## 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

#### 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
Through OSHA’s Alliance Program, this Tip Sheet was developed as a product of the OSHA and American Industrial Hygiene Association Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor. 06/2008

<table>
<thead>
<tr>
<th>Records</th>
<th>Personal Protective Equipment (PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Maintain equipment preventive maintenance records</td>
<td>• Use adequate engineering controls where possible</td>
</tr>
<tr>
<td>• Maintain employee training and exposure records</td>
<td>• Select appropriate PPE based on hazard assessment</td>
</tr>
<tr>
<td>• Maintain an up-to-date chemical inventory and MSDSs</td>
<td>• Use PPE in accordance with manufacturer’s instructions</td>
</tr>
</tbody>
</table>

### 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](http://www.osha.gov)
- AIHA website: [www.aiha.org](http://www.aiha.org)
- AIHA Laboratory Health and Safety Committee: [w2.umdnj.edu/eohssweb/aiha/administrative/design.htm](http://w2.umdnj.edu/eohssweb/aiha/administrative/design.htm)
- Professional organizations, such as the Microscopy Society of America: [www.microscopy.org](http://www.microscopy.org)