CODE OF PRACTICE FOR THE USE OF CYANIDES

PERSONNEL DIVISION
CODE OF PRACTICE FOR THE USE OF CYANIDES

1 Cyanides will not normally be used if alternative experiments exist to serve the same purpose using less hazardous materials.

2 When the use of cyanide is unavoidable, it will be restricted to the smallest possible number of laboratories and to the shortest period possible.

3 As a scheduled poison, cyanide will naturally be stored under lock and key normally under the control of a laboratory superintendent (or senior technician in his/her absence), and will normally be issued only as required for immediate use. A copy of this document will be prominently displayed in or on the poisons cupboard.

Stock solutions in laboratories, and materials used in individual experiments, should be disposed of at the earliest possible opportunity (see instructions appended). Where, exceptionally, cyanides are kept in the open laboratory for extended periods, cautionary labelling must be particularly thorough e.g. cyanide heat-treatment baths.

4 Before issuing any cyanide, it is the responsibility of the laboratory superintendent (or his/her nominee) to ensure that:

a) The teaching and technical staff working in the laboratory (or supervising research students) are aware of the issue of cyanide and of the siting of the Cyanide Kit, etc.

b) Portable oxygen should be available in or immediately adjacent to the laboratory in which cyanide is to be used.

c) A copy of the attached note ‘Instructions to Persons Using Cyanides’ is issued to each such person individually and personally, and their attention drawn to the need for careful observation of these instructions.

d) Where there is a foreseeable risk of cyanide poisoning then a first aider trained in the treatment of cyanide poisoning casualties is able to provide cover.

5 Teaching and technical staff responsible for laboratories will use their best endeavours to ensure that cyanides are disposed of correctly after use (i.e. destroyed according to the attached instructions).

6 The Laboratory Superintendent will liaise with the University Health and Safety Adviser to ensure that appropriate portable oxygen supplies are available.
INFORMATION SHEET

1 CYANIDE

Many different compounds contain the cyanide (CN⁻) ion. Their toxicity varies for a number of reasons including their readiness to give up these ions and their ability to enter the body by:

Inhalation as a dust or gas.

Ingestion as solid or liquid, cyanide begins to enter the body as soon as it touches the oral and oesophageal mucosa. 50-100 mg of sodium cyanide can cause almost instantaneous collapse.

Absorption through skin or eyes. This causes irritation as well as the more serious effects of poisoning.

2 SYMPTOMS OF POISONING

It should be stressed that individual cyanide poisoning is a rare event. The affected person may have:

• irritation of eyes, nose and throat
• dizziness, nausea, weakness, headache or flushed skin
• rapid breathing progressing to slower, deeper breathing, unconsciousness and cardiorespiratory arrest.

3 FIRST AID

Speed is essential.
Send for medical aid.

Inhalation and ingestion:

• Remove casualty to fresh air, if necessary, using breathing apparatus and protective clothing.
• Keep the casualty warm.
• Administer oxygen.
• If the casualty is NOT BREATHING, start resuscitation using a mechanical method to deliver oxygen. Do not use mouth to mouth resuscitation.
• If there is no heart beat or pulse, start cardiac massage.

Skin contact:

• Remove casualty's contaminated clothing.
• Gently brush solid particles from the skin, making sure you protect your own skin from contamination.
• Wash the skin and eyes copiously with water.
• Transfer casualty to nearest accident and emergency hospital by the quickest possible means together with the first aid cyanide antidote.
When appropriately trained personnel are present i.e nurses or doctors then an antidote may be given. This will depend on a clinical assessment of the case. If there is a diminishing level of consciousness and it is certain that cyanide has been absorbed then intravenous antidote would be appropriate. If there is doubt then follow the steps outlined above while monitoring the patient's condition.

4 CYANIDE ANTIDOTES

Oxygen can bring about rapid improvements.

7 EXAMPLES OF CYANIDES AND NITRILES

Hydrogen cyanide (HCN); sodium, potassium, calcium and ammonium cyanides; cyanogen (N=CC=N); All dissociate readily to release CN and are very toxic.

- HCN odour detectable at 2-5 ppm
- short term exposure limit (10 mins) 10 ppm
- immediately fatal at about 250-300 ppm

Halogenated compounds for example, cyanogen chloride, as well as being toxic are very irritant and can cause poisoning oedema.

Simple and complex salts that dissociate less readily e.g Cobalt Copper Silver and Iron Salts are less toxic.

Cyanide glycosides.

Nitriles e.g. acrylonitrile CH\(_2\)=CHCN used in production of acrylic fibres and ABS plastics. Toxicity of different nitriles tends to vary because of toxic effects of the compound itself and variable dissociation to CN•.

REFERENCES

1 Patty’s Industrial Hygiene and Toxicology (P.4845 et seq.)
2 What You Shoul Know About Cyanide Poisoning - A Guide For Employers (Health and Safety Executive Leaflet MS(A)9)
3 Martindale’s Extra Pharmacopeia (25th Edition)
4 Cyanide Poisoning (Richard Elliott, Technology and Healing Sciences Division, Health and Safety Executive)
INSTRUCTIONS TO PERSONS USING CYANIDES

READ THIS CAREFULLY BEFORE STARTING WORK
Tick boxes when appropriate action taken (e.g. obtain a safety pipette filler).

1  CYANIDES ARE EXTREMELY HAZARDOUS MATERIALS: 0.1 gram of KCN will frequently be lethal, while 0.02% of HCN in the atmosphere is said to be instantly fatal. Cyanide can be absorbed through the skin.

2  The poisoning effect is EXTREMELY RAPID; if a fatal dose is received, treatment may well be too late. The only reliable safeguard is rigorous prevention of poisoning.

3  NEVER work alone when using cyanide; the normal regulation to this effect must be meticulously observed.

NEVER PIPETTE CYANIDES BY MOUTH; always use a safety pipette filler

ALWAYS WEAR GLOVES, AND HANDLE MATERIALS in such a way as to minimise the risk of spillage or splashing on any part of the body.

Wherever possible, carry out experiments with cyanides in a FUME CUPBOARD, since HCN may be liberated, and this is a particularly dangerous gas (see above).

4  BEFORE STARTING WORK YOU MUST:

a) Ensure that staff, technicians and colleagues in the vicinity know you are using cyanides, and that you and they know where the Cyanide Resuscitation Kit is kept, and know what to do in an emergency.

IF YOU SUSPECT YOU HAVE ABSORBED CYANIDE

a) LET SOMEBODY KNOW.

b) Staff or colleagues will summon the nurse (if available) and an ambulance. You will be treated with oxygen, amyl nitrate inhalation, and possibly kelocyanor intravenous injection.

(The last may only be administered by a doctor or a competent nurse).

DISPOSAL OF CYANIDES

CYANIDES MUST NOT BE PUT IN WASTE BINS NOR WASHED DOWN THE SINK WITHOUT PRIOR DESTRUCTION.

Larger quantities of cyanide require more drastic techniques for their destruction; consult laboratory technicians and see Hazards in the Chemical Laboratory, G D Muir.