

Department of Occupational and Environmental Safety NEWSLETTER

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CASE WESTERN RESERVE UNIVERSITY

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Laboratory Ergonomics: Microscope Use

This last article in the series on applying ergonomic principles to laboratory practices discusses microscope use.

As you may have noticed, many of these tips are the same regardless of the procedure you are performing—using the microscope, pipetting, test tube work, and, yes, using a computer. There’s a good reason for that: ergonomics, in its desire to match the task to the person instead of the other way around, seeks to minimize the stress placed on the body in very simple ways, ways which are the same no matter what the task.

OSHA is currently considering an ergonomics standard for the workplace. We will keep you informed of this process.

To Control Awkward Postures:

- Assure proper lower back and thigh support from chair and that feet are supported.
- Assure adequate thigh clearance under lab bench; often low-hanging false fronts need to be removed.
- Raise, incline, and move microscope as close as needed to assure upright head position.
- Work with elbows close to sides.
- Work with wrists in straight, neutral positions.
- Choose microscope eye pieces which allow improved head and neck posture.

To Control High Repetition:

- Take adequate breaks—even short several second “micro-breaks” help.

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Glove Compatibility: How to Choose the Right Glove

Few things are more important when working with chemicals than to have the proper protection—from engineering controls like fume hoods and respirators to the right personal protective equipment (PPE), the last line of defense against potentially harmful chemicals.

And yet, choosing the right glove, one of the most-commonly used type of PPE, is often not even thought of as a choice—laboratory workers often just don the closest glove handy (usually latex) without considering if the glove will truly protect them against the harmful qualities of the chemicals they are using. This article will outline some of the issues to take into consideration when choosing the right glove for the job.

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What WASTE!

Summer Housekeeping Chores

Summer is a good time to put your laboratory in order, since most students will have left and the lab will be less chaotic. If this hasn't already been done, take care of a few "housekeeping" tasks that will put your lab into "new school year" shape.

1) Clean out chemical stocks. Go through laboratory shelves and dispose of any chemicals that are no longer used or needed. We strongly recommend that this kind of sorting be done often for many reasons:

- it keeps disposal costs down since there are smaller amounts to dispose of at one time;
- it reduces the possibility of these chemicals becoming "unknowns," which can occur if labels fall off or get defaced;
- it reduces hazards in the lab—the fewer chemicals around the better, especially if some of the compounds are uncertain.

A new chemical inventory should be submitted to DOES after disposal of chemicals. If some of the chemicals are transferred to a co-worker, that person must also submit an updated inventory list.

2) Dispose of trash promptly—especially hazardous and radioactive waste. Call DOES (x2906) to arrange disposal (with the appropriate accompanying paperwork completed) as early as possible in the day so we can process the request.

3) Go over training materials so that they reflect any changes to the laboratory's safety procedures and protocols. New students beginning work in the fall will then have the most up-to-date set of materials and guidelines to follow.

Bon Voyage!

Alas, this issue of DOES Newsletter marks the end of an editorial "era" for DOES. After nearly seven years of outstanding service, Carla Kungl, our Technical Writer, will be leaving to pursue her career in University teaching.

Carla will soon finish her dissertation, Women Writers and Detectives: Constructing Authority in British Women's Detective Fiction, and depart with dog in tow for the University of California at Santa Barbara. We are pleased that the technical writing skills Carla honed in our department will be put to good use in her new role teaching "Writing for Engineers" in UC Santa Barbara's Writing Program.

However, with Carla's departure, the Department loses the unique character of its newsletter, which bears the stamp of her continuous efforts to raise the safety consciousness of the University community.

Our thanks and best wishes go with Carla as she carries her skills, insights, and characteristic enthusiasm to a lucky new audience on the West Coast.

Dr. D. Sedwick, Director, DOES

Upcoming Training Sessions

Radiation (x2906)

•**New Training:** Aug.25(1-4); Sept.8(9-12), 21(1-4)

•**Retraining:** Aug.31(2-3); Sept.7(10-11), 17(2-3), 27(10-11)

•**X-ray Training:** call office to set up training session

Chemical (x2907)

•**OSHA Lab Standard:** Mondays 1-3 (Service Building Conference Room)

Bloodborne Pathogen (x2907)

•**New Training:** Mondays 3-4 (Service Building Conference Room)

• **Retraining:** (Service Building Conference Room) Aug. 26(10-11); Sept.3(2-3), 15(10-11)

Glove Compatibility: How to Choose the Right Glove

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Types of Gloves

Most gloves come in both single-use (“disposable”) and reusable forms. Reusable gloves offer more protection than disposables, so use a thicker gauge glove with more dangerous chemicals.

Most gloves are made from one of the following materials:

- **Latex (or natural rubber)**—Latex gloves are most common in disposable form, offering excellent conformity and dexterity. Therefore, they are good for sterile procedures or brief chemical jobs (when you only need gloves for a few minutes). Latex gloves are resistant to most acids and alkalis. Personnel with latex-related allergies should not use these gloves.

- **Neoprene**—Neoprene provides protection against a wide range of corrosive chemicals; it resists oils, greases, alcohols, resins, alkalis, and many solvents. It is poor for chlorinated aromatic solvents, phenols, and ketones.

- **Nitrile-Butadiene Rubber (NBR)**—NBR gloves are marketed as SOL-VEX or Nitrile. These gloves work well with aromatic petroleum and chlorinated solvents. They are resistant to cuts, snags and punctures and are good substitutes for latex gloves (if latex allergy is a concern).

- **Vinyl**—Vinyls are popular in both disposable (thinner, examination-type gloves that allows precision in movement) and reusable forms (made of polyvinylchloride, or PVC). The PVC glove is thicker and is necessary for use with corrosive materials.

Applying Definitions

When deciding what glove is best for use with different chemicals, compilers of glove compatibility charts rate the “penetration” of a chemical through a material. Penetration is defined one of two ways: “permeation” is the diffusion of a chemical on a molecular level through PPE, the results of which may or may not be visible to the naked eye;



HOT TIPS



X-Ray Surveys: Using Radiation- Producing Equipment

DOES will be conducting surveys and Ohio Department of Health (ODH) compliance reviews of all radiation-producing equipment (RPE) on campus starting in September. Equipment capable of producing x-rays such as x-ray diffractors, auger systems, electron microscopes, miscellaneous cabinet x-ray units, and particle accelerators fall under ODH rules and regulations.

During these surveys, DOES will monitor external radiation levels for each unit and assure that compliance issues concerning the use of RPE are being met. Two important compliance issues, training and proper postings, are explained in detail below.

Training

DOES will provide initial training when use with the machine begins. Users only need this general safety training once.

However, retraining must be provided ANNUALLY by the AU of those personnel who will use the equipment. Annual retraining should be machine-specific, explain-

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“degradation” is a change in the physical property of PPE based on adverse effects of a chemical, the results of which usually are visible to the naked eye.

“Breakthrough time” is the time it takes for a chemical to break through PPE until it can be detected by analytic instruments; this is often provided on glove compatibility charts for each chemical and each glove material, along with a “degradation rating” of Excellent, Good, Fair,

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Glove Compatibility: How to Choose the Right Glove

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or Poor. You can select the best glove for the job based on these parameters.

For example, on the Fisher Scientific glove chart, the breakthrough time of the chemical aniline through a 22 millimeter nitrile glove was 72 minutes; its degradation rating is thus given as "good" for use up to thirty minutes but only "fair" for use up to sixty minutes. On the other hand, when using aniline with a glove made from neoprene, there was very little breakthrough even after 8 hours; its degradation rating is given as "excellent."

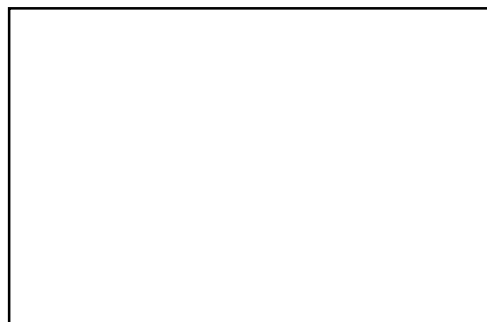


Figure 1. "Permeation" may or may not be visible to the naked eye.



Figure 2. "Degradation" often is visible to the naked eye.

Glove compatibility charts are available from most manufacturers of PPE. Often they are given in the company's catalogue, so you can check compatibility before you order. Appendix D of CWRU's Chemical Safety Manual has an abbreviated chart; and our website (<http://does.cwru.edu>) also offers links to various companies' glove compatibility charts.

Remember that basic glove charts only provide the briefest of guidelines about chemical penetration of a glove, and that penetration rates vary with the thickness of glove. If you have questions about what glove to use for a specific chemical, call the manufacturer or Safety Services (x2907).

TOP TEN Considerations for Selection of Gloves

- 1) All chemicals pass or permeate through protective barriers sooner or later. Remember, permeation can take place without any visible evidence of change in the material.
- 2) Even the best material will not perform properly if it is torn, cut or damaged. Inspect your gloves before and after each use, by inflation with either air or water.
- 3) A barrier may protect against one chemical very well, but perform very poorly against a mixture of chemicals. No glove protects against everything, so make sure to take into account chemical combinations.
- 4) Remember to wash your hands after removing gloves.
- 5) Generally, thicker is better—a thicker glove will increase the time to breakthrough, but the benefits may be offset by loss of dexterity. Double-gloving can increase thickness and provide desirable properties of different materials.
- 6) Gloves look alike! Do not depend on color or appearance alone since most gloves come in a variety of colors and forms. Make sure you have gloves of the right thickness, material, and compatibility.
- 7) After working with reusable gloves, decontaminate them thoroughly.
- 8) Recommendations for gloves are often given by their generic name—nitrile, neoprene—but manufacturers often have slightly different polymer formulations for each of these generic labels, providing different levels of resistance to chemicals. Check the specific manufacturer's chart of the glove you are using for the best information.
- 9) Check to see if there is any special storage or maintenance information to provide the best care for reusable gloves.
- 10) The best way to select the proper glove is to have it specifically tested under the work conditions and the chemicals being used.

X-Ray Surveys: Using Radiation- Producing Equipment

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ing startup and shutdown procedures, proper response to equipment malfunctions, standard operating procedures and any changes or special procedures since the worker has used the machine last.

Proof of retraining must be properly documented in the quarterly survey reports sent back to DOES. In addition to writing in the date a worker has been retrained on the survey report, the AU should send us a copy of the sign-in sheet for the retraining and an outline of the items covered during retraining.

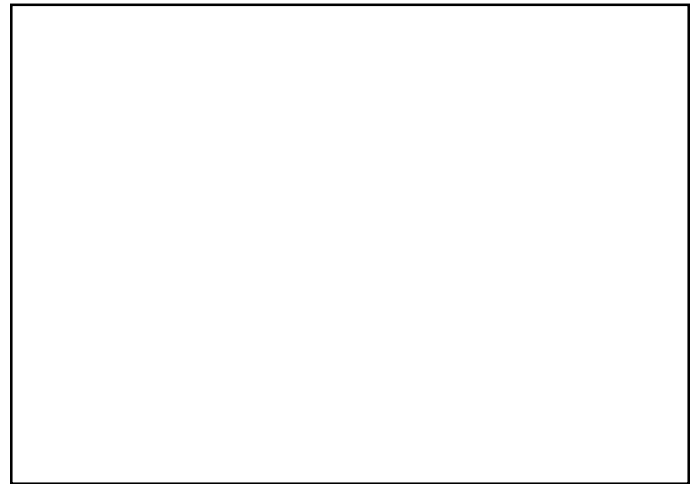
The AU must also retain copies of the sign-in sheet and retraining materials so that they can be accessed if necessary by DOES or by ODH inspectors.

Note that this training is for RPE users only and does not meet training requirements for use of radioactive materials.

Postings

There has been one important change in posting regulations concerning machines that are no longer in use—machines which are disabled or are in storage. In addition to being locked out (either at the main switch or at the plug), these machines must now be tagged with some sort of notice (see sample below). We can bring a “Notice” posting to you or you can make one yourself—there is no set wording requirement as long as it is clear that the machine cannot be moved or used without clearance from Radiation Safety.

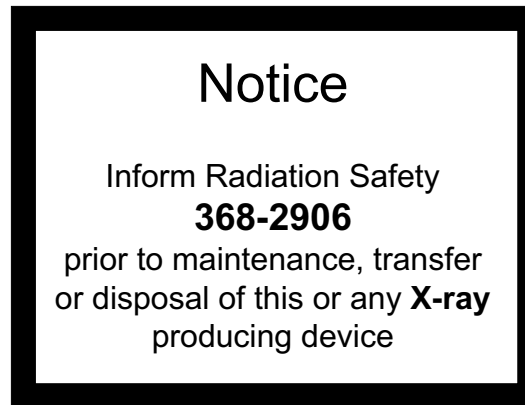
Please call us for assistance with the lockout/tagout procedure so that we can bring you the the



proper materials, including a Posting Notice if you wish.

Other warnings that must be posted in the areas surrounding RPE include:

- 1) ODH Notice to Employees
- 2) ODH Radiation Protection Rules
- 3) warning signs and labels (available from DOES)
- 4) machine-specific operating procedures
- 5) if the machine is not in use, a “Notice” similar to the sample below.



Example of new sticker which must be posted on an RPE if the machine is no longer in use.

Specific compliance requirements for different types of RPE, in addition to these general requirements, are also required. Requirements for the four types of RPE—dental, veterinary, fluoroscopic, and radiographic equipment (including electron microscopes)—will be explained to users of equipment during compliance reviews.

Call Yelena Tigay at the Radiation Safety Office (x2906) for initial training or if you have any other questions concerning Radiation-Producing Equipment. Also, please notify us if you have equipment which may fall under ODH regulations that has not already been checked by our department.

Laboratory Ergonomics: Microscope Use

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- Rotate microscope work between several employees.
- Evaluate work processes to spread microscope work throughout the day.
- Add personnel for peak periods.

To Control Contact Stresses:

- Do not rest forearms on sharp work surface edges; pad edge of forearm or create a forearm rest pad.

To Control Eye Fatigue:

- Keep microscopes clean.
- Assure illuminators are in alignment and light is even, and of proper intensity.
- Assure optical components are in proper repair.
- Take frequent short breaks to rest your eyes; focus far away or shut eyes to change eye focal length.

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