Laboratory Hygiene Plan

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Agenda

- MIOSHA Standard for Hazardous Work in Laboratories
- Methods and Observations Used to Detect the Presence or Release of a Hazardous Chemical
- Permissible Exposure Limits (PEL) of Chemicals Used in AB Laboratory
- Physical and Health Hazards of Chemicals in AB Laboratory
- Signs and Symptoms Associated with Exposure to Hazardous Chemicals
- Measures To Protect Against Exposure to Hazardous Chemical in AB Laboratory
- AB Laboratory Chemical Hygiene Plan

MIOSHA Standard for Hazardous Work in Laboratories

- OSHA's 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories, and MIOSHA Part 431. Hazardous Work In Laboratories, covers all workers using hazardous chemicals in laboratories.
- "Laboratory use" means performing chemical procedures using small quantities of hazardous chemicals on a laboratory scale and not as part of a production process in an environment where protective laboratory practices and equipment are in common use.

MIOSHA Standard for Hazardous Work in Laboratories

Monitoring Employee Exposure

- Employers must periodically measure employee exposures to harmful substances if there is reason to believe exposure levels routinely exceed the action level
- Monitoring may be terminated when employee exposures are below the action level

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MIOSHA Standard for Hazardous Work in Laboratories

Chemical Hygiene Plan

- If laboratory employees use hazardous chemicals, the employer must develop and implement a written chemical hygiene plan to protect them.
- The plan must include the following:
  - Use of personal protective equipment
  - Requirements that ensure fume hoods and other protective equipment are functioning properly
  - Provisions for employee training

MIOSHA Standard for Hazardous Work in Laboratories

Chemical Hygiene Plan

- The plan must include the following:
  - Circumstances requiring employer approval of certain laboratory operations, procedures, or activities before implementation
  - Provisions for medical consultation
  - Measures to protect employees from particularly hazardous substances
  - Assignment of a Chemical Hygiene Officer— a qualified employee who by training or experience can provide technical guidance in developing and implementing the chemical hygiene plan.

MIOSHA Standard for Hazardous Work in Laboratories

Employee Training

- Employers must provide workers with information and training that ensures their awareness of the chemical hazards used in their work area

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MIOSHA Standard for Hazardous Work in Laboratories

Medical Consultation and Examinations for Employees

- If exposure occurs:
  - The employer must provide certain information to the physician, including:
    - the identity of the hazardous chemical(s)
    - a description of the conditions under which the exposure occurred, and
    - a description of the signs and symptoms of exposure that the employee is experiencing

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MIOSHA Standard for Hazardous Work in Laboratories

Respirator Use

- Workers must use respirators if engineering, administrative, and work practice controls fail to maintain exposures below PELs (Permissible Exposure Limit)
- Respiratory protection must be made available at no cost

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MIOSHA Standard for Hazardous Work in Laboratories

Record Keeping

- Employee exposure and medical records must be maintained
- Records must be kept, transferred, and made available

Methods to Detect the Release of a Hazardous Chemical

Spills will be the Typical Release of a Chemical

- Possible indications of a spill
  - Puddle of liquid present
  - Smells of fumes in the air
  - Possibly hissing sounds from a compressed gas cylinder
- Being vigilant about what is going on around you in the lab will help you to detect a release

Permissible Exposure Limits (PEL) of Chemicals in AB Laboratory

Full Listing in Appendix of Laboratory Hygiene Plan

Alpena Biorefinery Laboratory Chemical Permissive Exposure Limits (PEL)

Chemical	CAS#[1]	OSHA PEL[2], mg/m^3 TWA[3]	OSHA PEL, ppm, TWA
Acetic Acid, Glacial	64-19-7	25	10
Accellerase	9012-54-8: cellulase, 9001-22-3: glucosidase, 7732-18-5: water	NA	NA
Acetone	67-64-1	2400	1,000
Acetonitrile	75-05-8	70	40

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Physical and Health Hazards of Chemicals in AB Laboratory

Physical Hazards

- Flammable- will cause severe burns to skin if in contact with it
  - Ethanol, Acetic Acid, Acetone, Actonitrile
- Reactive- decomposes to carbon dioxide and monoxide when heated
  - Formic Acid

Physical and Health Hazards of Chemicals in AB Laboratory

Health Hazards

- Corrosive- will cause severe burns to skin if in contact with it
  - Sulfuric/Hydrochloric Acid, Potassium/Sodium Hydroxide
- Irritant- Inhaling vapors can irritate the respiratory tract
  - Bleach, Hydrated Lime

Signs and Symptoms Associated with Exposure to Hazardous Chemicals

- Burns or burning sensation on skin or in eyes if in contact with chemical
- Lung irritation from inhaling vapors
- Light-headedness from inhaling vapors
- Upset stomach or vomiting if ingested or possibly inhaled

Measures To Prevent Exposure to Hazardous Chemicals in AB Laboratory

- Engineering Controls
  - The use of a fume hood to contain and remove vapors
- PPE
  - Safety glasses, disposable gloves, lab coat
  - All help to minimize exposure to skin and eyes
- Work Practices
  - Washing hands after handling chemicals
  - Not eating or drinking in laboratory

AB Laboratory Chemical Hygiene Plan

Laboratory Safety Practices

- Eye protection is required at all times while in the laboratory
  - Safety glasses with side shields will be the minimum requirement
- Protective apparel is also required, and any additional PPE will be task based
  - Use of a lab coat and disposable latex or nitrile gloves is the minimum apparel required for any task
  - Leather, closed toe shoes are required at all times
    - No sandals, mesh shoes or sneakers
- Long hair and loose clothing must be secured

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AB Laboratory Chemical Hygiene Plan

Laboratory Safety Practices

- Do not smell or taste chemicals
- Washing of hands will be required after handling any chemicals
- Laboratory glassware must never to be used for food or drink
- No storage of food or drink is allowed in laboratory refrigerators or freezers
- Smoking, eating and drinking will be prohibited in the laboratory

AB Laboratory Chemical Hygiene Plan

Laboratory Housekeeping Practices

- Keeping work areas clean and free from clutter and obstructions
- Cleaning up after each operation and at the end of each work shift or day
- Cleaning up spilled chemicals immediately and disposing of them properly
- Keeping access to emergency equipment and exits clear of obstructions

AB Laboratory Chemical Hygiene Plan

Fume Hood Usage

- When a procedure produces a toxic, offensive, or flammable vapors
- When heating or evaporating a solvent
- When transferring hazardous chemicals from one container to another
- When a operation may produce splashing, fires or small explosions
- When making acid or caustic solutions

AB Laboratory Chemical Hygiene Plan

Exposure Response

- It is important that employees become familiar with the location and operation of the eye wash and safety shower so that they can find and operate them with eyes closed
  - If eyes are exposed to a chemical the must be held open and rinsed for 15 minutes to flush completely
- Medical consultation and evaluation will be provided by AB to any employee who experiences an exposure
- When transferring hazardous chemicals from one container to another

AB Laboratory Chemical Hygiene Plan

Chemical Storage

- Current MSDS must be on file
- Each container must contain a label that indicates the hazards associated with it
  - Both of these are the same as RTK/HazCom
- Chemicals must be stored securely with the labels facing outward.
- Chemicals must be stored only with like chemicals
  - Acids and Bases separated on different shelves
  - Flammable chemicals must be stored in a Flammable Cabinet