2.2. Avoid contaminating surrounding areas and make sure the spilled material does not come into contact with any body of water including storm water sewers, drains, streams channels or ditches.

3. Spill Clean-up

- 3.1. Anyone causing a spill is responsible for cleaning it up or for making sure that others clean it up. Anyone who comes across an unattended spill is responsible for reporting the spill to the proper regulatory agencies and/or EHS.
- 3.2. EHS will oversee, assist and/or clean-up depending on what the spilled material is and the quantity of it.
- 3.3. Decontamination or neutralization of the spill site may be required.
- 3.4. If any sorbent material was used to soak up the spilled material, dispose the saturated material as hazardous waste in accordance to regulatory standards.
- 3.5. Disposable PPE or badly contaminated garments should be properly disposed immediately after the spill clean-up.

4. Spill Prevention

- 4.1. Assess the types of hazards present in the laboratory paying close attention to chemical storage, handling and transportation.
- 4.2. Equipment used with chemicals in the laboratory should also be well maintained by calibrating and periodically checking for leaks, loose connections and faulty valves.

Summary: Research laboratories should be assessed for hazards especially those related to chemical storage, handling and transportation. Careful consideration of those hazards allows for the prevention of any chemical spill/release from happening. In the event of a chemical spill, it is important to first be safe and wear proper PPE before attempting to handle the spill or trying to rescue someone. If one acts fast and safely to stop the flow of the chemical will minimize structural damage and exposure to individuals. When the spill is controlled, the spill should also be kept from spreading and contaminating the surroundings. The spill incident should be reported to the proper regulatory agencies and/or EHS and cleaned accordingly.

References:

1. Resource Conservation and Recovery Act (RCRA) Regulations at <https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-regulations#haz>
2. Penn State EHS Chemical and Oil Spill/Release Clean-Up and Reporting Requirements at <http://legacy.ehs.psu.edu/envprot/SpillReporting.pdf>
3. Occupational Health and Safety [OSHA]. Compliance guidelines (Standards- 1910.120 App C). at

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9768