Safe Work Practice

Animal Projects with Chemicals

1.0 Hazard Description

Chemicals utilized in projects with animals can have the potential to cause injury or illness in humans and animals or harm to the environment. Federal and provincial safety regulations required that Principal Investigators (PIs) conduct a hazard assessment for their project, which includes chemical hazards.

In general, chemical hazards can be broken down into categories using the WHMIS 2015 criteria. These include:

- Flammable and combustible substances (See EHS-SWP-141)
- Oxidizers
- Substances causing serious health effects (See EHS-SWP-142)
- Acutely toxic substances (See EHS-SWP-142)
- Substances causing less serious health effects
- Corrosive substances
- Explosive or reactive substances
- Gases under pressure (gas cylinders) (See EHS-SWP-143)
- May cause damage to the aquatic environment.

Other hazards categories that must be considered include:

- Cryogens (See EHS-SWP-144)
- Animal Perfusions (See EHS-SWP-150)
- Nanomaterials (See EHS-SWP-145)

If the PI identifies the use of chemicals in their Animal Use Protocol (AUP), they must review this Safe Work Practice (SWP) and the SWP for the type of hazard involved, as applicable. PIs must incorporate the required controls identified in these documents into their hazard assessment and subsequent project-specific Standard Operating Procedures (SOPs) as detailed in the Animal Research, Teaching and Testing Projects SWP (EHS-SWP-101).
1.1 **Hazard Assessment Considerations**

1. When conducting a hazard assessment of chemical substances, the PI must consider whether project plans or experimental activities will pose a risk to the employees, animals, or environment. Considerations include:
   - **Toxicity and other effects** – The overall toxicity of the substances must be taken into account, including the acute toxicity, chronic toxicity, and other effects such as irritation.
   - **Routes of exposure** – The employee must be protected from being exposed to the chemical through the 4 routes of exposure: inhalation, skin absorption, ingestion, or injection.
   - **Routes of excretion and anticipated concentration of agent/metabolites in urine or feces** – This information assists in determining the timing of the first cage change after drug administration.
   - **Anticipated agent/metabolites in bedding** – This information helps determine the appropriate level of personal protective equipment required for animal care staff.
   - **Flammability** – Many substances are flammable and these must be used, handled, and stored properly.
   - **Cryogens** – Cryogens also pose a physical hazard due to the extreme cold. They are also simple asphyxiants, and so precautions are required for handling and storage.
   - **Nanomaterials** – Nanomaterials are more commonly being used in research and, in some cases, may pose a greater hazard than their parent material.
   - **Other hazards** – Other hazards that are less likely to be present in Animal Projects but should be considered include corrosive materials, explosive or reactive substances, and oxidizers.

2.0 **Minimum Hazard Controls**

In addition to the Minimum Requirements listed in the Animal Research, Teaching and Testing Projects SWP, PIs working with chemical hazards must abide by the following:

2.1 **Elimination/Substitution**

1. Whenever possible, appropriate substitutions or eliminations of a chemical substance should be considered to reduce the inherent risks involved.
2. Elimination involves removing the hazardous chemicals from the process.
3. Substitution involves replacing the hazardous chemical with a less hazardous substance.
2.2 Engineering Controls

1. There are two main engineering controls for chemical hazards. The first is isolation of the chemical substance, and the second is ventilation.
2. Isolation should be used wherever possible to protect employees from direct exposure. This could include using barriers and guards to prevent accidental exposure. Isolation should also be used during storage of various chemicals, to ensure they are not stored with incompatible materials. Appropriate containers and cabinets must be used to store various materials.
3. Ventilation is the most common control used in laboratories to protect employees from exposure. This could include the use of fume hoods, Class II B2 biological safety cabinets, or other local exhaust ventilation systems.

2.3 Administrative Controls

1. Administrative controls include education and training, standard operating procedures, signage, and rules.
2. All employees handling chemicals should be educated and trained in the health hazards of those chemicals and the proper controls. All employees working with chemicals receive at a minimum:
   a. WHMIS site specific training (this should be hands on training on the site-specific chemicals and procedures for WHMIS, including safely handling, labelling, and safety datasheets)
   b. Laboratory specific training in procedures, equipment, and other health and safety requirements.
3. Standard operating procedures should be written and followed for any procedures or equipment used in the laboratory.
4. Signage must be posted to warn users of chemical hazards.
5. Rules that are enacted to provide a safe working environment must be followed by all employees and enforced by both the supervisor and the owner/manager of the space.
6. Administrative controls must consider all personnel who may work with chemicals, or handling the animals, byproducts, or bedding that is potentially contaminated with chemicals. This includes the PI, research personnel, animal care staff, cleaning personnel, and others, such as visitors.

2.4 Personal Protective Equipment (PPE)

1. If the hazard assessment identifies PPE as a control for chemical hazards, it must be appropriate for the task and type of hazards.
2. Respirators, if required, should be equipped with filters appropriate for the chemicals in use. Respirator users must be trained in the use, care, maintenance, and limitations of their respiratory protective equipment (RPE). Fit-
testing is required biannually for all users who wear a tight-fitting respirator, including an N95 respirator.

3. Surgical masks do not provide respiratory protection and must not be worn for protection against inhalation hazards, including allergens.

4. Gloves and other skin protection must be selected according to the hazard. Manufacturers typically provide data on what type of gloves/skin protection is appropriate for which type of hazard. For example, nitrile gloves are not recommended for use with acetone, which is commonly used to clean labware.

5. Safety glass or goggles must be worn at all times to prevent exposure to an employee’s eyes.

3.0 Emergency Preparedness/Response

1. Laboratories and animal facilities where chemicals are used must have ready access to an appropriate chemical spill kit.

2. Emergency procedures should be documented and all users should be trained in the laboratory specific procedures. Emergency drills for chemical spills and releases, which could include table-top exercises, should be conducted on a regular basis.

3. Emergency shower and eyewash stations should be appropriate for the chemicals in-use. At a minimum, most eyewash requirements for highly toxic chemicals include flushing for at least 15 minutes. An eyewash bottle only typically provides 30-60 seconds of flushing.

4. In case of accidental exposure:
   a. Exposure to eyes: Flush with water for a minimum of 15 minutes. Seek immediate medical attention.
   b. Exposure to skin: Flush area with water for a minimum of 15 minutes, then wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Seek immediate medical attention.
   c. Injection: Allow wound to bleed freely. Wash well with soap and water, or alcohol-based hand rub. Cover area with dry dressing. Seek immediate medical attention.
   d. Inhalation - Remove the victim from exposure and move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Keep victim quiet and warm. Seek immediate medical attention.
   e. Ingestion - Do not give anything by mouth. Seek medical attention. Never give anything by mouth to an unconscious person.
   f. When seeking further medical attention, if possible, personnel should bring a copy of Handling Protocol and material safety datasheet.

5. In case of chemical spill:
   a. Alert people and evacuate the area of the spill. Secure the affected area.
   b. Remove and disinfect any material that has been splashed on personnel and remove grossly contaminated clothing.
c. Wear appropriate personal protective equipment for the cleanup operation, which includes at a minimum liquid barrier gloves, safety glasses, N95 respirator, long pants, closed-toe shoes and a fully fastened laboratory coat.
d. Cover the spill with absorbent material to prevent aerosolization.
e. Use a tool (spatula, forceps) to remove the absorbent material, place in a bucket, and rinse with copious amounts of water before discarding in general waste. Do not use hands to pick up broken glass or sharps.
f. Clean the original spill with copious amounts of water. Notify the supervisor of the incident.
g. Complete an Incident/Injury Report available via the EHS Incident Portal.

4.0 Applicable Legislation and Regulations


5.0 Related Resources

2. Chemical Safety Program, Environment, Health & Safety, University of Alberta
3. Safe Work Practice: How to Use Animal Safe Work Practices (EHS-SWP-100), Environment, Health & Safety, University of Alberta
5. Safe Work Practice: Allergen Protection (EHS-SWP-110), Environment, Health & Safety, University of Alberta
6. Safe Work Practice: Needle Safety (EHS-SWP-120), Environment, Health & Safety, University of Alberta
7. Safe Work Practice: Animal Projects with Flammable Substances (EHS-SWP-141), Environment, Health & Safety, University of Alberta
8. Safe Work Practice: Animal Projects with Highly Toxic Substances (EHS-SWP-142), Environment, Health & Safety, University of Alberta
9. Safe Work Practice: Animal Projects with Gases Under Pressure (EHS-SWP-143), Environment, Health & Safety, University of Alberta
10. Safe Work Practice: Animal Projects with Cryogens (EHS-SWP-144), Environment, Health & Safety, University of Alberta
11. Safe Work Practice: Animal Projects with Nanomaterials (EHS-SWP-145), Environment, Health & Safety, University of Alberta
12. Safe Work Practice: Animal Perfusions (EHS-SWP-150), Environment, Health & Safety, University of Alberta
6.0 Document Management

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