Introduction

Hazardous chemicals include those known or suspected to be carcinogenic, mutagenic, or toxic by any means. Research personnel is at risk of exposure to the hazardous chemicals when preparing and administering the chemicals to laboratory animals. Animal caring staff and cage cleaning staff are at risk of exposure to the chemicals or their toxic metabolite excreted/secreted from the animals to the bedding and other surfaces in the cages. When the chemicals are administered via feed or drinking water as media, anyone handling the material are also at risk of exposure.

This guideline provides information for Principal Investigators to plan (Part A) and conduct protocols (Part B) involving the use of hazardous chemical in laboratory animals. The goal is to minimize the exposure of animal users, animal caring and cage sanitation staff to the chemicals.

A. PROTOCOL PLANNING

Chemical Hazards Identification

Principal Investigators (PIs) and animal users must identify, at the planning stage, the hazards associating with the chemicals to be handled. The corresponding material Safety Data Sheets and other resources will be used as references for identifying the intrinsic hazards of the chemicals and to establish an appropriate control practices according to needs of the different protocol.
References for the Hazards of Chemicals

Good Resource Websites:

- Where to Find MSDS and Other Resources on the Web
- ChemSpider: Search and Share Chemistry

HKUST Websites:

- Chapter 8 Chemical Safety of HKUST Safety Manual

Hong Kong Websites:

- Occupational Safety and Health in the Civil Service: OSH Topics
- Occupational Safety & Health Council: Legislation

USA Websites:

- American Cancer Society: Known and Probable Human Carcinogens
- US Dept of Health & Human Services – National Toxicology Program: 14th Report on Carcinogens
- NIH PubChem
- CDC: NIOSH Pocket Guide to Chemical Hazards
- CDC: International Chemical Safety Cards (ICSC)
- National Cancer Institute – Environmental Carcinogens and Cancer Risks

Canadian Websites:

- Canadian Centre for Occupational Health and Safety (CCOHS)
- Provincial Health Services Authority: A centralized inventory of Material Safety Data Sheets
- CCOHS Chemindex
- CCOHS ILO Encyclopaedia of Occupational Health and Safety
- CCOHS WHMIS 1988 classification
- Public Health Agency of Canada: Pathogen Safety Data Sheets (PSDSs)

UK Websites:

- Health and Safety Executive – Control of Substances Hazardous to Health (COSHH)
- Health and Safety Executive – Risk Assessment

Australian Website:

- SafeWork Australia – Safety Data Sheets
**Hazardous Metabolites from the Chemical Administered Animals**

Chemical-administered animals may excrete and/or secrete hazardous metabolites. The metabolism of a hazardous chemical may be species specific. It is the PI’s responsibility to understand the potential risk from the hazardous chemical or its metabolite/s in the affected animals, and contaminated cages and materials to establish the control measures to ensure the safety of animal users, animal care and cleaning staff. PIs are expected to review peer reviewed literatures for up-to-date resource materials in order to make decisions based on science. In the absence of such information, a conservative and cautious approach must apply to the control measures used.

**Submitting Protocol and SOP for the review by the Animal Ethic Committee (AEC), Animal and Plant Care Facility (APCF) and Health, Safety and Environment Office (HSEO)**

Download and fill in the Committee on Research Practices Review Form (i.e. the Protocol). In the Protocol describe the use of the hazardous chemicals and provide a written description of how the hazardous chemicals and/or metabolites will handled to minimize risk to humans. This written description of handling practices will be the Standard Operation Protocol (SOP) and will be relevant to the individual laboratory for the particular hazard to be used in the submitted IACUC protocol. Attach the written SOP to the IACUC Protocol. Both the SOP and IACUC protocol will be reviewed and if deemed suitable will be approved. If the SOP or Protocol are not deemed suitable they will either be returned to the PI with suggestions for amendment, which must be complied with before resubmitting or rejected.

**Notification and Coordination with APCF on the Use of the Hazardous Chemicals**

Before the start of the animal procedures involving the hazardous chemicals, contact the appropriate SO or Director of APCF for the arrangement of location for chemical administration, housing of animals, contaminated waste handlings and room signage.

MSDS of the concerned chemicals, the approved SOP established by the individual laboratory and the related literatures must be provided to APCF for the preparation of technical support.

**B. CONDUCTING THE PROTOCOLS**

**Hazardous Chemical Preparation**

Follow the SOP established by the individual laboratory. Minimal controls when handling hazardous chemicals include the use of laboratory fume hood or other appropriate engineering controls and the appropriate personal protective equipment (PPE). The appropriate PPE includes as an absolute minimum safety goggles, chemical resistant gloves, and lab gowns. The appropriate personal dressing practices include not wearing short pants and open-toed shoes.

The personnel preparing the chemicals must be well trained on the approved SOP and be familiar with the chemical hazard and the associated hazard/s due to any hazardous metabolite produced by the animals. The personnel using the hazardous chemical or metabolite/s must know the management practices of disposing of the hazardous waste. The laboratory training documents are kept for at least one year.
**Chemical Administration and Animal Care**

**PPE** The appropriate PPEs and any additional equipment specified by the approved SOP established by the individual research laboratory must be worn/used.

**Animal Restraining or Sedation** Appropriate procedures in animal restrain or sedation as specified in the approved SOP and/or IACUC protocol must be followed to avoid accidental self-injection.

**Chemical Administrations**

- **Injection**
  
  SOP should include the appropriate precaution on the use of needles. For example, used needles are not to be recapped but directly disposed of into a designated sharp box in the designated working platform (e.g. a designated biological safety cabinet). Alternatively, safety needles are used.

- **Tablet**
  
  Avoid dispersal and inhalation of dust throughout the procedures.

- **Topical Application**
  
  The animal users and animal care staff are notified to avoid direct contact with the application sites.

- **Drinking Water and Feed**
  
  Avoid generating aerosol from the water and dust from feed.

- **Aerosolization**
  
  Conduct in fume hood or consult HSEO for the appropriate alternative protection measure.

**Working Surface Decontamination** Decontaminate the working surface and tools involved in the procedures by a wet wiping method using the appropriate decontamination agent. Gloves are removed and personnel must wash hands afterwards.

**Cage Management**

- **Cage Signage and cage handling** The chemical administered animals are housed in cages are labeled by Health Hazard Cards with the properly filled information, e.g., chemical name, type of hazard and date/s of administration/s. If appropriate, a note must be made on the card to notify personnel if excreta, bedding, drinking water and feeds are contaminated or containing the hazardous chemicals/metabolites.

  The Health Hazard Card is maintained on the cage for 72 hours after the final administration (unless risk assessment requires a longer time, determined by the current understanding of the chemical's metabolism in the concerned species and administration route) and after 72 hours the contaminated cage is changed. After that, the new cage and animals are considered safe and the Health Hazard Card is not placed on the new cage.

  Before a cage is classified as risk-free, the removal of the Health Hazard Card is prohibited and, animal users are responsible for the cage changing.

- **Housing** The animals are housed in individually ventilated cage or static microisolator (i.e. filter topped-cage). Whenever available, cage liners (for IVC cages in 7H) or disposable cages (for static isolators in 7J) are used to eliminate the risk of hazardous aerosol exposure during cage cleaning process.
**Soiled cage handling** SOPs written for chemical hazard handling for individual protocols should follow the framework outlined below.

*In 7H facility*

- In the designated biological safety cabinet (BSC), the left-over feed are disposed into the changed-out cage liners.
- In the BSC, the cage liners are then put into a white bag designated for chemical waste disposal.
- The bag is labeled with a sticker, sealed with a cable tie, and kept in the animal room for disposal by an APCF staff.
- The cage bases that did not made contact with the soiled bedding and animals are treated as ordinary soiled cages and placed in the designated staging area for collection by APCF staff.
- Other cage materials, including the cage top and metal wire bar lids are placed in another plastic bag, labeled, sealed, and kept in the animal room awaiting transfer to 7J facility for decontamination and washing.
- Drinking bottles are placed in a separate plastic bag, sealed, and labeled properly and kept in the animal room for decontamination and washing by 7H APCF staff, unless additional risk assessment indicating a special need on the drinking bottle handling is advised.
- Potentially contaminated waste, i.e. soiled liners with dirty bedding and feed, in the white bags will be placed in the designated hazardous chemical waste bin by APCF staff for incineration by EPD contractor.
- Filled sharp boxes are disposed of as clinical waste according to EPD waste regulation.

*In 7J facility*

- Left-over feed and cage top filters or bonnets are disposed into the changed-out disposable cage in the BSC.
- Water in the drinking bottle is poured into the dirty disposable cage.
- The disposable cage bases containing dirty bedding, feed and cage top filter papers/bonnets are placed in an orange bag designated for chemical waste disposal. The bag is labeled and kept in the animal room for disposal by APCF staff.
- Drinking water bottle, cage top filter frame, and metal wire lids are placed into a designated covered box for decontamination and washing by APCF staff.
- Potentially contaminated waste, including used disposable cages with/without soiled bedding and other disposable cage items in the orange bags will be placed into the designated hazardous chemical waste bin (requested from HSEO) for incineration by EPD contractor.
- Filled sharp boxes are disposed of as clinical waste according to EPD waste regulation.