

NATIONAL UNIVERSITY OF SINGAPORE
FACULTY OF SCIENCE

Experiment-Based Risk Assessment Form

Name of Department	Chemistry	Location of Lab	S7-04
Name of Laboratory	Advanced Chemistry Teaching Lab	Name of PI (lecturer-in-charge)	Dr. Chng Yong Sheng
Name of Lab Officer	Leng Zhi Jin, Wong Ling Rong	Name of Activity/Experiment	CM5176 GIST (Sem 1) Synthesis of 3-Butyl-1-methylimidazolium Bromide


Hazard Identification				Risk Evaluation & Control						
No	Description / Details of Steps in Activity	Hazard(s)	Possible Accident(s) or ill Health, and Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
1	A solution of 1-methylimidazole (5 mmol) in acetonitrile (25 cm ³) was prepared in a round bottom flask and cooled in an ice/water bath	1-methylimidazole: toxic	Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood	2	1	2			
		1-methylimidazole: irritant	Irritating to eyes and skin	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1			
		acetonitrile: toxic	Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood	2	1	2			
		acetonitrile: irritant	Irritating to eyes and skin	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1			
		acetonitrile: flammable	May causes fire and burns if heated	Keep away from open flames/heat sources	2	1	2			
		Broken glassware	Cuts from broken glassware	Check glassware before use	2	1	2			
2	To this solution was added the bromoalkane dropwise (5.5 mmol). The resulting solution was then stirred and allowed to warm to room temperature. It was then heated at reflux overnight	n-bromoalkane: toxic	Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood	2	1	2			
		n-bromoalkane: flammable	Irritating to eyes and skin	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1			
		n-bromoalkane: irritant	May causes fire and burns if heated	Keep away from open flames/heat sources	1	1	1			
		Hot surfaces: hotplate, hot oil	Burns from touching hotplate or oil bath.	Do not touch hot surfaces. After switching off the heat, place oil bath and hotplate away from user.	2	1	2			
		loose connections to reflux condenser	Causes water leaks	Secure all connections to reflux condenser with cable ties	2	1	2			
3	After evaporation of the solvent, the viscous solution was either washed and decanted or crystallized by addition of ethyl acetate (3 x 25 cm ³) and resulting crystals were filtered	rotary evaporator: electrical hazard	electrocution	Ensure there are no exposed wires present	2	1	2			
		rotary evaporator: evacuated system	Potential implosion risk: cuts from broken glassware.	Inspect all glassware visually, do not use any with cracks	2	1	2			
		ethyl acetate: toxic	Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood	2	1	2			
		ethyl acetate: irritant	Irritating to eyes and skin	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1			
		ethyl acetate: flammable	May causes fire and burns if heated	Keep away from open flames/heat sources	2	1	2			
		Broken glassware	Cuts from broken glassware	Check glassware before use	2	1	2			
	If a solid was obtained, the crude product was recrystallized from a reduced volume of acetonitrile before the addition of ethyl acetate	acetonitrile: toxic	Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood	2	1	2			
		acetonitrile: irritant	Irritating to eyes and skin.	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1			

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4		acetonitrile: flammable	May causes fire and burns if heated	Keep away from open flames/heat sources	2	1	2		
		ethyl acetate: irritant	Irritating to eyes and skin. Harmful if swallowed or inhaled	No eating or drinking in lab, use in fume hood. Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1		
		ethyl acetate: flammable	May causes fire and burns if heated	Keep away from open flames/heat sources	1	1	1		
		Broken glassware	Cuts from broken glassware	Check glassware before use	1	1	1		
5	If a viscous liquid was obtained, the solvent was removed in vacuo at 60 °C and excess starting material was extracted from the product with ethyl acetate	rotary evaporator: electrical hazard	electrocution	Ensure there are no exposed wires present	2	1	2		
		rotary evaporator: evacuated system	Potential implosion risk: cuts from broken glassware.	Inspect all glassware visually, do not use any with cracks	2	1	2		
		Broken glassware	Cuts from broken glassware	Check glassware before use	2	1	2		
6	Preparation of NMR sample; add 0.4 mL of deuterated solvent in NMR tube along with at least 50 mg of sample	CDCl ₃ : toxic	Harmful if swallowed or inhaled or absorbed through skin	No eating or drinking in lab, use in fume hood. Wear gloves, safety glasses, long pants, covered shoes and lab coat	2	1	2		
		CDCl ₃ : irritant	Irritating to eyes and skin	Wear gloves, safety glasses, long pants, covered shoes and lab coat	1	1	1		
		CDCl ₃ : flammable	May causes fire and burns if heated	Keep away from open flames/heat sources	1	1	1		

Conducted By


Name Dr. Chng Yong Sheng

Signature 

Date 1/6/2022

Approved By

Name Assoc Prof Yeo Boon Siang

Signature 

Approval date 1-Jun-22

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(Maximum 3 years)