Guidance Note, GN041

CHEMICAL HAZARDS

Anyone working with chemicals of any sort must ensure before the work commences that they:

- understand the hazards associated with the chemicals
- know what precautions should be taken

The main hazards of chemicals are:

- the toxic effects of chemicals if they enter the body
- the corrosive effects of some chemicals if they come into contact with human tissue
- the flammable nature of some chemicals
- the reactive nature of some chemicals - often when incompatible chemicals come together

These hazards need to be considered during:

- storage of chemicals
- use of chemicals
- disposal of chemical waste

Consider also what will be done of there is a spillage (or other uncontrolled release) of a chemical.

Hazard Data Sheets

Unless the chemical is one whose properties are well known to the user, it is essential to consult a hazard data sheet. Supervisors should get their students into the habit of consulting hazard data sheets as part of the process of carrying out risk assessments.

Risk assessment

Risk assessments must always take account of the risks created by any chemicals which are used.

Risk assessments must always address

- storage of chemicals
- use of chemicals
- disposal of waste
- actions to be taken in event of a spillage

The wide range of chemicals which are used in the University means that it is not possible here to provide anything other than very general guidance on precautions which should be taken. Supervisors of those using chemicals are responsible for ensuring that hazards are identified and that necessary precautions are taken. The principle that it is those controlling the work who should determine how it is carried out safely is well established in law.

Storage of chemicals

1. All chemicals (either in the stores or in the laboratory) must be correctly labelled. Materials purchased from suppliers should already be correctly labelled. When solutions are prepared in the laboratory or when chemicals are dispensed or repacked, they must be clearly labelled and any hazards indicated with appropriate hazard symbol labels.
2. Correct chemical names are required (E.g. Labelling a bottle only as "solution A" would not be acceptable. What would happen if the bottle leaked or was knocked over when the person who made up the solution was away from the Department?)
3. Durable labels are required (E.g. Felt pen on glass is not acceptable)
4. When making arrangements for storing chemicals consider the effects of two chemicals coming into contact if there was a spillage or a leak. With some incompatible chemicals violent reactions can occur if the chemicals combine under uncontrolled conditions. With other chemicals uncontrolled mixing can result in the production of highly toxic gases or fumes.
5. Chemicals must be stored so that they cannot possibly accidentally come into contact with incompatible chemicals.
6. Bottles containing liquids must always be placed in bottle carriers when being transported to/from storage areas which are outside the laboratory.

Carcinogens

The procedures in this section are mandatory for work with Category 1 and Category 2 carcinogens.

Carcinogens are divided into three categories.

Category 1: These are substances known to be carcinogenic to man. There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer. If purchased from a supplier they will be marked:

- R45 MAY CAUSE CANCER or
- R49 MAY CAUSE CANCER BY INHALATION

Category 2: These are substances which should be regarded as if they are carcinogenic to man. There is sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer, generally on the basis of appropriate long-term animal studies and other relevant information. If purchased from a supplier they will be marked:

- R45 MAY CAUSE CANCER or
- R49 MAY CAUSE CANCER BY INHALATION

Category 3: These are substances which cause concern for man owing to possible carcinogenic effects but in respect of which the available information is not adequate for making a satisfactory assessment. There is some evidence from appropriate animal studies,

but this is insufficient to place the substance in Category 2. If purchased from a supplier they will be marked: R40 POSSIBLE RISK OF IRREVERSIBLE EFFECTS.

1. Carcinogenic chemicals should not be used for purposes for which a satisfactory non-carcinogenic substitute is available.

2. The use of carcinogens for teaching purposes should be avoided. If it is considered that their use in a teaching procedure is unavoidable, the need for their use and the conditions of use must be reviewed annually. The written permission of the Head of School must be obtained before first use of any carcinogen for teaching and each year thereafter.

3. Work with carcinogens must be conducted in accordance with WRITTEN procedures which are derived from the risk assessment for the work. Risk assessments for work with carcinogens should always consider:
   - processes which can produce aerosols or vapour containing a carcinogen
   - manipulation of carcinogens likely to result in dust formation
   - storage and manipulation of carcinogenic gases, volatile carcinogens and compounds which decompose spontaneously evolving carcinogens
   - weighing of carcinogens and the preparation of solutions containing them
   - the possible effects of static electricity during handling of powders
   - changing traps and exhaust filters
   - response to a spillage or other uncontrolled release of a carcinogen
   - decontamination of work areas and equipment
   - disposal of waste

4. Carcinogens should be handled only in suitable designated areas with adequate equipment for their containment.
   - Designated areas should be marked clearly.
   - Access to designated areas should be restricted to those carrying out the work
   - The numbers of those involved in the work and entering the designated areas should be kept as low as possible.
   - Effective methods must be devised to ensure people not involved in the work do not enter designated areas

5. If small samples of carcinogenic materials need to be taken to non-designated areas(e.g. for specialised analysis), samples should be clearly marked as carcinogens and be carried in robust sealed containers. The same stringent precautions as are required in designated areas should be observed in non designated areas.

6. Carcinogens should be kept segregated from all other chemicals in a locked cupboard clearly labelled "Chemical carcinogens". Keys may be held only by authorised people.

7. Protective clothing required should be specified and be worn at all times.
   - Protective clothing must be disposable and must be disposed of in the same manner as the carcinogen itself.
   - Contaminated clothing must not be sent for laundering. (ANY PROCEDURE WHICH CAUSES CONTAMINATION OF PROTECTIVE CLOTHING IS UNSATISFACTORY AND MUST BE IMPROVED.)
   - Protective clothing which has been worn in a designated area is potentially contaminated and must not leave the designated area except for disposal.

8. Standards of personal hygiene in any laboratory should always be high. When working with carcinogens it is particularly important to ensure that the highest standards are maintained
   - No eating, drinking, or applying of cosmetics is permitted in the laboratory
   - There should be no mouth pipetting
   - Any exposed cut or abrasion of the skin must be covered with an appropriate surgical dressing before commencing work or putting on protective clothing
   - Hands should be washed and dried with disposable towels before leaving the laboratory

9. Decontamination methods for experimental residues and laboratory equipment should ensure complete chemical conversion into non-carcinogenic substances. Written instructions for cleaning and decontamination of equipment must be prepared. Decontamination and cleaning of equipment should be carried out in the designated area.

10. Written procedures for disposal of waste must be prepared. Contaminated material which cannot be decontaminated should be double bagged in sealed plastic bags, clearly labelled with contents and carcinogenic nature of hazardous substances and then disposed of by licensed waste contractors.

11. Any sharps (e.g. needles, broken glass) must be placed in plastic sharps containers for disposal by incineration.