

## HANDLING HAZARDOUS CHEMICALS IN BIOLOGICAL RESEARCH

*Hazardous chemicals are substances capable of producing adverse effects on humans or the environment. They include: carcinogens, mutagens, teratogens, reproductive hazards and acutely toxic chemicals. To ensure the safe use of these types of chemicals, key information on their proper handling is provided below.*

### MINIMIZE

The quantity handled of a hazardous chemical is a key safety consideration. Minimize the quantity and concentration of hazardous chemicals handled by:

- Using pellets, pre-weighed amounts and ready-made solutions (rather than dry preparations)
- Reducing weighing and diluting steps whenever possible
- Substituting a less hazardous chemical whenever possible
- Purchasing small quantities in septum vials so solvents can be injected in a BSC.

### CONTAIN

Avoiding aerosolization of hazardous chemicals in the open lab can be accomplished by handling larger quantities of hazardous substances and any quantity of a volatile substance in:

- **Fume hoods** (preferable)
- Biosafety cabinets (BSCs) ducted to the outside
- Glove boxes (not acceptable for volatiles)

Decontaminate work surfaces after use. Plastic-backed bench paper facilitates clean-up and containment.

### USE PPE

Personal protective equipment (PPE) essential in protecting against hazards includes:

- Standard PPE: Lab coats, gloves and protective eyewear
- Additional PPE: Tyvek-type disposable lab coats or Tyvek sleeves taped to gloves, double gloving
- Respirators: recommended as a last resort, when procedures cannot be done in containment

Please be advised that protective eyewear is required by Wisconsin law for all lab workers. Also, choose gloves that protect against the specific chemicals handled. Contact Occupational Health (265-5000) for more information on appropriate respiratory protection.

### COMMUNICATE

Hazard communication and spill protocols are important precautionary measures. Spill protocols should be:

- Written for the specific hazardous agents used in a facility
- Posted in relevant areas of labs
- Used for training new staff

Cancer hazard stickers are available from our office and should be used to label areas and equipment where carcinogens, potential carcinogens and mutagens are used (fume hoods, storage areas, fridges, etc.).

### Additional Information

Visit the UW Office of Biosafety webpage for access to Toxnet, the National Toxicology Program's Report on Carcinogens and other biosafety information: <http://www2.fpm.wisc.edu/biosafety>

Visit the UW Chemical Safety webpage for hazardous chemicals, particularly hazardous substances and MSDS resource information: <http://www2.fpm.wisc.edu/chemsafety>

## HANDLING HAZARDOUS CHEMICALS IN ANIMAL RESEARCH

*Hazardous chemicals are substances capable of producing adverse effects on humans or the environment. They include: carcinogens, mutagens, teratogens, reproductive hazards and acutely toxic chemicals. To ensure the safe use of these types of chemicals, key information on their proper handling is provided below.*

### PROTECT AGAINST MIXED HAZARDS

Handling different types of biological and chemical hazards, often simultaneously, requires both increased and hazard-specific precautions. When treating animals with hazardous chemicals, a risk assessment is necessary to evaluate key factors:

- Hazardous nature of chemical (volatility, aerosol-generating potential)
- Route of administration, doses, metabolism
- Hazardous nature of the metabolites, quantities of metabolites and chemicals in excreta
- Type of animal treated, number of animals treated, potential infectivity of animal

### MINIMIZE

The quantity handled of a hazardous chemical is a key safety consideration. Minimize the quantity and concentration of hazardous chemicals handled by:

- Using pellets, pre-weighed amounts and ready-made solutions (rather than dry preparations)
- Reducing weighing and diluting steps whenever possible
- Substituting a less hazardous chemical whenever possible
- Purchasing small quantities in septum vials so solvents can be injected in a BSC.

### CONTAIN

Containment should be used that protects against both chemical and biological hazards, avoids aerosolization of hazardous materials in the open lab and ensures sterile conditions are maintained if necessary.

- Fume hoods: Use when sterility is not a concern; preparing stock solutions of hazardous chemicals; loading syringes and preparing feed; administration of hazardous chemicals to small animals.
- Biosafety cabinets (BSCs): Use ducted BSCs for volatile and highly toxic chemicals; use BSCs that recirculate air to the lab only for small quantities of nonvolatile chemicals; sterile filtering solutions prepared in a fume hood.
- Necropsy and changing cages/bedding can generate aerosols and containment is advised for procedures involving: infectious or potentially infectious animals; wastes containing sufficient quantities of hazardous materials (biological, chemical or radioactive).

### USE PPE

Personal protective equipment (PPE) essential in protecting against hazards includes:

- Standard PPE: Lab coats, gloves and protective eyewear
- Additional PPE: Tyvek-type disposable lab coats or Tyvek sleeves taped to gloves, double gloving
- Respirators: recommended when procedures cannot be done in containment, such as administering hazardous chemicals to large animals.

Please be advised that protective eyewear is required by Wisconsin law for all lab workers. Also, choose gloves that protect against the specific chemicals handled. Contact Occupational Health (265-5000) for more information appropriate respiratory protection.

Contact Jim Turk at 263-9013 or [jmturk@uwmad.wisc.edu](mailto:jmturk@uwmad.wisc.edu) if you have questions or information concerning the handling of hazardous chemicals in biological research. For additional chemical disposal information, contact John Wendt of Chemical Safety at 265-5517 or [jwendt@fpm.wisc.edu](mailto:jwendt@fpm.wisc.edu)

## HANDLING HAZARDOUS CHEMICALS IN ANIMAL RESEARCH

### DISPOSE & DISINFECT

Key factors important in determining the appropriate disinfection and disposal route for animal waste/bedding that contains both biological and chemical hazards are:

- Whether chemical is toxic in small quantities
- Volatility of chemical and its metabolites
- Doses administered
- Type and number of animals treated
- Whether wastes contain unmetabolized chemical or harmful metabolites

Decontaminate work surfaces after use. Plastic-backed bench paper facilitates clean-up and containment.

Primary methods for disposal and disinfection of animal waste/bedding include:

- Autoclaving: waste/bedding from small animals administered human pathogens or potentially infectious materials (but not containing hazardous chemicals).
- Chemical disinfectants: used to disinfect biological material **and** inactivate hazardous chemicals (e.g. **bleach**, which may inactivate some hazardous chemicals)
- Special disposal via UW Safety: waste/bedding contaminated with both biological and chemical hazards, which cannot be chemically disinfected and inactivated.

UW Chemical Safety in conjunction with the Office of Biological Safety can help determine the best decontamination and disposal routes for mixed hazard wastes and can provide guidance in tailoring precautions to specific circumstances.

### HAZARD COMMUNICATION IN ANIMAL RESEARCH

The importance of hazard communication extends to animal housing units when administering hazardous chemicals to animals:

- Do not assume animal care staff know what precautions to take with chemically treated animals.
- Precautions can vary depending on: the specific chemical, dose, route of administration, and how the chemical is metabolized.
- Post chemical hazard door signs in animal areas when animals are being treated with hazardous chemicals (available from our office) and label cages with necessary precautions (essential PPE, cage changes conducted in containment).

Spill protocols are important precautionary measures and should be:

- Written for the specific hazardous agents used in a facility
- Posted in relevant areas of labs
- Used for training new staff
- Cancer hazard stickers are available from our office and should be used to label areas and equipment where carcinogens, potential carcinogens and mutagens are used (fume hoods, storage areas, fridges, etc.).

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