Safe Work Practice

Animal Projects with Nanomaterials

1.0 Hazard Description

Nanomaterials 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, nanomaterial hazards can be broken down into the same categories of their parent material. However, additional precautions should be considered due to the particulate size.

If the PI identifies the use of nanomaterials in their Animal Use Protocol (AUP), they must review this Safe Work Practice (SWP). 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:

- **Inhalation hazards** – When handling nanomaterials, particularly with prepared solutions, the materials can very easily become airborne and become an inhalation hazard.
- **Skin absorption hazards** – Certain nanomaterials may have the potential to be absorbed through the skin, where the parent material may not.
- **Ingestion hazards** – Exposure should be prevented through incidental ingestion.
- **Inject hazards** – many nanomaterials may be in the form of a solution in a needle, and procedures must be in place to protect from incidental injection.

2.0 Minimum Hazard Controls

In addition to the Minimum Requirements listed in the Animal Research, Teaching and Testing Projects, and Animal Projects with Chemicals (EHS-SWP-140) SWPs, PIs working with pressurized gases must abide by the following:
2.1 Elimination/Substitution

1. Appropriate substitutions or eliminations of a chemical substance must be used wherever possible to reduce the risk of exposure to nanomaterials.

2.2 Engineering Controls

1. When handling powder or solutions that could be aerosolized, nanomaterials should be handled in a ventilated enclosure such as a fume hood.
2. Where loss of experimental product is a concern due to the ventilation, specialized enclosures should be used which offer a lower flow rate and have less of an impact on the nanomaterials, but still provide worker protection.
3. Ventilated enclosures can exhaust outside the building or be filtered through a minimum HEPA filter before exhausting the air back into the room.
4. Other engineering controls may be considered, such as a glovebox or glove-bag.

2.3 Administrative Controls

1. Additional site-specific training must be completed for users of nanomaterials. Users must be made aware of the potential health impacts of nanomaterials and how to protect themselves and others from these hazards.

2.4 Personal Protective Equipment (PPE)

1. Respirators, skin protection, and eye protection must be worn in addition to the engineering controls for nanomaterials. This PPE will act as a last line of defense to protect the employee should the engineering or administrative controls fail.

3.0 Emergency Preparedness/Response

1. Considerations should be taken to prevent exposure to other personnel who may be affected by a spill, leak, or other incident.
2. Spills with powder or otherwise loose nanomaterials should be cleaned up using wet-wiping methods or a HEPA filtered vacuum.

4.0 Applicable Legislation and Regulations

3. Occupational Health and Safety Regulations, Government of Alberta

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 Chemicals (EHS-SWP-140), Environment, Health & Safety, University of Alberta
8. Safe Work Practice: Animal Projects with Flammable Substances (EHS-SWP-141), Environment, Health & Safety, University of Alberta
9. Safe Work Practice: Animal Projects with Highly Toxic Substances (EHS-SWP-142), Environment, Health & Safety, University of Alberta

6.0 Document Management

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