

Introduction

OSHA 1910.1450 (e)(3) states that the Chemical Hygiene Plan (CHP) must include criteria for identifying and implementing adequate controls, criteria for obtaining prior approval before implementation, and specific provisions for exceptionally hazardous substances:

- (ii) "criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous."
- (v) "The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation;"
- (vii) "Provisions for additional employee protection for work with particularly hazardous substances. These include 'select carcinogens,' reproductive toxins and substances which have a high degree of acute toxicity." (Ref 29CFR1910.1450)

Many chemical hygiene plans may not include sufficient detail to adequately describe selection of appropriate engineering and administrative controls and PPE in a dynamic laboratory research and development environment. Laboratory workers could be at risk if insufficient controls are utilized either for an initial experiment, or a revised experiment for which initial controls are no longer protective.

By using the concepts of assigning Control Bands using GHS H-codes, and developing a laboratory-focused risk matrix and controls approach, a solution can be developed and incorporated into the CHP that can be utilized by bench laboratory workers to satisfy the requirements above.

Building on a Foundation: ILO, GHS, Prudent Practices

The ILO Chemical Control Toolkit uses GHS Health Hazard Statements to assign chemicals to hazard bands A-E and then estimates exposure by considering scale of use and dustiness (solids) or volatility (liquids). The final outcomes are recommended controls, mainly focused on manufacturing operations. This tool follows the same approach but adds consideration of physical and environmental hazards and recommends controls options focused on laboratory scale operations.

Sources: *Prudent Practices for Handling Hazardous Chemicals in Laboratories*, *GHS Purple Book* and *ILO Toolkit*

www.ilo.org/legacy/english/protection/safework/ctrl_banding/toolkit/icct/



The goal of this tool is to provide a resource to laboratory employees for evaluating planned experiments to ensure hazards are recognized and controls are in place. When fully implemented and documented, it can serve as a means to comply with evaluation criteria of a Chemical Hygiene Plan. The tool will be field tested later this year. Consideration is being given to converting it into an app.



**Risk Assessment Tool:
User Interface**

1. Use classification from SDS(s) Section 2 to manually select from the dropdown list each H-phrase for chemical(s) used.

Chemical Name	Mixture XYZ
CAS No.	mixture
H-Code	H226
H-Code	H301
H-Code	H314
H-Code	H335
H-Code	H400
H-Code	

2. Select estimates for exposure potential from the dropdown lists

Quantity	Ability to become airborne
milliliters	Medium:Boiling point >50 - <150 C

Tool returns the Hazard Bands and Exposure Scores to the user:

Hazard Bands	Special Hazards
Flamm Liquid 3	
Health 3	
Health 3	Skin and Eye
Health 3	Inhalation
Environment 1	

Quantity	Score	Ability to become airborne	Score
milliliters	3	Medium:Boiling point >50 - <150 C	3

3. Safe handling advice is sorted, duplicates removed and returned to the user.

Remove ignition sources before handling.	Bond or ground conductive containers and transfer lines.	Do not heat using an open flame. Use steam, water, oil, hot air baths, or heating mantle.
Avoid skin contact with toxic material: wear gloves and lab coat and/or gauntlets.	Wash hands after removing gloves.	Wear eye protection.
If potential for generating aerosols, use in fume hood or other containment.	Contain all liquid and solid waste for proper disposal.	



**Behind the Scenes:
Tool Functionality**

1. Tool associates a hazard band with each H phrase selected. Special concerns are noted.

Chemical Name	Mixture XYZ		
CAS No.	mixture		
		Hazard Bands	Special Hazards
H-Code	H226	Flamm Liquid 3	
H-Code	H301	Health 3	
H-Code	H314	Health 3	Skin and Eye
H-Code	H335	Health 3	Inhalation
H-Code	H400	Environment 1	
H-Code		#N/A	

2. Tool assigns exposure scores based on the exposure potential selections.

Quantity	Score
milliliters	3
Ability to become airborne	Score
Medium:Boiling point >50 - <150 C	3

3. Tool retrieves safe handling advice that corresponds to all Hazard Bands with the applicable Exposure Potential.

Hazard Bands	Special Hazards	Score	Score
Flamm Liquid 3		3	3
Health 3			
Health 3	Skin and Eye		
Health 3	Inhalation		
Environment 1			

Remove ignition sources before handling.	Bond or ground conductive containers and transfer lines.	Do not heat using an open flame. Use steam, water, oil, hot air baths, or heating mantle.
Avoid skin contact with toxic material: wear gloves and lab coat and/or gauntlets.	Wash hands after removing gloves.	
Avoid skin contact with toxic material: wear gloves and lab coat and/or gauntlets.	Wash hands after removing gloves.	Wear eye protection.
Avoid skin contact with toxic material: wear gloves and lab coat and/or gauntlets.	Wash hands after removing gloves.	If potential for generating aerosols, use in fume hood or other containment.
Contain all liquid and solid waste for proper disposal.		

