

**(Sample)**

**Laboratory Notebook**

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| **Issued to:**  **Laboratory/group:**  **Book Number:** |

**University of Melbourne**

**Laboratory Notebook**

**Incorporating the Chemical Risk Assessment Form.**





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| Issued to:  Name of Department:  Laboratory/group:  Project:    Start date: \_\_\_\_\_/\_\_\_\_/\_\_\_\_\_\_  Finish date: \_\_\_\_\_/\_\_\_\_/\_\_\_\_\_\_  Book Number:  Previous Book Number:  Other information:  Induction:  Lab Supervisor: |

# Guidelines for using the Laboratory Note Books

This Note Book has been printed to facilitate the keeping of a valid record of your work, which will help you prove when particular experiments were done, when you had particular ideas and how the risks were assessed. In order to maximise the likelihood of this **Note Book** constituting effective evidence of the above, it is strongly recommended that you adhere to the following guidelines:

1. **Complete the date and signature boxes**

Ensure a date is entered for each experiment and that it is signed and counter-signed.

1. **Always use ink, not pencil**
2. **Fix attachments permanently**

Any attachments, e.g. spectra or photographs, must be dated and signed across the border. Supporting data which cannot be secured in the Note Book should be cross-referenced, signed and witnessed as above, and filed carefully.

1. **Work directly in the Note book**

Enter experiments, data and observations directly into the Note Book. Do not use another note book or loose sheets for a rough copy.

1. **Include full details and conclusions for each experiment**

Information should be sufficient for someone else to repeat your work.

1. **Do not leave blank spaces**

Diagonally cross through any blank pages or blank spaces left on a page. Sign and witness in the usual way.

1. **Do not tamper with entries**

Do not use correction fluid or remove pages. Incorrect entries should be struck through with a single line.

1. **Storage**

Note books should not be permanently removed from the Department.

1. **Ownership Rights**

All note books are owned by the University of Melbourne.

# Guidelines for using the Chemical Risk Assessment form

This risk assessment form is designed to record both chemical risk information and experimental details from laboratory work.

These guidelines should be consulted for information regarding the correct manner in which to use this form. They are not intended to be comprehensive and as such should be interpreted in light of the more exhaustive information available from your Local Health & Safety contact.

Each form comprises two pages: the *first* page contains the reaction risk assessment. The *second* page is designed to integrate useful experimental information and to record experimental procedures and any other observations or relevant information. For correct management of research data and compliance with the University’s Code of Conduct for Research, this page incorporates a sign-off area for validation of data and records. This is particularly important if Intellectual Property issues arise. This is followed by another two lined pages for adding further data and information.

Note this form is not intended to cover every possible eventuality that may occur in a laboratory situation; you should always enter further safety information if it is required. The sections and tick boxes are set out to help you appropriately assess the safety and risk implications of the experiment you are carrying out. It is appropriate to start a new write-up for each experiment. This is not a form for “commonly performed activities”. The *General Risk Assessment Form* should be used for such procedures. It is acceptable to refer back to a previous form containing experimental and safety data to prevent repetition of information, but if reactions are scaled up and the safety and risk implications change, this must be taken into account.

For **Chemicals Used** enter full names, including solvents. Use the columns headed **MW**, **mmol, Density, Mass** and **Vol** as appropriate (shaded; not compulsory). The **Hazards** section can be completed using Risk Phrase and Safety Phrase numbers that are reproduced at the start of this book. Risk and safety data for a particular substance can be acquired from an appropriate chemical catalogue or material safety data sheets.

The section headed **Reaction Hazards** is intended to help you assess and identify what can potentially go wrong during your experiment, so you can better prevent or control such occurrences. If it is reasonably foreseeable that a spillage or leak may exceed the lower explosion limit of a substance, then a more detailed risk assessment will be required. If your procedure has safety and risk implications beyond those listed, you should complete the **Additional Safety** **Implications** section. There are several procedures for which this **MUST** be done. For example:

1. If your assessment has identified a manual handling hazard, a separate manual handling risk assessment may be needed.
2. If your reaction involves the use of Scheduled Poisons or Scheduled carcinogens for which your Department does not hold a permit, you must inform your Local Health & Safety contact **BEFORE** beginning the experiment.

The selected Reaction Hazards should be entered into the risk assessment table so they can be quantified using the Likelihood/Consequence criteria. The risk score should reflect what could occur **before** control measures are put in place.

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| **Step 1 – Consider the Likelihood**  What is the likelihood of this incident occurring? **Consider this without new or interim controls in place.** Look at the descriptions and choose the most suitable Likelihood. | | **Step 2 – Consider the Consequences**  What are the consequences of this incident occurring? Consider what could reasonably have happened as well as what actually happened. Look at the descriptions and choose the most suitable Consequence. | | **Step 3 – Calculate the Risk**  1. Take step 1 rating and select the correct column  2. Take Step 2 rating and select the correct line  3. Circle the risk score where the two ratings cross on the matrix below.  E =Extreme, H = High, M = Medium, L = Low  Risk Score = ………………. | | | | | | |
| **LIKELIHOOD** | | **CONSEQUENCES** | |  |  | **CONSEQUENCES** | | | | |
| **Likelihood** | **Description** | **Consequence** | **Description** |  |  | **I** | **II** | **III** | **IV** | **V** |
| A  Almost certain | Will occur in most circumstances when the activity is undertaken (greater than 90% chance of occurring) | I  Insignificant | First aid treatment, minor injury, no time off work | **LIKELIHOOD** | **A** | **M** | **H** | **H** | **E** | **E** |
| B  Likely | Will probably occur in most circumstances when the activity is undertaken (51 to 90% chance of occurring) | II  Minor | Single occurrence of medical treatment, minor injury, no time off work | **B** | **M** | **M** | **H** | **E** | **E** |
| C  Possible | Might occur when the activity is undertaken (21 to 50% chance of occurring) | III  Moderate | Multiple medical treatments, non-permanent injury, less than 10 days off work | **C** | **L** | **M** | **M** | **H** | **E** |
| D  Unlikely | Could happen at some time when the activity is undertaken (1 to 20% chance of occurring) | IV  Major | Extensive injuries requiring medical treatment (e.g. surgery), serious or permanent injury/illness, greater than 10 days off work | **D** | **L** | **L** | **M** | **H** | **H** |
| E  Rare | May happen only in exceptional circumstances when the activity is undertaken (less than 1% chance of occurring) | V  Severe | Severe injury/illness requiring life support, actual or potential fatality, greater than 250 days off work | **E** | **L** | **L** | **L** | **M** | **H** |

The section headed **Control Measures** has listed some of the most common control measures. If your procedure requires any further controls (such as the neutralisation of stench from a thiol by destroying it with Sodium hypochlorite) they should be specified in the space provided.

In **Additional Emergency Procedures** you should indicate what is required other than what is already provided in your lab, as you have ticked off at the beginning of this book on the Emergency Equipment page. If you are using materials that have special first aid requirements in the case of exposure (such as HF or cyanide), this should be entered as appropriate. In the event of a spillage or uncontrolled release, you and other people working in the laboratory are at risk of being exposed to hazardous material. You should be aware of the location of chemical spill kits, emergency procedures and be prepared to evacuate the area if necessary. Where there is a possibility of an explosive risk or chemical release, consideration should be given to restrict access to the area while the reaction is taking place.

**Waste Disposal** contains the most common methods of disposal for a wide range of chemicals. It is recommended that you consult the waste procedure at the front of this book or in the *Waste risk management procedure*, for guidelines regarding the disposal of chemical waste.

In some cases the hazards of compounds created in a research lab are not entirely known. Consideration must therefore be given to the **Management of End Product**, i.e. how it may be further used or what is the most appropriate way to store the product and for how long.

Your form must be signed and dated by you (the assessor) and a co-signatory (usually your supervisor or a post-doctoral worker).

The **Procedure** should be clear, concise and sufficiently detailed to ensure that a co-worker could repeat the experiment safely and successfully. You can enter any further safety or experimental considerations in this section. If you require more than one page for your procedure then continue on a separate sheet.

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| **University of Melbourne**  **Chemical Risk Assessment Form** | | | | |
| ***Title of Experiment:***  Isobornyl acetate | | | | |
| ***Reaction hazards (Chemicals, equipment & apparatus)*** SDS for the substance/s read and understood  | | | | |
| Fire/explosion risk   Gas release/high pressure reaction   Known human carcinogen/mutagen   Hazardous to the environment   Prolonged reaction ie >8 hrs   (Fatigue & Supervision must be considered) | Flammable liquid   Corrosive   Toxic   Oxidiser   Reproductive hazard   (Teratogen) | Asphyxiant   Stench   Biological   Radioactive   Sensitiser/   Irritant | Air sensitive   Moisture sensitive   Security sensitive  Cryogens   Electrical hazard  | Hot liquids   Ignition sources   UV/X-ray/Laser   Use of stills   Endo-Exothermic  |

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| **Additional Safety Implications (specify):**  Camphene: flammable solid.  Use of rotary evaporator (See generic risk assessment on Chemistry web site) |  |  |  |  | **CONSEQUENCES** | | | | |
| **Likelihood** | **Consequence** |  |  | **I** | **II** | **III** | **IV** | **V** |
| **A**  Almost certain | **I**  Insignificant | **LIKELIHOOD** | **A** | **M** | **H** | **H** | **E** | **E** |
| **B**  Likely | **II**  Minor | **B** | **M** | **M** | **H** | **E** | **E** |
| **C**  Possible | **III**  Moderate | **C** | **L** | **M** | **M** | **H** | **E** |
| **D**  Unlikely | **IV**  Major | **D** | **L** | **L** | **M** | **H** | **H** |
| **E**  Rare | **V**  Severe | **E** | **L** | **L** | **L** | **M** | **H** |

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| ***Identified hazards (from above)*** | | | | | | ***Risk Assessment*** | | | | | ***Risk score***  *L x C* | | E = Extreme  H = High  M = Medium  L = Low |
| *Likelihood (L)* | | | *Consequence (C)* | |
| Exposure to corrosive chemicals | | | | | | C | | | 2 | | M | |
| Exposure to flammable solid & liquids | | | | | | C | | | 2 | | M | |
| Acid neutralisation | | | | | | D | | | 2 | | L | |
| Fractional distillation | | | | | | C | | | 3 | | H | |
|  | | | | | |  | | |  | |  | |
| ***Control Measures*** | | | | | | | | | | **Gloves:**  Latex  Nitrile   PVC  Rubber  Neoprene   PVA Barrier  Thermal   Other Specify: | | | |
| Safety glasses  | | Fume hood  | Face mask…………..…………….  | | | | | Safety shield  | |
| Goggles  | | Lab coat  | Respirator………………….………  | | | | | Other……..…..  | |
| Full face mask  | | PC2/3 lab  | Schlenk line/closed vessel  | | | | | .................. | |
| **Specify prevention, control or containment for any items selected above, incl method for containing/neutralising spills:**  - Remove ignition sources.  - Visually inspect all glassware for integrity prior to beginning work. (as per rotary evaporator risk assessment)  - Water should be slowly added to the acidic mixture.  - Do not distil to dryness. At the end of distillation, cool the entire apparatus before allowing the air to re-enter.  Do you need to fill out an Apparatus Running Outside Working Hours form? No. Sample is simply left to sit at room temp overnight. | | | | | | | | | | | | | |
| ***Additional Emergency Procedures***  Neutralising agent  Restrict access to area  Special first aid requirements (specify): Other (specify): | | | | | | | | | | | | | |
| ***Waste Disposal – Refer to University Waste Disposal Procedures*** | | | | | | | ***Management of End Product.*** Is the compound sensitive to:  Light  Temperature  Time  Air  Moisture   Shock/vibration  Other Specify:…………………………………..  **Specify control measures if yes to any of the above:** Keep away from sunlight. Store in cool area away from ignition sources. Avoid oxidizing agents. | | | | | | |
| Water Soluble  | Water Insol.  | | Acid/pyridine  | | Sharps  | |
| Chlorinated  | Biohazard  | | Non-hazardous  | | Silica/filteraid  | |
| Cytotoxic  | Radioactive  | | Other (specify): | | | |
| **Name of Assessor:**  Joe Blogs | | | | | | | **Name of Co-signatory:**  Dr. H. Supervisor | | | | | | |
| ……………………………………………….  **Signed** | | | | ………./………/………  **Dated** | | | …………………………………………..  **Signed** | | | | | ………./………/……  **Dated** | |

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| Date:  18/10/2001 | | | Ref:  JB 069: Isobornyl acetate | | | | | Continued from page: |
| ***Experiment:***   |  | | --- | | HOAc, Ac2O  H2SO4 | | | | | | | | | |
| ***Chemicals Used*** | ***MW*** | ***mmol*** | | ***Density*** | ***Mass*** | ***Vol*** | ***Hazards*** | |
| Acetic acid, Glacial | - |  | | 1.05 |  | 100ml | Flammable, Causes severe burns | |
| Acetic anhydride | 102.09 |  | | 1.08 |  | 5ml | R10,34,20/22 | |
| Sulfuric acid | 98.08 |  | | 1.6 |  | 1ml | R35 Causes severe burns | |
| Camphene | - | 0.2mol | | 4.35 | 27.2g |  | R11,36,50/53 | |
| Diethyl ether | - |  | | 0.71 |  | 50ml | R12,19,22,66,67 | |
| NaCl saturated | - |  | | - |  | 50ml | - | |
| NaHCO3 aqu. | - |  | | - |  | 100ml | - | |
| Magnesium sulphate |  |  | |  | ~50g |  | - | |
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1. To glacial acetic acid (100ml), acetic anhydride (5ml) and conc. sulfuric acid (1ml), add camphene (27.2gm, 0.2 mole) in a flask.
2. Seal the flask and mix the contents by swirling until they are homogenous (10 mins).
3. Keep the reaction mixture at room temperature overnight, then transfer to a separating funnel.
4. Rinse the flask with water (100ml) and diethyl ether (50ml). Transfer the rinse solution to the separating funnel and discard the aqueous layer.
5. Wash the ethereal layer with water (2 x 100ml), aqueous NaHCO3 (100ml) and saturated NaCl (50ml).
6. Dry the solution with magnesium sulphate and remove the solvent (rotary evaporator).
7. Subject the oil to fractional distillation (Vigreux) to yield the isobornyl acetate.

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Results yielded 30.5gm, 78% isobornyl acetate. GLC showed the presence of a small amount of unreacted camphene.

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| **Name of Assessor:** | | **Name of Co-signatory:** | | Continued on  page: |
| …………………………………………  **Signed** | …./……/….  **Dated** | ……………………………………………….  **Signed** | …./……/….  **Dated** |

# School of Chemistry Waste Disposal Procedures

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| ****Section A. Common Solvent Wastes****  * The only waste or chemicals that may be disposed of down sinks or drains are non hazardous substances with a pH between 6 and 10. Waste disposed of down the sink runs to the sewers. Maintenance workers in the sewers can be put at risk through exposure to hazardous substances. Toxic substances may also be concentrated at sewage treatment plants and subsequently contaminate land or water. * All waste containers in fume cupboards or on lab benches etc should be closed with a screw cap or lid when not in immediate use to minimise evaporation and stored in a spill tray. * Waste should be segregated into the following categories to assist the waste contractor in treating or disposing of it. This segregation lowers costs to the university and allows for reuse and recycling.   + water-soluble hydrocarbons   + water-insoluble hydrocarbons   + chlorinated hydrocarbons   + acid/pyridine mix   + benzene, terahydrofuran, diethyl ether   + cytotoxic waste   + low level radioactive waste * All waste containers **must** be labeled with the appropriate labels that **must** contain the following minimum information   + chemical name/s and hazard diamond/s   + the department number and lab room number   The 7 waste categories are common throughout the University. They are not intended for surplus or unwanted chemicals. The 7 waste categories are currently collected on the third Thursday of each month except for January.  **Where appropriate all the above substances should be treated or processed to the lowest level of hazard practicable.** ****Section B. Surplus, Unwanted and Waste Chemicals**** The procedures apply to all chemicals and hazardous material as well to all solid and liquid waste generated by research and teaching (with the exception of the common solvent wastes covered in Section A). Unwanted or surplus chemical reagents may fall in to (but are not limited to) the following categories.   |  |  |  | | --- | --- | --- | | Carcinogens, mutagens and teratogens | Photographic chemicals | Contaminated gloves, pipette tips etc | | Drugs of addiction | Thiols and mercaptans | Contaminated glassware | | Heavy metal solutions or suspensions | Expired use by date substances | Biohazards | | Pesticides & Herbicides | Filter aid/silica gel | Other toxic or hazardous substances |  * **Where appropriate all surplus, unwanted substances or waste should be treated or processed to reduce the level of hazard.** * Where there are a number of partially full containers of the same chemical at the same level of purity, the contents should be consolidated if possible. * **Waste and chemicals for disposal must be in sealed containers, not beakers or other lab glassware.** * **Damaged or broken containers must be repacked or over packed.** * The containers are placed in cardboard boxes according to their hazard class with appropriate packaging material eg vermiculite. **Chemicals of different hazard classes are not to be mixed** e.g. flammable liquids and oxidising agents. * A hazard class diamond (where appropriate) is placed on each box. * A list of the contents of each box to be attached to each box. It is to be visible and legible. Each box must also be marked with its room or lab of origin * Where there are many chemicals for disposal, a file (in Microsoft XL on disk or by email) is to be provided to the Departmental Safety Officer of all chemicals and waste for disposal when handing over the substances for disposal.  It should contain the following information * Box number and lab of origin * Chemical-name-full name: no abbreviations of formulas * Size- total quantity in milliliters or grams * No. of Packs-total number of containers   When all chemicals are ready for disposal a time and date for bringing them to the storage areas is to be arranged with the Departmental Safety Officer. ****Section C: Empty chemical containers and sharps****  * Empty winchesters (2.5l bottles) and other chemical containers including lab glassware must be clean and free of any chemical residue which may be hazardous to health or the environment. * Residue free glass may be disposed of in the appropriate glass bins. * **No caps are to be left on any container to be disposed of**. * **Labels must be defaced to be illegible or removed.** * Sharps must only be disposed of in approved sharps containers, available from places such as the Chemistry Store and Bio21 Store. These are disposed of the same way as the solvent waste, collected on the third Thursday of each month except for January. |

**EMERGENCY EQUIPMENT**

Prior to commencing work in your laboratory, tick off the emergency/safety equipment contained therein and briefly describe their location in the lab. Any ticked items do not have to be included in the section of the risk assessment titled “Additional Emergency Procedures”, when required for that particular reaction.

Location:

Dry powder fire extinguisher within 20 metres ……………….

CO2 fire extinguisher within 20 metres ……………….

Fire blanket ……………….

First aid kit that is accessible within 5 minutes ……………….

Absorbent material for chemical spills ……………….

(eg. Vermiculite and sodium hydrogen carbonate)

Eye-wash station ……………….

Emergency shower ……………….

Gas shut-off ……………….

Gas/power emergency stop button ……………….

…………………………………. ……………….

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| **University of Melbourne**  **Chemical Risk Assessment Form** | | | | |
| ***Title of Experiment:*** | | | | |
| ***Reaction hazards (Chemicals, equipment & apparatus)*** SDS for the substance/s read and understood  | | | | |
| Fire/explosion risk   Gas release/high pressure reaction   Known human carcinogen/mutagen   Hazardous to the environment   Prolonged reaction ie >8 hrs   (Fatigue & Supervision must be considered) | Flammable liquid   Corrosive   Toxic   Oxidiser   Reproductive hazard   (Teratogen) | Asphyxiant   Stench   Biological   Radioactive   Sensitiser/   Irritant | Air sensitive   Moisture sensitive   Security sensitive  Cryogens   Electrical hazard  | Hot liquids   Ignition sources   UV/X-ray/Laser   Use of stills   Endo-Exothermic  |

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| **Additional Safety Implications (specify):**  Camphene: flammable solid.  Use of rotary evaporator (See generic risk assessment on Chemistry web site) |  |  |  |  | **CONSEQUENCES** | | | | |
| **Likelihood** | **Consequence** |  |  | **I** | **II** | **III** | **IV** | **V** |
| **A**  Almost certain | **I**  Insignificant | **LIKELIHOOD** | **A** | **M** | **H** | **H** | **E** | **E** |
| **B**  Likely | **II**  Minor | **B** | **M** | **M** | **H** | **E** | **E** |
| **C**  Possible | **III**  Moderate | **C** | **L** | **M** | **M** | **H** | **E** |
| **D**  Unlikely | **IV**  Major | **D** | **L** | **L** | **M** | **H** | **H** |
| **E**  Rare | **V**  Severe | **E** | **L** | **L** | **L** | **M** | **H** |

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| ***Identified hazards (from above)*** | | | | | | ***Risk Assessment*** | | | | | ***Risk score***  *L x C* | | E = Extreme  H = High  M = Medium  L = Low |
| *Likelihood (L)* | | | *Consequence (C)* | |
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| ***Control Measures*** | | | | | | | | | | **Gloves:**  Latex  Nitrile   PVC  Rubber  Neoprene   PVA Barrier  Thermal   Other Specify: | | | |
| Safety glasses  | | Fume hood  | Face mask…………..…………….  | | | | | Safety shield  | |
| Goggles  | | Lab coat  | Respirator………………….………  | | | | | Other……..…..  | |
| Full face mask  | | PC2/3 lab  | Schlenk line/closed vessel  | | | | | .................. | |
| **Specify prevention, control or containment for any items selected above, incl method for containing/neutralising spills:**  Do you need to fill out an Apparatus Running Outside Working Hours form?  | | | | | | | | | | | | | |
| ***Additional Emergency Procedures***  Neutralising agent  Restrict access to area  Special first aid requirements (specify): Other (specify): | | | | | | | | | | | | | |
| ***Waste Disposal – Refer to University Waste Disposal Procedures*** | | | | | | | ***Management of End Product.*** Is the compound sensitive to:  Light  Temperature  Time  Air  Moisture   Shock/vibration  Other Specify:…………………………………..  **Specify control measures if yes to any of the above:** | | | | | | |
| Water Soluble  | Water Insol.  | | Acid/pyridine  | | Sharps  | |
| Chlorinated  | Biohazard  | | Non-hazardous  | | Silica/filteraid  | |
| Cytotoxic  | Radioactive  | | Other (specify): | | | |
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| ***Experiment:*** | | | | | | | | |
| ***Chemicals Used*** | ***MW*** | ***mmol*** | | ***Density*** | ***Mass*** | ***Vol*** | ***Hazards*** | |
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