

Hazard Assessment of Chemicals & Chemical Groups Using a Control Banding Technique

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Introduction

- ***Control banding is:***
 - A systematic, qualitative strategy for assessing and managing hazards.
 - Focused on a limited number of specific control measures.
 - Assignment of control measures is based on a range or “band” of hazards and potential exposure.

Chemical Safety Levels

- An approach to control banding for chemical use
 - Group chemical hazards and exposure with similar physical and chemical characteristics, processes and anticipated exposure scenarios.
- Given a well-defined set of chemical processes, control strategies are determined for each of these groupings – the Chemical Safety Level.



Pros, Cons, Limitations

- **Pros:**
 - Provides a broad overview of hazard controls appropriate to typical processes and reactions are well-established.
 - Provides a reasonable, logical way to assess hazards and apply controls systematically.
 - Can be used as a teaching tool to understand how protective strategies are matched to chemical hazards in a holistic way.
 - Chemical Safety Levels 1 to 4, are similar to biosafety levels/risk groups.
 - Can be applied to other workplaces where chemicals are used – shops, art studios, field or research stations.

Pros, Cons, Limitations

- **Cons and Limitations**

- Non-routine activities would need a more rigorous assessment, using other techniques.
- Control band nomenclature is context-dependent.
- Care must be taken with nomenclature to avoid confusion for intended audience.



Establishing Chemical Safety Levels

- A methodology is presented that could be used to help determine a Chemical Safety Level (CSL) appropriate to the chemical activities.
- Care should be taken in developing a CSL approach that works best with the research program.



Information Needed

- To inform the assignment of the Chemical Safety Level-
 - Chemical identity and the GHS assignments;
 - Chemical amounts and concentrations;
 - Expected chemical reactions;
 - Research processes and/or lab activities;
 - Potential emergency scenarios;
 - Professional judgment, supported by EH&S consult.

Table 8.1 Suggested Approach for Establishing Chemical Safety Levels				
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	Laboratory hazards equivalent to teaching 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 laboratory - flammable solvents, corrosives, inorganic salts, toxics, flammable gases. No air/water reactive, pyrophoric materials	Air/water reactive, pyrophoric materials or gases. Explosives or potentially explosive compounds, highly toxic materials (in any state of matter)
Lab Room				
None identified				

Table 8-1 – designed to help you determine a CSL appropriate to the chemical activities in the lab.

Compare the tentative CSL to “Chemicals Used” row to confirm proper assignment.

Working down the rows, identify the safety measures appropriate to the lab room, lab group or process.

TRAINING REQUIREMENTS (prerequisites 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; ***monthly drop bys; **self-audits three times per year; ‡risk-based institutional review schedule	*Daily self-inspections; ***monthly drop bys; **self-audits three times per year; †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 supervisor reviewed
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	Above plus eye protection	Above plus lab coat	Above plus flame resistant lab coat

Assigning the Chemical Safety Level

- The CSL assignment should be accomplished through partnership of EH&S professionals, academic department management and individual lab supervisors.
- CSL assignments should be revisited at least annually to assure continued applicability.



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Summary

Control banding, in the form of assignment of a Chemical Safety Level with an associated band of controls, can be a straightforward way of applying risk mitigation to well-established chemical research activities.

