

Laboratory Scale Risk Assessment

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Laboratory Scale Risk Assessment

OBJECTIVE:

- Present a tool for easily assessing the RISK associated with a common lab procedure

GOALS:

- Distinguish HAZARD and RISK
- Understand personal importance of RISK ASSESSMENT
- Understand a LabRat

Laboratory Scale Risk Assessment

Standard Operating Procedures

- Part of good science – details of how you do the experiment
- Safety must be part of the SOP
 - Reminders to yourself about how you can get hurt
- (M)SDSs report HAZARDS not RISKS
- Protecting yourself must address RISKS not HAZARDS

Laboratory Scale Risk Assessment

CHEMICAL HAZARD

- INHERENT
- UNCHANGEABLE
- MECHANISM BY WHICH CHEMICAL CAN DO HARM
 - Flammable Methanol
 - Skin/Eye Corrosive HCl/NaOH
 - Specific organ toxic Benzene, Methanol
 - And more ... see GHS

Laboratory Scale Risk Assessment

RISK = Π (frequency, severity)

- Qualitative Scale
 - HIGH, MODERATE, LOW
 - Making, working with neutral phosphate buffer
 - HPLC CH₃OH/CH₃CN/H₂O
 - Generating vinyl lithium

LOW RISK

MODERATE RISK

HIGH RISK

Laboratory Scale Risk Assessment

1. **Control banding chemical uses in research laboratories:** Hazards are placed into one of several categories, so that general control strategies appropriate for those categories may be implemented.
2. **Job hazard analysis:** A methodical approach to document the work steps and hazards associated with each step.
3. **What-if analysis:** An approach that raises a series of questions to help identify things that might go wrong.
4. **Checklists:** A method that tends to be more operational in that it helps researchers remember all of the precautions they are supposed to take.
5. **Structured development of standard operating procedures (SOPs):** A comprehensive method for evaluating various aspects of research work leading to development of SOPs.

Laboratory Scale Risk Assessment

Other:

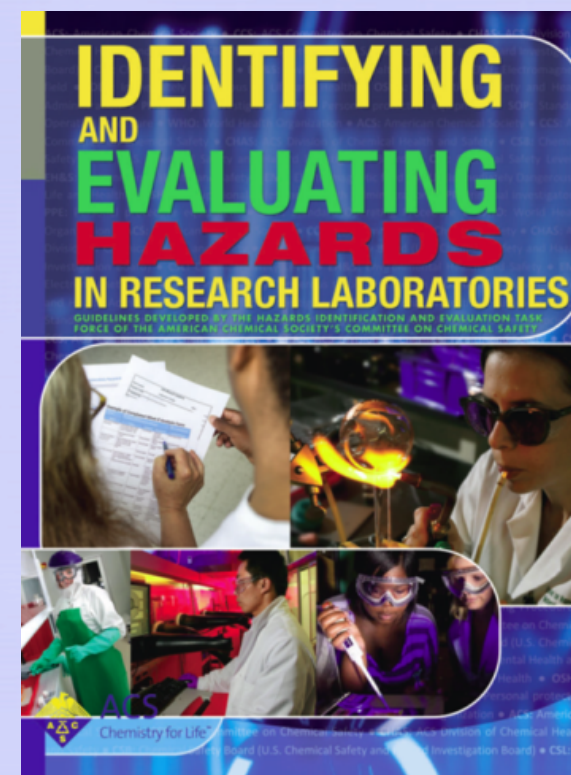
- HAZOP (Hazard & Operability) Study
- Failure Mode and Effect Analysis (FMEA)
- Fault Tree Analysis
 - And more – visit www.aiche.org

Objective is a comprehensive list of hazards

Chemical Lab Safety

American Chemical Society

- Identifying and Evaluating Hazards in Research Laboratories
- <http://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety.html>



Laboratory Scale Risk Assessment

Using a “simple” Lab Risk Assessment Tool

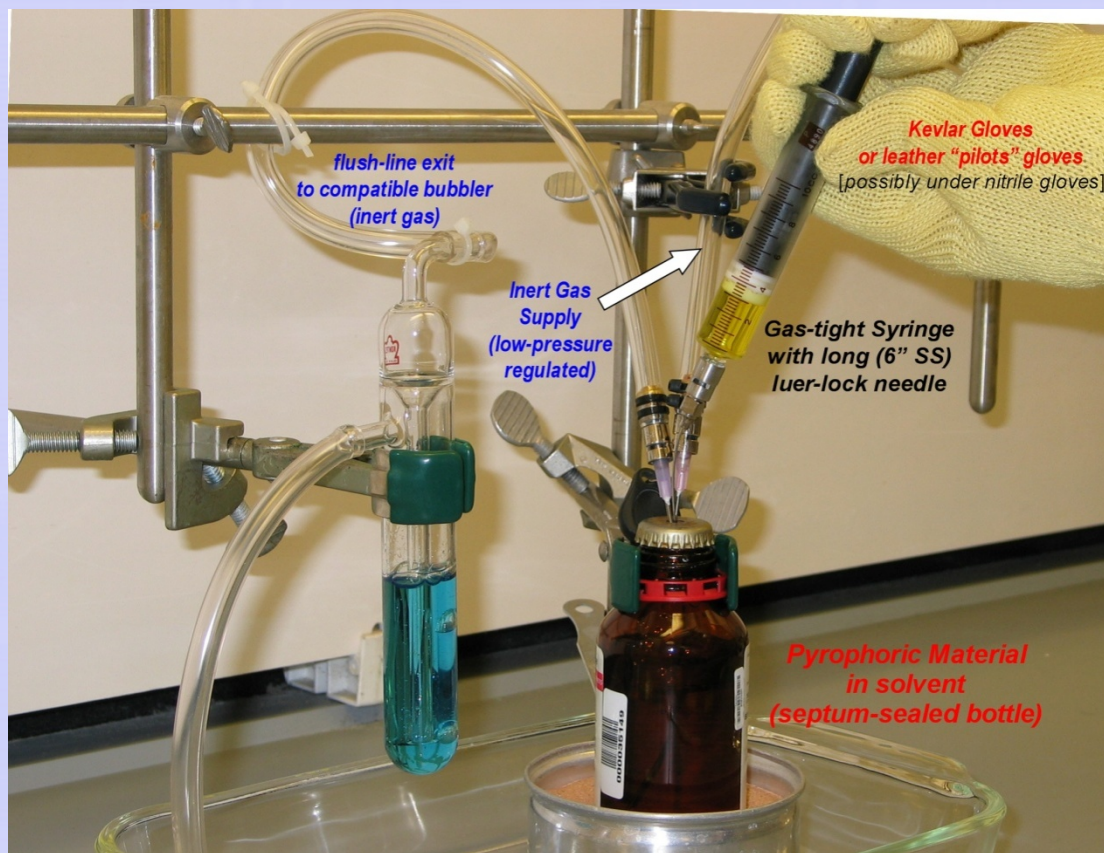
- LabRAT

t-Butyl Lithium generation of Vinyl Lithium



Laboratory Scale Risk Assessment

See also Aldrich Technical
Bulletin "*Handling and
Storage of Air-Sensitive
Reagents*"
AL-134



Chemical Volume(s)	Micro < 0.5 L	0.5	Normal	2 L	Large > 2 L
	1	2	3	4	5
Hazard Recognition	None	Routine			Extreme
Flammable	0	1	2	3	5
Corrosive	0	1	2	3	5
Toxic	0	1	2	3	5
Cryogenic	0	1	2	3	5
Pressure Hazard	Sub Atmospheric	Atmospheric			High Pressure
Explosive Hazard	0	3	1	2	3 5
	No	Yes			
Radiation Hazard	0	0	5		
		Minimal	Normal		High
Other Hazard: Specify & Score	0	1	3	4	5
Pyrophoric	2				
		Minimal	Normal		High
	0	1	2	3	4 5
Special Hazards:	Inhalation Toxicity 0	5	Reactive	0	
	5				
Procedure	Detailed & Written	Routine			Under Development
	1	2			5
		4			
Personnel Preparedness & Training	Fully Trained & Prepared	Routine			Untrained
	1	2			4 5
Ventilation Needed	Hood Used	General Lab Only			Not Used
	2	3			4 5
Shielding Needed	Used				Not Used
0	2				5
Process Conditions	Sub-ambient (P < 1 atm; T < 10°C)	Ambient (P = 1 atm; T > 10 & < 40°C)			Extreme
	2 or 3	2			4 5

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[illegible]

53 mL transfer t-BuLi via 60 mL syringe, per 29 Dec 2008

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	2 or 3	2 4			5

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RECOMMENDED ACTIONS BASED ON SCORE

LOW	< 10	Procedure can be performed with routine precautions.
MODERATE	11 - 20	Procedure can be performed with attention given to specific hazards. Supervision is recommended.
HIGH	21 - 25	Procedure may be performed if necessary. High level attention must be given to all hazards. High level, continuous supervision is mandatory.
EXTREME	> 25	Procedure must be revised to lower the risk.

List Chemicals Used

[illegible]

Laboratory Scale Risk Assessment

LabRAT is effective

LabRAT is easy to learn and to teach

LabRAT is available at

- <http://chemical-safety.com/documents/pdf/LABRAT-all.pdf>

Or email neal@chemical-safety.com

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Safe Research enhances excellent research



QUESTIONS?

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