Glutaraldehyde Toxicology & Management of Risk
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Glutaraldehyde Toxicology & Management of Risk

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Overview

- About NIOSH
- Risk management refresher
- Hazard vs. Risk
- Glutaraldehyde & Risk management

Why assess risk? *

- Creates awareness of workplace hazards and associated risk
- Identifies the population at risk
- Identifies if existing measures are adequate or if more work needs to be done
- Ensures that risk controls are proportionate to risk
- Can iron out risks at the design stage in processes which give rise to risks (i.e., machinery)
- Helps prioritize risk control measures

*Adapted from http://www.hse.gov.uk/risk/faq.htm - Health and Safety Executive (HSE), United Kingdom

Goal of Risk Management

Identify HAZARDS and manage RISKS associated with an occupational exposure to prevent work-related illness and/or injury and promote safe and healthful workplaces

National Institute for Occupational Safety and Health (NIOSH)

- Created by the Occupational Safety and Health Act of 1970
- Part of the Centers for Disease Control and Prevention (CDC) within the Department of Health and Human Services
- Our mission: To provide leadership in research to prevent work-related illness, injury, disability, and death

A Webber Training Teleclass
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Hazard vs. Risk

- A **hazard** is a substance or activity with the potential to cause harm
- A **risk** is the probability or likelihood that a hazard will cause harm
- Hazards = possibility
- Risk = probability

Risk Management

- Hazard Identification
- Dose Response
- Exposure Assessment
- Risk Characterization

Hazard Identification

- What are the potential effects on human health?
  - Acute (accidental over exposure)?
  - Sub-chronic (repeated exposure over short time)?
  - Chronic (exposure to low levels over lifetime)?
- Chemical & physical properties
- Reproductive, teratology, neurobehavioral effects
- Toxicology studies in animals
- Epidemiology studies in humans

Dose-Response

- How much does it take to cause a harmful effect?
  - Vitamin A in too large a dose can lead to birth defects, yet smaller doses are essential for good health
  - "All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy," — Paracelsus (1493-1541)
- What is a safe dose?
  - No observed adverse effect level (NOAEL)
  - Lowest observed adverse effect level (LOAEL)

Exposure Assessment

- How might people or the environment come in contact with the substance?
- Qualitative vs. Quantitative Assessment?
  - Observation of process
  - Identification of exposure groups or tasks
  - Is there a need for quantitative assessment?
- Is the exposure significant?
  - How long does the exposure last?
  - How concentrated is the substance?
  - What is the route? (i.e., inhalation, ingestion, dermal contact)
- Methods to determine exposure
  - Direct or indirect measurement
  - Modeling methods

Risk Characterization

The integration of information:

- Is there a known hazard?
- Dose-response?
- Is exposure possible or likely?
Glutaraldehyde Health Hazards

- Nasal, eye, upper respiratory irritation
- Conjunctivitis
- Allergic contact dermatitis
- Skin sensitization
- Asthma inducing agent
- Respiratory sensitization (probable)

Irritation/Toxicity Studies

- Hazards
  - Dermal irritation at glutaraldehyde concentrations ≥ 1%
  - Upper respiratory tract irritation from acute-chronic exposures
- Risk
  - Dermal/upper respiratory tract irritation poses a real risk under normal use conditions
  - Requires careful risk management strategies to minimize the probability of the hazard to cause injury or illness

Dermal Sensitization Studies

- Hazards
  - Contact sensitization at glutaraldehyde concentrations of ≥ 0.5%
- Risk
  - Dermal sensitization poses a real risk under normal use conditions
  - Requires careful risk management strategies to minimize the probability of the hazard to cause illness or injury

Respiratory Sensitization & Occupational Asthma Studies

- Hazards
  - Multiple case reports document an association between glutaraldehyde exposure and the development of occupational asthma
  - Some evidence for respiratory sensitization
- Risk
  - Occupationally-induced asthma poses a real risk under normal use conditions
  - Respiratory sensitization is a probable risk under normal use conditions
  - Careful risk management strategies are recommended to minimize the probability of the hazard to cause illness or injury

Risk Management

Reducing dermal irritation/sensitization risk

Personal Protective Equipment (PPE)

- Gloves
  - Proper size, length, type, and quality of glove required
  - Material
    - Nitrile rubber and butyl rubber
    - Any concentration of glutaraldehyde, up to 50%
  - Latex
    - Not recommended for protection against chemical exposure
    - Neoprene and polyvinyl chloride (PVC) gloves
      - Not recommended for use with any concentration of glutaraldehyde
      - Absorb and retain glutaraldehyde
  - Size and length
    - Snug fit
    - Extend up forearm

- Precautions
  - Inspect for tears and holes prior to use
  - Never use an imperfect glove
  - Never reuse an old pair of gloves
  - Occluded skin in contact with glutaraldehyde is more likely to become irritated
  - If skin contact occurs,
    - Remove the glove immediately
    - Wash the area thoroughly
    - Put on a new pair of gloves

- Lab coats, aprons, or gowns
Risk Management

Reducing eye irritation risk

- Complete eye protection
  - Splash proof goggles
  - Safety glasses with side shields together with a wrap-around full-face shield

Reducing respiratory irritation/sensitization risk

- Comply with occupational exposure limits (OELs)
  - ACGIH TLV for glutaraldehyde is .05 ppm ceiling
- Engineering controls and equipment
  - General room and local (fume hood) ventilation
  - Process automation and isolation
- Control Banding Hazard Guidance
- Respiratory protection
  - “last line of defense”
  - NIOSH-approved respirator
  - National Personal Protective Technology Laboratory (NPPTL)

Risk Management

Reducing the risk due to spills

- Routine safe handling
  - Always keep lids on containers
  - Cap containers with unused solution tightly to minimize risk of spilling
- Spill management
  - Restrict access to area
  - Don appropriate personal protective equipment
  - Clean up spills using appropriate spill kit or contact EH&S resource for assistance

NIOSH Resources

- Glutaraldehyde: Occupational Hazards in Hospitals (educational brochure)
- Control banding topic page
  http://www.cdc.gov/niosh/topics/ctrlbanding/
- Ongoing document development
  - Glutaraldehyde Criteria Document Update
  - Occupational Hazards in Hospitals – Chapter: Glutaraldehyde
- NIOSH Health Hazard Evaluations (HHE) Database
  http://www.cdc.gov/niosh/hhe/
- NIOSH Web Page
  http://www.cdc.gov/niosh/homepage.html
- NIOSH Inquiry Information Service 1-800-35-NIOSH (1-800-356-4674)

WHO Guidelines for Hand Hygiene in Health Care

Professor Didier Pitter, University of Geneva

October 19, 2005
Live Teleclass 1:30pm EST
Live French Teleclass 9:30am EST

October 20, 2005
UK Rebroadcast 1:30pm GMT

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