

GENERAL LABORATORY RISK ASSESSMENT

1. General information.

Department:	Chemistry	Date:	November 22, 2022
Procedure:	Etching metal blades using concentrated Hydrochloric Acid	Revision Number:	1
Principal Investigator:	Johnny Rotten	PI Phone Number:	99999
PI Signature: *By signing you are indicating that the tasks are planned for in such a way that the risk is tolerable.		<u>X</u>	

2. Identify if any of the following hazards or materials are present.

<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Nanomaterials	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Cannabis
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Biohazards	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Nonionizing Radiation
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radioactive materials	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Designated Substances (acrylonitrile, benzene, silica, isocyanates, vinyl chloride, As, Pb, Hg, etc.)
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	X-ray sources		
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Class 3B or Class 4 Lasers		

If you checked “yes” for any of the items above, review the associated program to ensure you have managed those requirements prior to or in conjunction with completing this risk assessment.

3. Describe the project steps in point form detail. Identify equipment and materials at relevant steps.

<ol style="list-style-type: none"> 1. Place 25-27 g of stainless steel (SS) blades and 70 mL of concentrated HCl into a 500 mL an acid resistant bottle 2. Place a pre-drilled or punctured lid tightly onto the HDPE bottle. 3. Once mixing is complete, open fumehood, remove lid from bottle, and decant concentrated HCl into an appropriate 4L HDPE waste bottle. 4. Wash the SS blades by then pouring 200-300 mL of on-tap deionized water into the bottle, firmly replacing the lid, and gently shaking the bottle to remove any residual HCl (1-5 mL) and iron oxide filings. Decant solution into an appropriate 4L HDPE waste bottle (At this point the HCl is heavily diluted and poses little-to-no risk to researcher). 5. Repeat the previous step 2-3 times to remove all residual materials and/or the solution remains clear and colorless. 6. Place 200 mL of on-tap deionized water back into the bottle, replace cap, and perform ultrasonication for 1 hour. Decant waste into sink 7. Place 100 mL of Methanol into the bottle, replace cap, and perform ultrasonication for 20 minutes. Decant waste into an appropriate glass waste solvent bottle 8. Drying the blades: blades can now be transferred to a small (ca. 100 mL) glass bottle and placed in the oven at 150 C for 10 min 9. following drying blades should be removed from the oven using thermal gloves and immediately placed into a nitrogen purged desiccator until they are used

4. Identify the WHMIS hazard classes, categories, and anticipated control measures used to reduce worker exposure. (Hover mouse here to learn how to add more rows)

Name of chemical	List all WHMIS physical and health hazard classes and categories (drop-down list and free-form text)	Category / Type	Using WHMIS precautionary statements as a guide, identify what control practices are required to minimize worker exposure for handling these chemicals – consider ventilation, PPE, containment, etc.
Hydrochloric Acid (27%)	Corrosive to metals	1	<ol style="list-style-type: none"> 1. Avoid breathing material 2. Wash skin after handling 3. Wear protective clothing/gloves/eye protection/face protection 4. Will form hydrogen gas when in contact with metals
	Skin corrosion	1B	
	Serious eye damage	1	
	Specific target organ toxicity - single exposure (list organs) – respiratory system	3	
	Choose an item.	Choose item.	
	Choose an item.	Choose item.	
	Choose an item.	Choose item.	
	Choose an item.	Choose item.	
	Choose an item.	Choose item.	
	Choose an item.	Choose item.	

5. List equipment being used.

Equipment used consists of devices that impart energy or contain reactions – examples include rotovaps, ovens, pressure devices, material test stands etc. ([Hover mouse here to learn how to add more rows](#))

Identify equipment (Click box to enter text)	Step #	List Potential Equipment Hazards	Identify anticipated controls to control the identified risks
None		Choose an item or enter text.	
		Choose an item or enter text.	
		Choose an item or enter text.	
		Choose an item or enter text.	

6. Hazardous conditions.

Please identify how experimental conditions (pressure, temperature, humidity, etc.) may alter the behaviour of chemicals being used. Remember to consider reactive intermediates as well.

Reaction of metals with conc. HCL will form hydrogen gas. If shaken in a closed container, pressure will build and if the container is not vented, could potentially explode. Include specifications on venting of bottle and not using glass to mitigate this risk.

7. Managing hazardous waste.

Please include waste disposal methods in your SOPs. Guidance can be found on the [Hazardous Waste website](#) or by emailing esf@uwaterloo.ca. (Hover mouse here to learn how to add more rows)

Contents and Anticipated Class	Waste Type	Anticipated Amount
Hydrochloric Acid (37%), AQ	<input type="checkbox"/> Solid <input type="checkbox"/> Radioactive <input type="checkbox"/> Biological <input checked="" type="checkbox"/> Liquid <input type="checkbox"/> Battery <input checked="" type="checkbox"/> Chemical	100 mL per week
Hydrochloric Acid (<5%), DI Water Rinse, AQ	<input type="checkbox"/> Solid <input type="checkbox"/> Radioactive <input type="checkbox"/> Biological <input checked="" type="checkbox"/> Liquid <input type="checkbox"/> Battery <input checked="" type="checkbox"/> Chemical	20 mL per week
	<input type="checkbox"/> Solid <input type="checkbox"/> Radioactive <input type="checkbox"/> Biological <input type="checkbox"/> Liquid <input type="checkbox"/> Battery <input type="checkbox"/> Chemical	
	<input type="checkbox"/> Solid <input type="checkbox"/> Radioactive <input type="checkbox"/> Biological <input type="checkbox"/> Liquid <input type="checkbox"/> Battery <input type="checkbox"/> Chemical	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All necessary labels, containers, transportation means are available to start the research process.	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	All waste generators have taken the online Chemical Waste Segregation SO2070	

8. Standard operating procedures and emergency planning.

All medium to high-risk activities require an SOP. Work with toxic, pyrophoric, or water reactive materials require emergency planning SOPs. Identify what SOPs will be created for this project in the table below and where they are located. [SOP template is available from the Safety Office](#).

SOP Name	Procedure available	Indicate how this SOP covers anticipated risks
Overall Process	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	This SOP covers the use of raw materials and the equipment needed.
Spill, Exposure, or Emergency	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Groups emergency spill plan covers use of hydrochloric acid.
	<input type="checkbox"/> Yes <input type="checkbox"/> No	

9. Personal protective equipment.

Note: Closed toed shoes and lab coat are mandatory for work with chemicals.

PPE Type	PPE Storage Location	When it is Worn
Acid apron	Hanging on west wall	While handling acid and shaking bottles of blades
Acid resistant gloves	Near acid storage cabinet	While decanting and handling acid
Faceshield and glasses	Shelf in entryway	While shaking bottles of blades

10. Supervisor commentary.

Consider additional steps of using orbital shaker. Specify bottle should not be made of glass.

Potential additional steps include:

1. Place the orbital shaker into the "trace" fumehood of C2-162.
2. Put the bottle in the orbital shaker and set the stir speed to 150 rpm with the auto shut-off timer to 1 hour. Up to 9 bottles can be shaken at a time.
3. After shaking has started put the fumehood sash all the way down and place a note on the window stating, "Blade etching being performed in concentrated HCl do not use fumehood until orbital shaker has stopped".

11. Worker sign-off.

By signing the sheet below, you acknowledge that you have:

1. Understood the stipulations, hazardous, and control requirements outlined in this document.
2. You have completed practical training and had the opportunity to ask questions

Name (Print)	Signature	Date