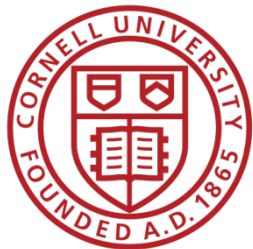


# **Engaging Students to Gain Understanding of Chemical Safety Information**

**Ellen Sweet, MS, CCHO  
Cornell University  
March, 2019**



Cornell University  
Environmental Health and Safety



# Outline

- Chemistry procedure preparation
- Working with EHS staff
- Risk assessment and documentation
- Next!

# Incoming!

*We know they're working with hazardous materials.  
How do we help them with a risk assessment?*

# Culture

*Have processes in place to develop protocols for conducting their work safely.*

Culture in which EHS is seen as a team member

Open lines of communication

Easy mechanisms for researchers to reach EHS staff

# Student Assessment of Chemical Risk?

## Risk Assessment Tools

This does not include completing a Job Hazard Analysis.



- SDS
- published procedures on similar work
- safety information from chemical supplier
- Internet searches on specific chemical safety information
- Consultation with colleagues
- Verbal review of laboratory practices
- Other


# When to Bring in the Big Guns

PMC  
US National Library of Medicine  
National Institutes of Health

PMC

Advanced Journal list

Journal List > HHS Author Manuscripts > PMC3286627

 **HHS Public Access**  
Author manuscript  
Peer-reviewed and accepted for publication

About author manuscripts Submit a manuscript

[J Org Chem](#). Author manuscript; available in PMC 2012 Feb 26. PMID: PMC3286627  
Published in final edited form as:  
[J Org Chem](#). 2009 Mar 20; 74(6): 2567–2570. NIHMSID: NIHMS95811  
doi: [10.1021/jo802706d](#) PMID: [19215116](#)

Author Manuscript

**Complications from Dual Roles of Sodium Hydride as a Base and as a Reducing Agent**

Dusan Heseck, Mijoon Lee, Bruce C. Noll, Jed F. Fisher, and Shahriar Mobashery\*

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The publisher's final edited version of this article is available at [J Org Chem](#)  
See other articles in PMC that [cite](#) the published article.

Sodium Hydride  
(Hydrogen)  
usually as

increases flammable gas  
by chemical supplier  
dispersion is safer than

c) Odour Threshold	no data available
d) pH	no data available
e) Melting point/freezing point	Melting point/range: 42 - 45 °C (108 - 113 °F) - lit.
f) Initial boiling point and boiling range	249 - 250 °C (480 - 482 °F) at 993 hPa (745 mmHg) - lit.
g) Flash point	135 °C (275 °F) - closed cup
h) Evapouration rate	no data available
i) Flammability (solid, gas)	no data available
j) Upper/lower flammability or explosive limits	no data available
k) Vapour pressure	no data available
l) Vapour density	no data available
m) Relative density	1.004 g/cm <sup>3</sup> at 25 °C (77 °F)
n) Water solubility	no data available
o) Partition coefficient: n-octanol/water	no data available
p) Auto-ignition temperature	no data available
q) Decomposition temperature	no data available
r) Viscosity	no data available
s) Explosive properties	no data available
t) Oxidizing properties	no data available



# How to Find EHS

Getting Started m Welcome to Cornell's ... Green Your Lab | Corn... Cornell University | Se... box

 Cornell University

## Environmental Health and Safety and Risk Management

Home About EHS "askEHS" e-Services Policies

EHS

**Welcome to EHS at Cornell University!**



**Emergency Services**



- DOT
- Emergency Management
- Emergency Services
- Environmental Compliance
- Event Management
- Fire Safety
- Lab & Research Safety
- Occupational Safety and Health

Environmental Health and Safety questions. We have  
of Environmental, Health and Safety.

**GOT A  
SAFETY  
QUESTION?**

**AskEHS!**

WWW.EHS.CORNELL.EDU/askEHS



# Initiating a Review

**Templates** that enable a thoughtful assessment of the procedure

Readily available chemical safety **resources**

# Format of the Documentation

Job Hazard Analysis			
Job Location: HEB 155		Laboratory Group: Frey	
Date:			
Activity or Job			
Completed By			
Equipment and Chemicals Required	Materials- 2ml septum vials (6), 0.5 ml 1% solution of NaH in THF, septum tops, syringe needle for nitrogen, PPE, propargyl bromide, fabric, freezer bag of ice, sand bucket		
Work Steps and Tasks <i>Describe the tasks / steps involved in the work – in order</i>	Hazards Identified for each Task / Step	Risk Level <i>Risk Nomogram can be used</i>	Control / Safe Work Procedures for each Task / Step <i>Controls to be implemented</i>
Location- glovebox N <sub>2</sub> (g) cylinder located next to hood. Through antechamber, place septum bottles	Contamination of glovebox with air	low	Training on the proper use of a glovebox and

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or  
  
EII  
Dry

# Format of the Documentation

 <b>Cornell University</b> Department of Environmental Health and Safety	<b>Hazardous Gas Proposal Form</b>	
	<b>Title:</b> Pre-Operational Safety, Health & Environmental Review	<b>Revision:</b> #1 3-22-2018



Research Process Overview			
<b>Date:</b> 02-019-2019	<b>Project:</b> Ethane Dry Reforming	<b>Principal Investigator (PI):</b>	David Erickson (de54); Tobias Haranth (th358)
<b>Review Initiator:</b>	Elvis Cao (xc295)	<b>EHS Representative:</b>	Ellen Sweet
<b>Other Review Team Members:</b>	PPelletier, DWoodie, EKolacki	<b>Lab Location:</b>	Olin Hall, B01
<b>Reason for POSHER:</b>	Initial Review <input type="checkbox"/> New Chemical or Process <input checked="" type="checkbox"/> Renovation/New Construction Project <input type="checkbox"/>		
<b>Brief Overview of Research/ Laboratory Process:</b>	Photocatalytic catalysis of ethane dry reforming to produce syngas ( $C_2H_6 + 2CO_2 \rightarrow 4CO + 3H_2$ ). UV LED lights will be used as the light sources, and heat tapes will be used to provide the required heat. We have already conducted photocatalytic study using the same platform for RWGS reaction ( $H_2 + CO_2 \rightarrow CO + H_2O$ ).		
<b>Brief Description of Primary Hazards:</b>	Both ethane and syngas are flammable. High temperatures		



Initiation Scoping	List Responses and Actions Required
Is a Safety Data Sheet for the specific gas provided with this form?	No
Timeframe desired for research to begin?	Middle to late February, 2019
What is the expected duration that the research will go?	A few months
Amount of gas consumption (per run, per week?)	8 hours each run, 2-3 times per week= 16-24 hours per week

# “Unpacking” the Procedure Steps

- How should tools be formatted?
- What questions should be asked?
- Search/engage other resources
  - DCHAS list-serv (not every EHS office has one of us!)

*Formulate an understanding of the hazards of the process, not just of the individual chemicals.*

# What's the Matter

- Can be very time consuming
- Can't do this with everyone



# Nifty New Tools

# Periodic Table of the Elements of Safety

1 Health Hazard	2 Corrosive																	3 Corrosive																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
4 Flammable	5 Toxic	6 Toxic	7 Toxic	8 Toxic	9 Toxic	10 Toxic	11 Toxic	12 Toxic	13 Toxic	14 Toxic	15 Toxic	16 Toxic	17 Toxic	18 Toxic	19 Toxic	20 Toxic	21 Toxic	22 Toxic	23 Toxic	24 Toxic	25 Toxic	26 Toxic	27 Toxic	28 Toxic	29 Toxic	30 Toxic	31 Toxic	32 Toxic	33 Toxic	34 Toxic	35 Toxic	36 Toxic	37 Toxic	38 Toxic	39 Toxic	40 Toxic	41 Toxic	42 Toxic	43 Toxic	44 Toxic	45 Toxic	46 Toxic	47 Toxic	48 Toxic	49 Toxic	50 Toxic	51 Toxic	52 Toxic	53 Toxic	54 Toxic	55 Toxic	56 Toxic	57 Toxic	58 Toxic	59 Toxic	60 Toxic	61 Toxic	62 Toxic	63 Toxic	64 Toxic	65 Toxic	66 Toxic	67 Toxic	68 Toxic	69 Toxic	70 Toxic	71 Toxic	72 Toxic	73 Toxic	74 Toxic	75 Toxic	76 Toxic	77 Toxic	78 Toxic	79 Toxic	80 Toxic	81 Toxic	82 Toxic	83 Toxic	84 Toxic	85 Toxic	86 Toxic	87 Toxic	88 Toxic	89 Toxic	90 Toxic	91 Toxic	92 Toxic	93 Toxic	94 Toxic	95 Toxic	96 Toxic	97 Toxic	98 Toxic	99 Toxic	100 Toxic	101 Toxic	102 Toxic	103 Toxic	104 Toxic	105 Toxic	106 Toxic	107 Toxic	108 Toxic	109 Toxic	110 Toxic	111 Toxic	112 Toxic	113 Toxic	114 Toxic	115 Toxic	116 Toxic	117 Toxic	118 Toxic	119 Toxic	120 Toxic	121 Toxic	122 Toxic	123 Toxic	124 Toxic	125 Toxic	126 Toxic	127 Toxic	128 Toxic	129 Toxic	130 Toxic	131 Toxic	132 Toxic	133 Toxic	134 Toxic	135 Toxic	136 Toxic	137 Toxic	138 Toxic	139 Toxic	140 Toxic	141 Toxic	142 Toxic	143 Toxic	144 Toxic	145 Toxic	146 Toxic	147 Toxic	148 Toxic	149 Toxic	150 Toxic	151 Toxic	152 Toxic	153 Toxic	154 Toxic	155 Toxic	156 Toxic	157 Toxic	158 Toxic	159 Toxic	160 Toxic	161 Toxic	162 Toxic	163 Toxic	164 Toxic	165 Toxic	166 Toxic	167 Toxic	168 Toxic	169 Toxic	170 Toxic	171 Toxic	172 Toxic	173 Toxic	174 Toxic	175 Toxic	176 Toxic	177 Toxic	178 Toxic	179 Toxic	180 Toxic	181 Toxic	182 Toxic	183 Toxic	184 Toxic	185 Toxic	186 Toxic	187 Toxic	188 Toxic	189 Toxic	190 Toxic	191 Toxic	192 Toxic	193 Toxic	194 Toxic	195 Toxic	196 Toxic	197 Toxic	198 Toxic	199 Toxic	200 Toxic	201 Toxic	202 Toxic	203 Toxic	204 Toxic	205 Toxic	206 Toxic	207 Toxic	208 Toxic	209 Toxic	210 Toxic	211 Toxic	212 Toxic	213 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QR Code

Key

Reactive Chemical Substances	R	Reagents
Physical Hazards		
Biological Hazards		
Flammable	A	Acute
Substitution		
Engineering Controls	M	Moderate
Administrative Controls		
Personal Protective Equipment		
Response Plans	P	Proper
Green		

Where does this interactive tool fit into the risk assessment process students do?

# Changing Science

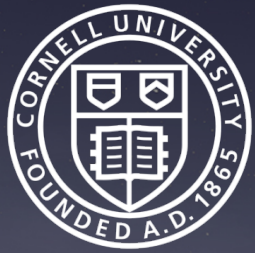
Management buy-in that current methods  
must be improved

Students better prepared with new  
assessment methods

Efficient, Detailed, and Sustainable

Enter- iRAMP





# Questions?

