

Importance of Chemical Safety

Dual use chemicals have the potential for accidental misuse, intentional abuse of activities, or illicit drug trafficking. Laboratories face some threats in today's world like theft of sensitive information, high-value equipment, or dual-use compounds employed for weapons. Fostering a culture of chemical safety and security is very important to mitigate these risks. This culture has to become an individual attitude, rather than expectations driven by institutional rules.

Security Breach

Labs, departments, and institutions must be aware of the potential for security breaches in the laboratory, either by personnel or by outside agents. Even unintentional security breaches pose a serious risk. Possible breaches include the:

- Theft or diversion of equipment and chemicals
- Misappropriation of dual-use chemicals or materials utilized for chemical weapons or illegal drug synthesis
- Threats from activist groups
- Accidental or intentional release of or exposure to hazardous substances
- Sabotage of chemicals or equipment
- Unauthorized laboratory experimentation

Enforcing Laboratory Safety and Security

Implementing safe practices by laboratory personnel requires continuing mandatory attention and education. Establishing procedures for chemical management is very important. Chemical management is a critical component of a laboratory safety program and defines procedures including

- Buying chemicals
- Handling chemicals and adequate ventilation
- Appropriate use of personal protective equipment (PPE)
- Institutional rules and procedures especially for spills and emergencies
- Storing chemicals
- Inventory tracking of chemicals
- Transporting and shipping chemicals
- Disposing of chemical waste

Chemical Safety and Security at the Laboratory Level

The culture of laboratory safety depends ultimately on the working habits of individual chemists and their sense of teamwork for protection of themselves, neighbors, community, and environment. Laboratory personnel should take the following steps to improve the culture of safety and security in the facility:

- Preplanning all experiments and follow institutional procedures on safety and security during planning
- Miniaturizing chemical laboratory operations to reduce hazards and waste whenever possible
- Assuming that all chemicals encountered in the laboratory are potentially toxic to some degree
- Considering the flammability, corrosivity, and explosivity of compounds and their combinations when performing laboratory operations
- Learning and following all institutional procedures regarding safety and security

Responsibilities of Students and Workers

1. Attending laboratory safety training
2. Reviewing written procedures and following those procedures
3. Developing SOPs, understanding all the hazards and safety and security protocols before working with a chemical or procedure for the first time
4. Asking the laboratory supervisor or if unsure about the hazards
5. Using engineering controls and PPE as appropriate
6. Reporting all incidents, security issues, and potential chemical exposures to the laboratory manager

Steps in Securing Chemicals of Concern (COCs)

COCs are highly hazardous chemicals or possible precursors of highly hazardous materials. The list includes chemicals listed by the Chemical Weapons Convention, chemicals that have the potential for mass destruction, explosives, precursors of improvised explosive devices, and chemicals of high acute toxicity (rated as Category 1 in the Globally Harmonized System of Classification and Labeling of Chemicals).

- All laboratory security measures should suit the potential risks, avoid hampering research and utilize local resources.
- Laboratory security planning includes the following:
 - Locking the lab when not occupied and lock cabinets containing COCs.
 - Establishing access permissions: who is authorized to use the materials and who can have key access?
 - Questioning the presence of unfamiliar people in laboratories.
 - Reporting all suspicious activity.
 - Following security procedures, including replacing materials and securing them when not in use.
 - Training what to do in an emergency or security breach, and how to recognize threats.
 - Increasing the situational awareness of laboratory personnel (e.g., knowing who is in the laboratory, identifying suspicious activity).
 - Reporting of suspicious behavior, theft, or vandalism.
 - Prohibiting unauthorized use of laboratory materials and facilities.
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Chemical Security at UAB

- Training laboratory workers on security issues and expectations.
- Including security issues in regular laboratory inspections.
- Establishing a protocol for reporting security concerns.

Use

- Maintaining inventory records of dual-use materials.
- Limiting the number of laboratory personnel who have access to dual-use agents.
- Providing easy access to a means of emergency communication, in case of a security breach or a threat from within or outside.
- Reviewing laboratory access controls
- Maintaining a log of who has gained access to areas
- Develop a formal policy prohibiting the use of laboratory facilities or materials without the consent of the principal investigator or laboratory supervisor.
- Monitoring and authorize the specific use of these materials.
- Remaining alert and aware of the possibility of removal of any chemicals for illicit purposes. Report such activity to the head of security.

PIs and Laboratory Managers can implement the Code of Practice by a risk assessment approach that may include the following controls.

- Reviewing security measures
- Ensuring that chemical storage is secure
- Restricting access arrangements to those who have a legitimate need
- Maintaining an accurate inventory
- Being familiar with and encouraging supervisors to be familiar with the chemicals and volumes used by students and technicians & limiting the number of people authorized to purchase chemicals