Safety Services Guidance

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| C:\Users\mbdssema\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\BMHH0JTL\Hydrogen_cyanide[1].png | Guidance on the Use of Cyanides and Nitriles |

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| Key word(s) : | COSHH Assessments, Storage, Use, Disposal, First aid |
| Target audience : | Laboratory workers (staff and students), Safety Advisors, Risk and Compliance Managers, First Aiders |

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| **Management cycle** | **Useful paragraphs** |
| Plan | 4 – 8, 12, 15, 18 |
| Do | 11, 13 – 15, 22-26 |
| Monitor |  |
| Review  |  |

Introduction

1. This guidance should be read in conjunction with the Health and Safety Executive guidance on the use of cyanides and cyanide poisoning at <http://www.hse.gov.uk/pubns/misc076.htm>
2. The scope covers hydrogen cyanide (HCN), cyanogen bromide, cyanogen chloride, lactonitrile, soluble cyanides and any other substance that can generate HCN during a reaction (whether or not this is planned or an unwanted side product). As little as 50 – 150 mg of these compounds can cause death. Poisoning can occur by inhalation (of mists of cyanide solutions or HCN gas produced by the reactions of metal cyanides with acid and with water). Cyanide compounds do not have strong colour, taste or smell, though occasionally some people can detect a bitter almond odour.
3. An escape of liquefied HCN involves the additional possibility of persons being splashed with the liquid and suffering ill health or death by skin absorption. Prevention of skin contact is essential; absorption of liquid HCN though skin is likely to prove fatal at concentrations of 2% or above.

Safe Use of Cyanides

1. Before using cyanides or other extremely hazardous chemicals, consider whether there are alternative, less hazardous chemicals that could be used instead. When the use of cyanides is unavoidable, the work should be thoroughly planned and the use of the cyanide compound reduced to the minimum quantity, used in the fewest locations and for the shortest time possible.
2. Risk Assessments (these may be called COSHH / chemical / general risk assessments) must include consideration of how the cyanide is ordered, stored, used and disposed of. Note that the aim must always be to prevent exposure; provision of first aid is a mitigation measure, not a control measure.
3. Work should be prior notified to and approved by the Principal Investigator and the School Safety Advisor.
4. All control measures in the risk assessment must be in place and working effectively. Fume cupboard extraction rates and their containment performance will need to be checked to ensure that they are appropriate for the processes being carried out. High performance fume cupboards and separate containment testing may be required.
5. If there is a foreseeable risk of cyanide poisoning, first aid arrangements and measures to deal with spillage etc must be provided and maintained by people competent and available to take the correct action(s). It is suggested that first aiders providing cover for areas where cyanides and nitriles are used have received additional training in oxygen therapy and there is medical oxygen available before work starts.

Storage of Cyanides

1. Cyanide compounds should be stored under lock and key with access controlled by a senior member of staff. They should not be stored on the open shelf in an open laboratory but in a well ventilated and clearly labelled cupboard away from acids and water. Minimum quantities should be ordered.

Areas where cyanides are used

1. These should have restricted / controlled access to prevent unauthorised entry. Access points into the laboratory should be suitably signed warning of the hazards present and should also detail measures to be taken in the event of an emergency.

Suggested Control Measures

1. No work involving cyanides should be undertaken outside normal working hours and no lone working should be allowed at any time under any circumstances.
2. Before work is allowed to proceed the competence of the people doing the work should be assessed by the senior member of staff and the risk/COSHH assessment should be checked to ensure that it is suitable and sufficient.
3. All operations should be carried out in fume cupboards including weighing. Suitable protective equipment should be worn at all times including clean lab coat, safety glasses and impervious gloves.
4. Suitable methods of neutralisation or destruction of spillages must be readily available and close to hand.
5. All personnel in the vicinity should all be informed that cyanide is being used and all laboratory users should be instructed about what to do in the event of an emergency.
6. Only suitably trained and authorised persons should be allowed to carry out work with cyanide.

Emergency arrangements and disposal

1. A suitable number of people should receive [specialist first aid training](http://documents.manchester.ac.uk/display.aspx?DocID=11032) and at least one trained person should be present whilst the work takes place. The First Aid Administrator should be able to help to arrange this specialist training, though it may have to be funded by the School/Faculty that requires the training.
2. For very small spillages and quick decontamination of spatulas, tissues, weighing boats etc. use an aqueous ferrous sulphate (FeSO4) solution to complex the cyanide.
3. Unwanted or unreacted cyanides and cyanide residues in water can be destroyed by cautiously adding sodium hypochlorite. Care must be exercised to minimise the amount of organic compounds treated with hypochlorite. For further advice, consult your School Safety Advisor (SSA) or Risk and Compliance Manager (RCM).
4. Untreated cyanides must not be put into waste bins or washed down the sink without prior destruction. The SSA / RCM can provide advice on suitable waste disposal arrangements.

[First Aid Arrangements](file:///C%3A%5CUsers%5Cmbxsscgd%5CAppData%5CLocal%5CMicrosoft%5CWindows%5CTemporary%20Internet%20Files%5CContent.Outlook%5CL9XM75RM%5CGuidance%20on%20the%20First%20Aid%20Treatment%20of%20CN-%2C%20HF%2C%20Phenol%20Exposure.docx)

1. Early warning signs of cyanide exposure are:
* Irritation of the eyes, nose and throat
* Dizziness, nausea, general weakness, headache, flusing or occasionally pale skin, palpitations.
* A feeling of suffocation followed by deep breathing, sudden unconsciousness, cessation of breathing and of heart function. The breath may have a characteristic smell of almonds.
1. When dealing with a case of suspected cyanide exposure, a speedy response is essential, BUT do not put yourself at risk in any way. Do not enter any areas if you suspect any gaseous cyanide is present. The casualty will need to be rescued by someone wearing self-contained breathing apparatus (eg the Fire and Rescue Service). If there has been a release of HCN, anyone dealing with a casualty WILL need respiratory protection, as well as gloves and other protective clothing.
2. If it is safe to do so, remove the casualty away from the suspect area (preferably to outside).
3. If the circumstances are unknown or the release is uncontrolled, immediately evacuate the laboratory, close all doors and evacuate the building by activating the fire alarm. Call for an ambulance and the Fire and Rescue Service and inform them of the presence of cyanide and give them an exact location. Inform Security (ext 69966) of the nature and location of the incident and advise them that the emergency services have been called.

First Aid Treatment

1. Maintain the casualty’s airway, breathing and circulation. If the casualty is breathing give oxygen via mask if available and trained to do so. If the casualty is not breathing resuscitation will be required via bag and mask.

Inhalation

* Quickly remove casualty from exposure if safe to do so, preferably to fresh air.
* Keep them warm and at rest.
* If breathing has ceased, apply artificial respiration using a bag and mask resuscitator if trained in its use. DO NOT USE MOUTH-TO-MOUTH RESUSCITATION OR YOU MAY BECOME CONTAMINATED.

Skin Contact

* Remove all contaminated clothing immediately
* Wash the skin with Diphoterine if available (otherwise with plenty of water for at least 10 minutes).
* Monitor and treat the casualty as for inhalation if required.

Eye Contact

* Immediately irrigate with Diphoterine if available (otherwise with water or saline for at least 10 minutes).
* Monitor and treat the casualty as for inhalation if required.

Ingestion

* Do not give anything by mouth.
* Treat as for inhalation.

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| Document control box  |
| Title  | Guidance on the use of cyanides and nitriles |
| Link to Policy or Chapter | University Health & Safety Arrangements |
| Date issued:  | March 2012 |
| Issued by:  | Safety Services  |
| Implementation date:  | March 2012 |
| Version:  | V1.1 March 2012V1.2 July2018 |
| Next review date:  | Upon significant change  |
| Owner of this document: | Head of Safety Services, Dr Patrick Seechurn |
| Lead contact: | University Safety Coordinator, Dr Elaine Armstrong |