

COSHH RISK ASSESSMENT

Assessment Reference Number:	Exeter_iGEM_COSHH_Diluting_Acids																		
Date of Assessment :	26.07.2017																		
Review Date:	Annually as standard or more frequently if (see examples below): Change to process or substance Control measures are failing Changes in toxicity information/revised MSDS Changes in personnel (vulnerability) Following an incident/accident/case of ill health Changes in frequency/quantity used																		
Building / Laboratory / Work Area:	Amory room 435																		
COSHH Assessors Name:																			
Identify the persons carrying out the process / using this/these substance(s)	Lab Technicians - Angela Elliott iGEM students - Anna Macklin, Jake Binsley																		
Who is likely to be exposed? (circle as appropriate)	Staff and/or Student(s)	Visitors	Maintenance	Other Groups <i>Give details</i>															
How many people are likely to be exposed? (circle as appropriate)	0-5	6-9	>10																
Any vulnerable or high risks groups likely to be exposed? (circle as appropriate)	Young Person (staff or student under 18)	Pregnant Workers (staff or student)	Other Groups <i>Give details</i>																
Process details:																			
<p>NB: If you are working with micro-organism(s) or biological agents please refer to the for information.</p> <p>If working with Nano-materials please refer to the Working Safely with Nanomaterials in Research & Development guidance document</p> <p>For work with chemicals continue completing this form.</p>																			
Diluting acids to required concentration																			
<table border="1"> <thead> <tr> <th>Dilution required</th> <th>Used for</th> <th>Amount of concentrated acid required if topped up with DI water to 1L</th> </tr> </thead> <tbody> <tr> <td>10% HCl</td> <td>Apparatus acid wash (general)</td> <td>100 ml</td> </tr> <tr> <td>35% HNO₃ (1+1)</td> <td>To acidify samples</td> <td>500ml</td> </tr> <tr> <td>18.5% HCl</td> <td>Prepare samples</td> <td>500ml</td> </tr> <tr> <td>2.1 % HNO₃</td> <td>Nitric acid wash for machine</td> <td>30ml</td> </tr> </tbody> </table>					Dilution required	Used for	Amount of concentrated acid required if topped up with DI water to 1L	10% HCl	Apparatus acid wash (general)	100 ml	35% HNO ₃ (1+1)	To acidify samples	500ml	18.5% HCl	Prepare samples	500ml	2.1 % HNO ₃	Nitric acid wash for machine	30ml
Dilution required	Used for	Amount of concentrated acid required if topped up with DI water to 1L																	
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2.1 % HNO ₃	Nitric acid wash for machine	30ml																	
<p>Always work in fume hood!</p> <p>Always pour acid in water, never the other way around!</p> <p>Diluting acids will result into an exothermic reaction and the release of toxic fumes.</p> <ol style="list-style-type: none"> Fill beaker or other container with approximately ¾ of the required water. Add required amount of concentrated acid (see table) 																			

3. Let cool down
4. Top up with water to required amount
5. Let fully cool down and top up with water if needed.

What products/substances are being used in the process?

Products / Substance(s) in process	Hazard or Risk phrases defined for this product in the Material Safety Data Sheet	Red, Amber, Green, (R,A,G,)	What form is this hazard?		Quantity Used / Stored?	Length of Time Used? (Duration)	How often is it used? (Frequency)	Is there a Workplace Exposure Limit for this product / substance?
Hydrochloric acid	Warning Skin Irritation Corrosive H290 (A) - May be corrosive to metals H314(R) - Causes severe skin burns and eye damage H335 (G) - May cause respiratory	RED	Gas		See table/ Concentrated acid is stored in lab 432 in an acid cupboard	Diluting acid in fume hood: <30min	About three days a week	UK - EH40/2005 STEL: 5 ppm 15 min STEL: 8 mg/m ³ 15 min TWA: 1 ppm 8 hr TWA: 2 mg/m ³ 8 hr
			Liquid	x				
			Vapour					
			Fume					
			Solid/ Powder/ Dust					
			Liquid	x				
			Vapour					
			Fume					
Nitric acid	Danger Oxidizing liquid Corrosive H314 (R) - Causes severe skin burns and eye damage H318 (R) - Causes serious eye damage EUH071 - Corrosive to the respiratory tract	RED	Gas		See table/ Concentrated acid is stored in lab 432 in an acid cupboard	Diluting acid in fume hood: <30min	About three days a week	UK - EH40/2005 STEL: 1 ppm 15 min STEL: 2.6 mg/m ³ 15 min
			Liquid	x				
			Vapour					
			Fume					
Water		Green	Solid/ Powder/ Dust		See table/ Concentrated acid is stored in lab 432 in an acid cupboard	ting acid in fume hood: <30min	daily	none
			Gas					
			Liquid	x				
			Vapour					
			Fume					
			Solid/ Powder/ Dust					

STOP CHECK AND CONSIDER THE NEXT QUESTION CAREFULLY

Can product(s) / substance(s) be substituted?	Y/N	Describe the options and the elimination / substitution process
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Can you eliminate any of the substances?	N				
Can you substitute any of the substances with less hazardous products?	N				
Are any of the substances being mixed?					
Number of substances being mixed	2	Highest risk (RAG) of the substances to be mixed?	RED	OVERALL RISK OF THE SUBSTANCE(S) (without control measures in place)	RED
NB: Treat overall assessment as highest risk (RAG)					
Is the process likely to create new hazards or enhance any existing hazards e.g. producing a violent or highly exothermic reaction, toxic fumes, by-products etc.?					Y
If Yes, detail any additional control measures that need to be in place		<p>Process must be carried out in fume hood! Keep away from metals.</p> <p>Mixing water and acid will result in an exothermic reaction and will produce toxic fumes!</p> <p>Hydrochloric acid: Corrosive Material. Causes burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors. Hazardous Combustion Products Hydrogen chloride gas.</p> <p>Nitric acid: Oxidizer: Contact with combustible/organic material may cause fire. Corrosive Material. Causes severe burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapors. May ignite combustibles (wood paper, oil, clothing, etc.). Hazardous Combustion Products Nitrogen oxides (NOx).</p>			
What are the risks of fire and/or explosion etc.?					
Is there a risk of fire?					Y
Is there a risk of explosion?					N
Is there a risk of toxic fumes?					Y
Is there any other associated fire related risk with this process?					N
If Yes to any of the above, detail any additional control measures that need to be in place.		<p>Process must be carried out in fume hood! Keep away from metals.</p> <p>Hydrochloric acid: Thermal decomposition can lead to release of irritating gases and vapours.</p> <p>Nitric acid is an oxidizer: Contact with combustible/organic material may cause fire. Corrosive Material. Causes severe burns by all exposure routes. Thermal decomposition can lead to release of irritating gases and vapours. May ignite combustibles (wood paper, oil, clothing, etc.).</p>			
NB: A separate risk assessment may be also required in accordance with the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR).					
What are the health effects?					
Possible route of entry into the body?		<p>Detail the health effects? (refer to the Material Safety Data Sheet)</p> <p>Consider both short-term and long-term health effects where applicable</p>			

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Ingestion	Y	
Inhalation	Y	Hydrochloric acid : May cause respiratory irritation Nitric acid : Corrosive to the respiratory tract
Contact e.g. skin	Y	Hydrochloric acid, Nitric acid : Causes severe skin burns
Absorption via skin and/or mucus membrane e.g. eyes, nose, mouth	Y	Hydrochloric acid, Nitric acid : Causes severe eye damage
Other e.g. young persons, pregnancy	Y	

What are the first aid requirements: *(consult the MSDS for details)*










First aid measurements	Hydrochloric acid, Nitric acid : Immediate medical attention is required. Show this safety data sheet to the doctor in attendance. If symptoms persist, call a physician.	
Ingestion	Hydrochloric acid : Do not induce vomiting. Call a physician or Poison Control Centre immediately. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation Nitric acid : Do not induce vomiting. Call a physician or Poison Control Centre immediately Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.	
Inhalation	Hydrochloric acid, Nitric acid : Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.	
Contact e.g. skin	Hydrochloric acid, Nitric acid : Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.	
Absorption e.g. eyes, nose, mouth, skin	Hydrochloric acid, Nitric acid : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.	

What are the required controls measures?

Describe the arrangements		
Enclosed System e.g. glove box	N	
Fume Cabinet	Y	A chemical fume cabinet with scrubbers
Extractor / Hood / Local Exhaust Ventilation	N	
Ventilation / Air Change <i>(If unknown seek advice from EDS/Campus Services)</i>	N	
Biological Safety Cabinet	N	
Sensors and / or alarms	N	
Personal Protective Equipment <i>(see details below)</i>	Y	
Other:	N	

What are the PPE requirements (in addition to the standard issue laboratory coat)

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 Eye Protection	 Respiratory Protection	 Face protection	 Gloves	 Hard Hat	 Ear Defenders	 Safety footwear	 Outer layer	 Apron	Other:
Y	N	N	Y	N	N	N	N	N	N
Describe the type / make/ model of PPE to be used – refer to the Material Safety Data Sheet(s) for guidance									
Goggles (European standard - EN 166)			EN 374 protective gloves (e.g. Nitrile, Latex)						
STOP CHECK AND CONSIDER THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE) CAREFULLY									
What actions to be taken in the event of spillage(s) and/or other emergency situations?									
Small Quantity <500ml				<p>Use Drizit Laboratory spill kit (to dam and adsorb spillages) and/or Acid spill kit (Sodium Hydrogen Carbonate to neutralize acid). If blue tissue or other absorption material was used: let dry in fume hood</p> <p>Hydrochloric acid, Nitric acid: Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.</p>					
Large Quantity >500ml				<p>Use Drizit Laboratory spill kit (to dam and adsorb spillages) and/or Acid spill kit (Sodium Hydrogen Carbonate to neutralize acid). If blue tissue or other absorption material was used: let dry in fume hood</p> <p>Hydrochloric acid, Nitric acid: Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water.</p>					
Do you have correct spill kit provisions to deal with spills (should they occur)?									Y
NB: Refer to Material Safety Data Sheet(s) for guidance									
Are there any other emergency situations (<i>not referenced above</i>) to be considered?									Y
If Yes, detail any additional control measures that need to be in place				Ensure that eyewash stations and safety showers are close to the workstation location					
What are the storage requirements for substances used during this process?									
NB: Refer to Material Safety Data Sheet(s) for guidance									
Are there any specific storage requirements for substances? (Is there a maximum recommended volume/quantity to be stored in one place or a specific temperature, type of cabinet, segregation etc.?) Also consider in laboratory and in holding areas for disposal									Y
If Yes, detail the storage arrangements that need to be in place <i>Refer to Material Safety Data Sheet(s) for guidance</i>				Keep containers tightly closed in a dry, cool and well-ventilated place.					
How should the substances used be disposed of?									

(include environmental impacts and by-products in your explanation if appropriate)

NB: Refer to Material Safety Data Sheet(s) for guidance

Hydrochloric acid, Nitric acid: Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.

If diluted acids are further diluted they can be discarded down the sink, flush with plenty of water.

Undiluted acids must be disposed via "Labwaste"

What are the management arrangements i.e. Training, SOP's, Communication etc.?

How will this risk assessment be communicated?

(i.e. how will staff/students be informed of this assessment?)

Everyone who needs to dilute an acid will be given an induction by a lab technician

Together with a print out of this COSHH form all MSDS Sheets for the substances used are in a red folder which is located in Amory, lab 435. COSHH form and MSDS Sheets are stored in addition on the N-Drive: Academics/Geos/general_lab/health and safety/COSHH or MSDS_safety data sheets respectively

Are Safe Systems of Work (SSoW) / Standard Operating Procedure (SOP) needed for this product/task/process in addition to this risk assessment?

Y

If Yes, detail / append the SSoW and/or the SOP if applicable

A hard copy of the protocol is stored in room 435 and in addition on the N-Drive: Academics/Geos/general_lab/health and safety/SOP_protocols,manuals

Are training requirements necessary and who will provide this?

N

If Yes, detail any specialist training required to undertake this process and who will provide said training

Are there any remaining (residual) risks to be operationally managed?

N

If Yes, detail any specific risks to be considered (e.g. pregnancy, vulnerable people, etc.)?

Actions

Use the table below to record actions to be taken if additional control measures are needed to meet the requirements of this risk assessment (identified above)

No.	Action (describe)	By Who?	Target Date	Date Completed

OVERALL RISK RATING OF THIS PROCESS (with control measures in place)	
RED	Control Measures Cannot be Implemented - Refer to Supervisor – Do Not Proceed
AMBER	Partial Control Measures Implemented - Further Controls Required- Refer to Supervisor – Do Not Proceed
GREEN	All Control Measures Implemented - Assessor to sign the risk assessment, Approver can then complete their sections once satisfied that the process/task etc. can proceed

Approval Process	
COSHH Assessors Signature:	
Assessors Name:	
Date:	
Confirmation received that all actions have been completed and the required control measures are in place:	Yes / No
Process Supervisors Name: <i>e.g. Principal Investigator, Line Manager</i>	Use CAPITAL Letters here
Approval Date:	
Confirmation that a copy is stored locally with the Laboratory Manager:	Yes / No