

NATIONAL UNIVERSITY OF SINGAPORE

Hazard Risk Assessment Form									
Name of Department		Chemistry			Location of Lab		S7-04		
Name of Laboratory		Advanced Teaching Lab			Name of PI		Dr Foo Mao Lin		
Name of LO		Leng Zhi Jin, Wong Ling Rong			Name of Activity/Experiment		GIST: Distillation		

Hazard Identification				Risk Evaluation and Controls						
No	Description/Details of Steps in Activity	Hazards	Possible Accident / Ill Health & Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (Probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
1	Prepare 10 mL of methyl cyclohexane and n-heptane with mole fractions between 0 and 1 with a step width of about 0.1	Methyl cyclohexane - flammable, irritant, toxic	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	1	2	2			
		n-Heptane- flammable, irritant, toxic	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	2	1	2			
		Breakage of glassware, pipette.	1. Skin cuts and exposure to hazardous chemicals (methyl cyclohexane and n-heptane) from broken glassware.	1. Perform reaction in a well-ventilated fumehood. 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. Check glassware for cracks prior to use.	1	1	1			

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2	Distill mixture of methyl cyclohexane and n-heptane in the apparatus with total reflux until equilibrium has been established.	Overheating	1. Explosion hazard - fire, flying glass pieces and harmful solvent vapour (Methyl cyclohexane and n-heptane)	1. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 2. Check that no glassware is cracked before starting the reflux 3. Ensure water circulation for condenser is turned on before refluxing to prevent solvent vapour from overheating and igniting 4. Ensure the heating mantle temperature is set close to the reflux temperature and not too high to prevent overheating	1	2	2		
		Methyl cyclohexane - flammable, irritant, toxic	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	1	2	2		
		n-Heptane- flammable, irritant, toxic	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	2	1	2		
		Breakage of glassware, pipette.	1. Skin cuts and exposure to hazardous chemicals (methyl cyclohexane and n-heptane) from broken glassware.	1. Perform reaction in a well-ventilated fumehood. 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. Check glassware for cracks prior to use.	1	1	1		

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		Electric shock hazard (Heating mantle)	Electric shock to the user in case of contact.	<ol style="list-style-type: none"> 1. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 2. Check heating mantle for broken wirings prior to use. 3. Reminder from lecturer or Graduate teaching assistant or lab technicians., do not touch power source and parts with wet bare hands. 4. Read the standard operational procedure and lab manual. 	2	1	2			
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3	Refractometer - prepare 0.3mL mixtures of methyl cyclohexane and n-heptane according to Table 1 and immediately measure the refractive indices.	Chemical hazards: Methyl cyclohexane and n-heptane are irritant to skin and eyes.	1. Exposure to hazardous chemicals (methyl cyclohexane and n-heptane). Irritation and burns if in contact with skin and eyes. 2. May be fatal if swallowed. 3. Harmful if inhaled.	1. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 2. Wash skin thoroughly after the experiment. 3. Perform reaction in a well-ventilated fumehood. 4. Reminder from lecturer or Graduate teaching assistant or lab technicians.	1	2	2			
		Fire hazard: Methyl cyclohexane and n-heptane and their vapour are flammable in air.	Explosion or catching of fire when methyl cyclohexane and n-heptane is exposed to heat.	1. Perform reaction in a well-ventilated fumehood. 2. Keep away from ignition sources.	2	1	2			
		Human factor: Spillage of chemicals and breakage of refractometer.	1. Irritation if in contact with skin. 2. Skin cuts and exposure to hazardous chemicals (methyl cyclohexane and n-heptane) from broken glassware.	1. Perform reaction in a well-ventilated fumehood. 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. Check glassware for cracks prior to use.	2	1	2			
4	Gas chromatography - inject exactly 0.1-0.2 μ L with the μ L syringe.	Sharps hazard: Injury from needle of the syringe.	1. Cut by the sharp needle.	1. Wear proper PPE (lab coat, nitrile gloves, safety glasses), use with caution and reminder from lecturer or Graduate teaching assistant or lab technicians. 2. Reminders to be advocated to students not to tamper with the needles unnecessarily.	1	2	2			
		Inhalation of solvent vapours (methyl cyclohexane and n-heptane)	1. Exposure to chemicals (methyl cyclohexane and n-heptane).	2. Turn on the GC exhaust suction before using the instrument	1	1	1			

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5	Bubble tray distillation. Pour 50 mL each of n-pentane, n-hexane and n-heptane into the 250 mL flask. Start the distillation reflux	Overheating	1. Explosion hazard - fire, flying glass pieces and harmful solvent vapour (Methyl cyclohexane and n-heptane)	1. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 2. Check that no glassware is cracked before starting the reflux 3. Ensure water circulation for condenser is turned on before refluxing to prevent solvent vapour from overheating and igniting 4. Ensure the heating mantle temperature is set close to the reflux temperature and not too high to prevent overheating	1	2	2			
		n-Pentane	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	2	1	2			
		n-Hexane	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	2	1	2			
		n-Heptane	1. Possible fire hazard which may lead to burns 2. May be harmful if swallowed or absorbed through the skin. 3. Harmful if inhaled.	1. Keep away from ignition source 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. No eating or drinking in the lab 4. Perform reaction in a well-ventilated fumehood.	2	1	2			

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	Breakage of glassware, pipette.	1. Irritation if in contact with skin. 2. Skin cuts and exposure to hazardous chemicals (methyl cyclohexane and n-heptane) from broken glassware.	1. Perform reaction in a well-ventilated fumehood. 2. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 3. Check glassware for cracks prior to use.	2	1	2			
	Electric shock hazard (heating mantle)	Electric shock to the user in case of contact.	1. Ensure PPE (safety glasses, nitrile gloves, lab coat, covered shoes) are worn at all times. 2. Check heating mantle for broken wirings prior to use.	2	1	2			

Name Dr Foo Mao Lin

Signature _____

date 21-Jun-22

Name A/P Yeo Boon Siang

Signature 

Approval date 21-Jun-22

Next Revision date
(Maximum 3 years)

20-Jun-25