NATIONAL UNIVERSITY OF SINGAPORE
FACULTY OF SCIENCE

Experiment-Based Risk Assessment Form

Name of Department	**Chemistry**	**Name and Location of Lab**	**S5-01-07 and S5-04-10**
Name of Laboratory	**General Teaching Lab and Synthesis Lab**	**Name of PI (lecturer-in-charge)**	**Dr Hoang Truong Giang**
Name of Student	**Irwan Iskandar, Teo Ai Hwee, Tan Lay San**	**Name of Activity/Experiment**	**Synthesis of Linalool**

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	Connect 100 mL 3-necked rbf to N2 gas and bubbler folowed by adding 0.3 mL of 6-methyl-5-hepten-2-one (sulcatone) and 2.0 mL tetrahydrofuran (THF) into the rbf. Stir the mixture and cool in ice bath.	**Fire Hazard**: Sulcatone is flammable. THF is flammable. **Chemical Hazard**: THF is an eye irritant and a probable carcinogen. **Physical Hazard**: Breakage of rbf or bubbler. **Electrical Hazard:** Exposed wires due to fray cables, plugs and/or sockets of the hotplate.	•Fire may start if sulcatone or THF are exposed to sparks, naked flame or other ignition sources. •THF can cause eye irritation if in contact with naked eye. •Cut injuries may result from broken glassware (rbf). •May result in short circuit and electrical shocks.	•Keep away from sparks naked flames and other ignition sources to prevent the catching of fire. •Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Experiment to be performed in a fumeood. Clean up any spillage to reduce exposure. •Visual inspection of glassware before any use and handle glassware with care. •Check the cables, plugs and sockets before use, Ensure that plugs are dry before use. In the case of fire, use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.	2	1	2			
2	Collect 6.0 mL of vinylmagnesium bromide (1.0 M in THF) via syringe and and add into the rbf dropwise over 5 minutes. Then, remove ice bath and stir for 1 h.	**Fire Hazard**: Vinylmagnesium bromide in THF is flammable. **Chemical Hazard**: Vinylmagnesium bromide is an skin irritant and a probable carcinogen. **Physical Hazard**: Breakage of rbf and sharps hazard (syringe). **Electrical Hazard**: Exposed wires due to fray cables, plugs and/or sockets of the hotplate.	•Fire may start if vinylmagnesium bromide is exposed to sparks, naked flame, and other ignition sources. •Vinylmagnesium Bromide can cause skin irritation if in contact with skin. •Cut injuries may result from broken glassware (rbf and syringe). •May result in short circuit and electrical shocks.	•Keep away from sparks naked flames and other ignition sources to prevent the catching of fire. •Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Experiment to be performed in a fumeood. Clean up any spillage to reduce exposure. •Visual inspection of glassware before any use and handle glassware with care. •Check the cables, plugs and sockets before use, Ensure that plugs are dry before use. In the case of fire, use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.	2	1	2			
3	For work-up, cool the reaction mixture in an ice bath and add 10 mL of saturated ammonium chloride	**Chemical Hazard**: Ammonium chloride is an eye irritant. **Physical Hazard**: Breakage of rbf or beaker..	•Ammonium chloride can cause serious eye irritation if in contact with the eye. •Cut injuries may result from broken glassware (rbf or beaker)	•Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Experiment to be performed in a fumeood. Clean up any spillage to reduce exposure. •Visual inspection of glassware before any use and handle glassware with care.	1	1	1			
4	Transfer the mixture into a 250 mL separatory funnel and add 20 mL of ethyl acetate and 20 mL of deionized water. Shake and separate the two layers. Extract the aqeous layer two more times with ethyl acetate and combine all 3 organic layers and subsequently extract this with saturated NaCl.	**Fire Hazard**: Ethyl acetate is flammable. **Chemical Hazard**: Ethyl acetate is an eye irritant. **Physical Hazard**: Breakage of conical flask, rbf, beaker or separatoory funnel. **Human Factor**: Spillage of solution from separatory funnel.	•Fire may start if ethyl acetate is exposed to sparks, naked flame or other ignition sources. •Ethyl acetate can cause eye irritation if in contact with the eye. •Cut injuries may result from broken glassware.	•Keep away from sparks naked flames and other ignition sources to prevent the catching of fire. •Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Experiment to be performed in a fumeood. Clean up any spillage to reduce exposure. •Visual inspection of glassware before any use and handle glassware with care.	2	1	1			

5	Pack a 60 mL sintered glass funnel with 1.5-2.0 cm of silica and add 10 mL of ethyl acetate. Apply vaccum and filter the extracted reaction mixture through the short pad of silica, into a 250 mL rbf, and this is followed by 2 X 30 mL washes of ethyl acetate.	**Fire Hazard:** Ethyl acetate is flammable. **Chemical Hazard:** Ethyl acetate is an eye irritant. Silica gel is a respiratory hazard. **Physical Hazard**: Breakage of beaker, separatory funnel or conical flask. **Human Factor**: Spillage of solution from beaker or separtory funnel.	•Fire may start if ethyl acetate is exposed to sparks, naked flame or other ignition sources. •Ethyl acetate can cause eye irritation if in contact with the eye. •Silica gel can cause respiratory problems if breathed in large amounts. •Cut injuries may result from broken glassware (beaker, separatory funnerl or conical flask).	•Keep away from sparks naked flames and other ignition sources to prevent the catching of fire. •Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Experiment to be performed in a fumeood. Clean up any spillage to reduce exposure. •Wear a mask if needed and do not breathe heavily when using silica gel. •Visual inspection of glassware before any use, Handle glassware with care.	2	1	2			
6	Remove the solvent by rotary evaporation and run an IR analysis as well as prepare the sample for NMR analysis.	**Fire Hazard**: Ethyl acetate is flammable. **Chemical Hazard**: Ethyl acetate is an eye irritant. **Physical Hazard**: Breakage of rbf or rotavap glasswares. **Electrical Hazard:** Exposed wires due to fray cables, plugs and/or sockets of the rotavap. **Mechanical Hazard**: Moving parts of rotavap.	•Fire may start if ethyl acetate is exposed to sparks, naked flame or other ignition sources. •Ethyl acetate can cause eye irritation if in contact with the eye. •Cut injuries may result from broken glassware. •May result in short circuit and electrical shocks. •Part of clothing or hair may get tangled on the moving parts of the rotary evaporator.	•Keep away from sparks naked flames and other ignition sources to prevent the catching of fire. •Proper PPE to be worn (gloves, goggles, lab coat, long pants, covered shoes, no contact lenses). •Clean up any spillage to reduce exposure. •Visual inspection of glassware before any use Handle glassware with care. •Check the cables, plugs and sockets before use, Ensure that plugs are dry before use. In the case of fire, use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.	2	1	2			

Conducted By _____

Name Dr Hoang Truong Giang

Signature _____

Date _____

Approved By

Name Assoc Prof Yeo Boon Siang, Jason

Signature _____

Approval date _____