

For Job Health and Safety on Electron Microscopes

What to do today to protect worker health and prevent health hazards

What are the hazards?

- Chemical – flammable liquids, aldehydes, heavy metals, resins, photographic compounds, compressed gases
- Physical – high pressure procedures, cryogenic materials
- Biological – tissues, blood and body fluid products, specimens
- Radiological – low energy x-ray radiation

How do I know there are hazards?

- Electron microscopy procedures involve use of hazardous and biological materials handled under potentially extreme conditions of pressure and temperature
- X-rays produced within the equipment due to bombardment of the specimen and internal components with electrons (beta particles)
- Warnings may be found on chemical product labels and material safety data sheets (MSDSs) from manufacturers

Why should I care?

- Exposure to chemicals and biological materials can be hazardous
- Conducting high pressure reactions or using cryogenic materials improperly can cause physical harm to the operator and the facility
- Exposure to x-ray radiation can produce injury to the body
- There are many regulatory requirements that must be satisfied

What do I need to do?

Training

- Train users on the electron microscope's operating manual
- Manufacturer may provide on-site training
- Train employees on safe use of chemicals, compressed gases, cryogenics, radiation sources, and handling lab specimens
- Send users to course on electron microscopy, lab safety, and/or radiation protection

When do I need to do it?

Inspections

- Conduct a radiation survey to assess exposures to x-rays; initially and following periodic maintenance
- Conduct a thorough laboratory safety inspection
- Evaluate engineering controls and PPE for adequacy

Records	<ul style="list-style-type: none"> • Maintain equipment preventive maintenance records • Maintain employee training and exposure records • Maintain an up-to-date chemical inventory and MSDSs
Personal Protective Equipment (PPE)	<ul style="list-style-type: none"> • Use adequate engineering controls where possible • Select appropriate PPE based on hazard assessment • Use PPE in accordance with manufacturer's instructions

When do I need more help?

- When there are no training materials on the hazards of working with an electron microscope, control measures, or regulatory requirements
- If I cannot determine whether employees are exposed to radiation or chemicals
- When my organization has no designated safety and health officer, radiation safety officer, chemical hygiene officer, and/or laboratory safety officer

Where can I get it?

- Manufacturer of my electron microscope
- OSHA's On-Site Consultation Services (available from my state)
- OSHA website: www.osha.gov
- AIHA website: www.aiha.org
- AIHA Laboratory Health and Safety Committee: www2.umdj.edu/eohssweb/aiha/administrative/design.htm
- Professional organizations, such as the Microscopy Society of America: www.microscopy.org

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