LA TROBE UNIVERSITY

GUIDELINES FOR THE RISK ASSESSMENT OF MIXTURES

PURPOSE

The purpose of these guidelines is to assist personnel in completing risk assessments for mixtures of chemicals.

RISK ASSESSMENTS

Background

Mixtures arise out of the combination of two or more chemicals. The combination or mixing of the chemicals may be done under a variety of conditions ranging from room temperature, to elevated or lower temperatures as well as other conditions.

Procedure

The following items are required to complete a Risk Assessment for mixtures:

- **A list of all the chemicals to be used** (all chemicals should be listed on your Department/School Register).

- **A current, compliant Material Safety Data Sheet (MSDS) from the supplier, manufacturer or importer which must be readily available to all users for each chemical to be used.** (Read the MSDS of all chemicals you are using before the first time the chemical is used. Users of chemicals must be aware of any particular conditions relating to the chemicals being used for example: *any particular storage conditions (heat, cold, away from direct light)), any incompatibilities with other chemicals when in use (if the chemical reacts violently with another chemical under any condition particularly the conditions to be used in the preparation of the mixture, for e.g. some chemicals react violently with water), any relevant first aid information (some chemical exposures must be treated in a particular way, ensure you are aware of these procedures have exotic or different first aid items readily available (e.g. where hydrofluoric acid is used calcium gluconate gel must be available at all times)*

- **Current and compliant Risk Assessments (RA) for each of the individual chemicals to be used.** *These RA's must be easily accessible to users.*

- **Accurately describe the procedure to be followed in the preparation of the mixture. The procedure must be written up and followed by persons performing the operation. This written procedure should form a part of or be referenced to in the Risk Assessment for mixtures.** The written procedure should include emergency procedures, for example what happens if the procedure is being done in a fume cupboard and some of one of the chemicals is spilt outside the fume cupboard.

- **Users must be aware of controls available to lower the risk of exposure to chemical, e.g. fume cupboards, Personal Protective equipment (gloves, glasses, laboratory coat, shoes, etc)**

- **Written procedures are required on the correct use of all controls**, e.g. a procedure on the correct operation of the fume cupboard, which PPE is required and which is the best way to select the most appropriate PPE.

- **Include the name of the people who did the Risk Assessment.**

- **If able to do so it is preferable to break the process up into smaller steps and assess each step separately.**

- **Once completed the Risk Assessment for Mixtures should be filed and be readily available to all persons who will be preparing solutions.**

- **Look on the CHEMWATCH MSDS database for a MSDS for the chemical you have prepared. If one not on the system then contact CHEMWATCH (by e-mail or phone with a list of chemicals for which you need MSDS and ask them to prepare them for you). You will have to provide the relevant information to them). It is a good idea to have hard copies of the MSDS available in the area where the chemical is used so if possible download one and file in area where chemical is used.** (We are considered manufacturers of any new chemical (mixture-solution we prepare so we need to prepare a MSDS. Asking Chemwatch to prepare one is .)

- **The Risk Assessment for mixtures must be reviewed at least every five years or whenever something changes in the procedure.**

The above procedure outlines the steps which must be undertaken in order for a compliant Risk Assessment for mixtures to be completed.

Please refer to the sample “Draft LTU Risk Assessment for Mixtures” form below.

SAMPLE Draft LTU Risk Assessment for Mixtures

Process Description: Preparation of Hydrogen chloride saturated Ethanol solution *Assemble apparatus as per prep notes for Medicinal Chemistry A Expt. 3*.

Note: Risk Assessments for the individual components have been completed and reside in the MS Risk Assessment library. (Copies attached)

METHOD: 100g Ammonium chloride (NH_4Cl) is weighed into a 1L Buckner flask with ground glass joint (QF). The NH_4Cl is moistened with sufficient 32% Hydrochloric acid (HCl) until it resembles "clumpy" sugar (approx. 25mL HCl/100g NH_4Cl). A QF dropping funnel containing 100mL Sulphuric acid s.g.1.84 (H_2SO_4) and topped with a Calcium chloride drying tube ($CaCl_2$ anhydrous) is attached to the flask. H_2SO_4 is added drop wise from the funnel at such a rate that the evolution of gas can be controlled. The gas is dried by then passing through a QF Drechsel bottle containing H_2SO_4 followed by an empty QF Drechsel bottle before being bubbled below the surface, into a winchester containing approx. 2L of Ethanol absolute. The procedure is repeated until the desired concentration of approx. 25g HCl/L Ethanol is achieved. [This is determined by titration& calculation. *See prep notes.*] Final solution is stored in a labelled bottle in Class 3 refrigerator until required for class use.

Note: Disposal of residues from reaction flask. Ammonium sulphate (not hazardous) with Sulphuric acid (minor amount) In a fume hood, cautiously add with constant stirring, the reaction flask residues to a bucket of water, before flushing down the sink with water. Disposal of Sulphuric acid from QF dropping funnel & Drechsel (drying) bottle as indicated on Sulphuric acid s.g. 1.84 Risk Assessment.

Hazardous Substances and Dangerous Goods

Hydrochloric acid CAS# 7647-01-0 moistened Ammonium chloride CAS# 12125-02-9

Sulphuric acid CAS# 7664-93-9

Calcium chloride (anhydrous) 0-10mm CAS# 10043-52-4

Hydrogen chloride gas (generated)

Ethanol CAS# 64-17-5

Hydrogen chloride saturated Ethanol (product)

Name of person/people performing assessment:

Date:

Department:

Room number:

Campus:

Review date if no changes to procedure:

Procedure step	Routes of exposure with Hazards and Possible Health Effects	Current safety measures	Review notes (additional safety measures with reason)	
H_2SO_4 added drop wise to NH_4Cl moistened with HCl	-inhalation of evolving HCl gas vapours will burn the respiratory tract -skin contact with HCl gas vapours, H_2SO_4 and HCl / NH_4Cl will all cause burns. -eyes may be burnt by the evolving HCl gas vapours as well as from contact with H_2SO_4 and HCl / NH_4Cl	-PPE as indicated on H_2SO_4 Risk Assessment. -Experiment conducted in fully operational fume cupboard. -Assemble apparatus over containment tray. -Identify experiment with sign on fume hood cabinet. -Scale of reaction (1L reaction vessel). -Constant monitoring of reaction rate. -Clamp apparatus on retort stands. -Use of Quick fit glassware for quick assembly/disassembly	none	
Generated HCl gas is bubbled through H_2SO_4 to dry before being passed into Ethanol absolute.	-inhalation of evolving HCl gas vapours is Toxic. Very corrosive to the respiratory system. -Very corrosive when skin comes into contact with HCl gas vapours. H_2SO_4 is also corrosive on the skin causing burns. -HCl gas vapours are very corrosive to eyes. Contact with H2SO4 will also cause burns to the eyes.	-PPE as above -Other measures as listed above -Rubber (heavy walled) connects reaction vessel to Drechsel (drying) bottle. Easy to disconnect if need. -HCl gas is bubbled into Ethanol below the surface. -Ethanol Winchester is fitted with a stopper which allows the introduction of the gas (as above) and a tube acting as a pressure vent. -Ethanol bottle sits in an ice/cold water bath to condense HCl gas vapours.	*Do we need to obtain a MSDS for Hydrogen chloride gas generated in this procedure? * If so, how, by who and where from? **CHEMWATCH** *Cannot obtain Australian commercial MSDS, but now (26/7/2004) have a copy Air-Liquide (France) SDS	

Storage HCl saturated Ethanol solution.	-inhalation of HCl gas is Toxic. Very corrosive to the respiratory system. -Very corrosive when skin comes into contact with HCl gas vapours. H_2SO_4 is also corrosive on the skin causing burns. -HCl gas vapours are very corrosive to eyes. Contact with H_2SO_4 will also cause burns to the eyes -ingestion of ethanol????	-PPE as above -Screw cap glass bottle, tightened firmly -Class 3 refrigerator to keep HCl gas condensed and for flammable liquid storage	*Check Chemwatch web site for MSDS for this chemical. If not there ask Chemwatch to prepare one for it.