# Approach to establishing chemical safety levels

Table 8-1

| **Descriptor or Control** | **Chemical Safety Level 1** | **CHemical Safety Level 2** | **chemical safety Level 3** | **chemical safety Level 4** |
| --- | --- | --- | --- | --- |
| Scope of Assessment Possibilities |
| Driving Consideration |
| **Conceptual Hazard Level** *(overview of risk level)* | Laboratory hazards equivalent to typical household use of chemicals | Laboratory hazards equivalent to academic lab settings (restricted hazardous chemical inventory; well-established procedures in place) | Moderate or varying laboratory hazards within a narrow range (open hazardous chemical inventory; evolving procedures) | Novel hazards or severe established hazards (high hazard chemicals or processes with well-established procedures) |
| Flexible |
| Context Dependent |
| **Chemicals Used** *(types or characteristics of chemicals used)* | Consumer products in consumer packaging; may receive but not open chemical packages | Low concentration acids/bases, lower alcohols, solid salts, simple asphyxiant compressed gases | Typical chemical inventory for a research lab, such as flammable solvents, corrosives, inorganic salts, toxics, flammable gases. Limited amounts (mg quantities) of air or water reactive, pyrophoric materials | Air/water reactive, pyrophoric materials or pyrophoric gases. Explosives or potentially explosive compounds, highly toxic materials (in any state of matter) |
| Lab Room |
| None Identified |
| **Training Requirements** *(prerequisite for people working in the lab)* | Observe label and warning signs | General lab safety training in addition to warning labels and signs | Laboratory hazards require laboratory- specific safety training | Laboratory access restricted to people accompanied by experienced personnel |
| Lab Group |
| Based on Highest Lab Hazard Rating |
| **Supervision Requirements** *(safety responsibilities of lab leader(s))* | Awareness of work being conducted | Constant supervision or working alone based on specific restrictions | Peer presence or working alone based on specific restrictions | Peer presence |
| Lab Room |
| Based on Highest Active Lab Hazard Process |
| **Oversight Requirements** *(expectations for institutional review of lab operations)* | \* Weekly self-inspections;  \*\* self-audits three times per year | \* Weekly self-inspections;  \*\* self-audits three times per year | \* Weekly self-inspections;  \*\* self-audits three times per year;  \*\*\* monthly drop bys; † risk-based institutional review schedule | \* Daily self-inspections;  \*\* self-audits three times per year;  \*\*\* monthly drop bys; † risk-based institutional review schedule |
| Lab Group |
| Based on Highest Lab Hazard Rating |
| **Planning Requirements** *(specific requirements for planning of work)* | Process-specific plans written and the presence of other chemicals prohibited | Written procedures including safety protocols | Written procedures including safety protocols must be peer reviewed | Written procedures including safety protocols must be reviewed by supervisor |
| Process Specific |
| Based on Highest Rated Chemical Involved |
| **General PPE Requirements (eye and skin exposure)** *(protection requirements to enter the room)* | Coverage of legs and feet | CSL 1 PPE plus eye protection | CSL 2 PPE plus lab coat | CSL 3 plus flame resistant lab coat |
| Lab Room |
| Primarily Based on Physical Ratings |
| **Specific PPE Requirements (hand and respiratory protection)** *(protection requirements to conduct work)* | No gloves | Activity-specific gloves, such as thin nitrile, vinyl, or latex disposable gloves would be typical | Activity-specific gloves, such as thin nitrile, vinyl, or latex disposable gloves would be acceptable for an incidental small quantity splash. Neoprene or butyl rubber may be needed for immersion in solvents, or similar situation | Activity-specific gloves, such as flame resistant if using pyrophoric liquids, neoprene if using large quantities |
| Process Specific |
| Primarily Based on Physical Ratings |
| **General Ventilation Requirements** *(facility support requirements)* | None or low ventilation specifications | ‡ Moderate ventilation, as defined by laboratory ventilation management plan | ‡ High ventilation, as defined by laboratory ventilation management plan | Ventilation designed specifically for this operation |
| Lab Room |
| Primarily Based on Health Rating |
| **Other Engineering Controls** |  | Local exhaust ventilation (snorkel) | Fume hood, local exhaust ventilation (snorkel), limited glove box use | Fume hood, local exhaust ventilation (snorkel), glove/dry box, enclosed reactor |
|  |
| Based on Exposure Risk |
| **Emergency Response Protocol** *(expectations for response to potential hazmat emergencies)* | Institutional-specific response protocol | Institutional-specific response protocol; people with knowledge of incident have responsibility to provide information to responders | Institutional-specific response protocol; may have advanced lab response protocol to make the situation safe while evacuating | Institutional-specific response protocol; specific pre-planning required |
| Lab Room |
| Primarily Based on Physical and Mechanical Ratings |
| \* Self-inspection: quick look at physical surroundings; may or may not use a formal checklist.  \*\* Self-audit: more comprehensive review of the CSL and other documentation; use a checklist.  \*\*\* Drop-by: informal review, consult, check-in, friendly visit by an institutional representative.  † Risk-based Institutional Review: formal review of lab by an institutional representative; use a checklist, document issues for correction, escalate issues to upper management, as necessary.  ‡ Contact facilities for details about the laboratory ventilation plan. | | | | |

This file is excerpted from “Identifying and Evaluating Hazards in Research Laboratories: Guidelines developed by the Hazard Identification and Evaluation Task Force of the American Chemical Society’s Committee on Chemical Safety”.

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