



GREEN LABS GUIDE



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PORTLAND STATE

**GREEN
GREEN
GREEN**



LABS



WASTE SIGNAGE

RECYCLE:
PAPER, METAL,
PLASTIC BOTTLES &
TUBS > 6oz



FROZEN FOOD BOXES
DRINK CUPS
TAKEOUT CONTAINERS
PLASTIC BAGS
LIDS

WASTE DISPOSAL: HAZARDOUS & UNIVERSAL WASTE

(Place a work order here to have any of the following items picked up:)

ID: _____ No 50001
DEPARTMENT OF ENVIRONMENTAL HEALTH & SAFETY
HAZARDOUS CHEMICAL LABEL

DATE: _____ DEPT: _____ ROOM: _____
PRINCIPAL INVESTIGATOR: _____
LABELED BY (PRINT NAME): _____

COMPONENTS

_____	_____	%
_____	_____	%
_____	_____	%
_____	_____	%
_____	_____	%
_____	_____	%
_____	_____	%

TOTAL QUANTITY: _____ UNITS: _____

HAZARD CLASS: AQUEOUS (CIRCLE) YES NO

_____ FLAMMABLE	_____ TOXIC/POISON
_____ OXIDIZER	_____ CARCINOGEN
_____ CORROSIVE	_____ HALOGENATED SOLVENTS
_____ REACTIVE	_____ OTHER

Rev: 07100-RIT




got waste?

If you have waste, contact EHS through:
Work Order (503.725.2155) <http://psb.edu/facilities>

DO NOT carry waste in hallways, stockpile in lab, or
bring directly to EHS or Chemistry Stockroom.

Waste includes:
Used or unwanted chemicals
Items contaminated with biological or radioactive materials
Sharps
Discarded laboratory glassware
Batteries, light bulbs/bulbs
Used Oil

Environmental Health & Safety
EHSV: 144, ehs@psb.edu Portland State University

Disposable containers, NOT reusable containers, should be placed in the red bag*
*Use your Stericycle provided medical waste container, it may vary from the photo.

INCLUDES:

- ITEMS WITH RADIOACTIVE MATERIALS.
- LABELED USED OR UNWANTED CHEMICALS
- LABORATORY GLASSWARE
- SHARPS WITH BIOLOGICAL MATERIALS
- USED OIL

RECYCLE GLASS: BOTTLES & JARS



- LIDS
- LIGHTBULBS
- BROKEN GLASS
- LABORATORY GLASS

LANDFILL: DRINK CUPS, FOOD CONTAINERS, BAGS & WRAPPERS



CANS
GLASS/PLASTIC BOTTLES
CLEAN PAPER

COMPOST: ANY FOOD SCRAPS



LIQUIDS, GREASE, COOKING OIL
PLASTIC BAGS
CARDBOARD OR PIZZA BOXES
TAKEOUT CONTAINERS
STYROFOAM
GLASS OR METAL

REDUCE & REUSE

Minimize Disposables

- **Share with Chemical Inventory:** Post non-expired surplus chemicals to EHS Assistant for viewing by and exchange with other labs. Check the inventory before purchasing new chemicals.
- **Maintain an inventory** in [EHS Assistant](#) of supplies, equipment, and chemicals to avoid unnecessary purchases.
- **Utilize durables.** Use glassware (volumetric pipettes, test tubes, Petri dishes) and reusables whenever possible.
- **Stop junk mail:** Request electronic catalogs. Unsubscribe and reject mail with [these steps](#).
- **Printing:** Set printers to double-sided as default.
- **Reuse in your lab:** Designate a spot in your laboratory to store envelopes, stakes and flags used in the field, or other items for reuse.
- **Checkout lab coats and eyewear** from the Chemistry Stockroom. Laundering service is free.
- **Check the stockroom for chemicals;** they distribute the amount you need from their bulk supply.
- **Get cleaning materials/refills from the stockroom for free;** they stock PSU-preferred greener cleaning brands and you can bring your soap/cleaner container to get a refill.
- **Stockroom reuse:** Save the following items to bring to **Stockroom SRTC 280** and **utilize these shared materials instead of buying.**

- Styrofoam shipping containers
- Dry ice containers
- Packing peanuts
- Pipette tip boxes (go to Terracycle)
- Bubble wrap, small quantities of air filled packing pillows
- Electronic (E-waste)*
- Gas cylinders
- Wood crates
- Foam pieces
- Scrap metal
- Batteries and fluorescent bulbs*
- Ink and other printer/copier cartridges*

Procuring New

- **Order samples** if you only need a small amount.
- **Combine orders** with other labs.
- **Take-back programs and packaging:** [Learn](#) about the programs companies offer for taking back lab products. [Thermo](#) has a cardboard box alternative to Styrofoam coolers.
- **Recycled content:** Purchases products manufactured from recycled materials when possible. Per campus standards, purchase 100% recycled paper.
- **Check for eco-labels:** such as [Energy Star](#), [ACT](#), Federal Energy Management Program (FEMP), and [other energy efficient equipment and products](#).
- **Microscope bulbs:** Choose LED microscope lighting versus standard mercury microscope bulbs.
- **Shipping:** Choose ground. Only ship overnight or rush when absolutely necessary.

Donate and Get Used

- **Donate large items:** Contact [Surplus](#) to donate office equipment, furniture, appliances, and electronics. This service is free and Surplus will not conduct pickups without contact.
- **Buy used on campus:** Check [Surplus sales and auction](#) for larger used items.
- **Check PSU's [Reuse Room](#)** in Cramer Hall 180 (open 24/7) before buying new and to donate smaller office, household, and kitchen items.
- [Utilize other local and on-campus reuse/donation/rental resources.](#)

Field Work

- Pack-In and Pack-Out.
- Use compostable staking/flagging materials in case of loss.
- Use drip irrigation, soaker hoses, and other techniques when doing field work.
- Practice the [Leave No Trace](#) principles.

CONSERVE

Energy

- **Turn off lights** when you leave the room. Use task lighting and/or natural window lighting rather than overhead lights when possible.
- **Turn off and/or unplug** electronic devices (computers, monitors, heat plates, spinner plates, cell phone chargers, battery chargers, etc.) that may draw a charge even when not in use, especially before weekends and breaks.
 - **Set electronics to sleep after a short period of inactivity.**
 - **Use energy smart power strips to easily cut power.**
 - **Use automatic turn off timers on equipment.**
- **No space heaters** are allowed at PSU.
- **Air vents** should be unobstructed.
- **Fume Hoods:** Keep fume hood sashes closed when they are not in use and low when they are in use in order to [save energy](#).
- **More sustainable travel/conference methods:** teleconference, foot/stroll, bike, train, public transit, carpooling, electric car. **Look for lodging certifications** (EPA Energy Star Label for Hospitality, LEED Certification, Green Hotels Association, Ecoroom).

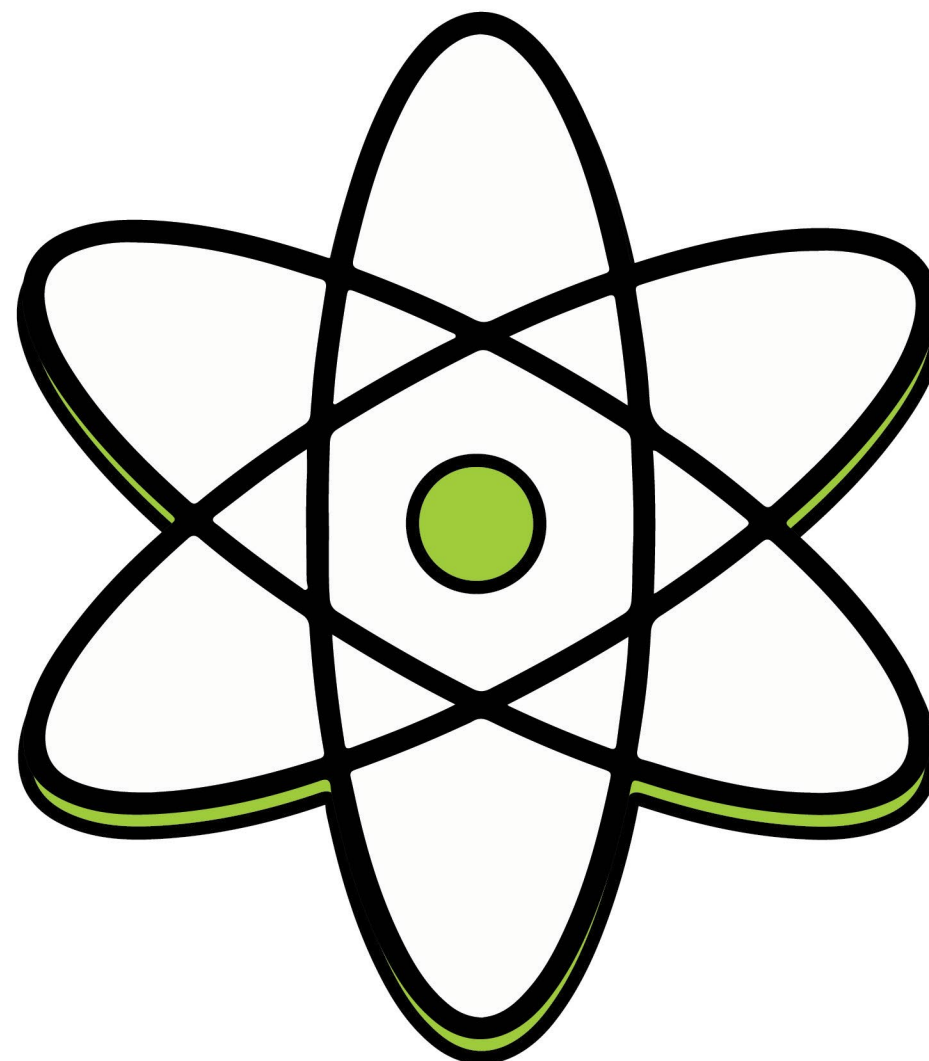
Freezer Management

Participate in the [Freezer Challenge!](#)

- **Chill up** ultra-low temperature (ULT) freezers from [-80°C to -70°C](#). (Storing DNA at -70°C has been found to preserve DNA as well as -80°C.) Store samples at the most appropriate temperature closest to or at room temperature.
- [Defrost freezers](#) and/or remove ice buildup to maintain low-temperature freezers at least 1 time per year or whenever the ice on the interior walls builds up to ¼ of an inch in thickness.
- [Clean](#) the external components of our refrigerator and/or freezer, [including coils](#), filters, and motors every 6 months to avoid excess energy usage and costly repairs.
- **Conduct [clean-outs](#).** Designate lab member(s) to take regular (monthly and a larger biannual) inventory of your freezer/refrigerator to ensure that expired or irrelevant samples aren't taking up valuable space and energy. Barcode samples for easier management.
- **Store samples at high density if possible.**
- **Share** refrigeration space with colleagues.

Water

- [Utilize autoclaves](#): Contact EHS (ehs-group@pdx.edu) to receive training on proper and efficient use.
- Use [timers](#) for water valves and baths. Turn off baths when not in use.
- Try alternatives to [single-pass cooling](#) to save water and prevent flooding risk.
- Use tap water or lower purity water instead of DI water when acceptable for experiment.
- [Report](#) leaks for repair.



GREEN CHEMISTRY

Green Chemistry

- Use the 12 Design Principles of Green Chemistry when planning experiments. Plan small-scale experiments first to optimize resources. Use this guide to identify safer chemicals and other tips like capping containers of VOCs and chemical waste when not in use.

The 12 Principles of GREEN CHEMISTRY

Green chemistry is an approach to chemistry that aims to maximize efficiency and minimize hazardous effects on human health and the environment. While no reaction can be perfectly 'green', the overall negative impact of chemistry research and the chemical industry can be reduced by implementing the 12 Principles of Green Chemistry wherever possible.

- 1. WASTE PREVENTION**
Prioritize the prevention of waste, rather than cleaning up and treating waste after it has been created. Plan ahead to minimize waste at every step.
- 2. ATOM ECONOMY**
Reduce waste at the molecular level by maximizing the number of atoms from all reagents that are incorporated into the final product. Use atom economy to evaluate reaction efficiency.
- 3. LESS HAZARDOUS CHEMICAL SYNTHESIS**
Design chemical reactions and synthetic routes to be as safe as possible. Consider the hazards of all substances handled during the reaction, including waste.
- 4. DESIGNING SAFER CHEMICALS**
Minimize toxicity directly by molecular design. Predict and evaluate aspects such as physical properties, toxicity, and environmental fate throughout the design process.
- 5. SAFER SOLVENTS & AUXILIARIES**
Choose the safest solvent available for any given step. Minimize the total amount of solvents and auxiliary substances used, as these make up a large percentage of the total waste created.
- 6. DESIGN FOR ENERGY EFFICIENCY**
Choose the least energy-intensive chemical route. Avoid heating and cooling, as well as pressurized and vacuum conditions (i.e. ambient temperature & pressure are optimal).
- 7. USE OF RENEWABLE FEEDSTOCKS**
Use chemicals which are made from renewable (i.e. plant-based) sources, rather than other, equivalent chemicals originating from petrochemical sources.
- 8. REDUCE DERIVATIVES**
Minimize the use of temporary derivatives such as protecting groups. Avoid derivatives to reduce reaction steps, resources required, and waste created.
- 9. CATALYSIS**
Use catalytic instead of stoichiometric reagents in reactions. Choose catalysts to help increase selectivity, minimize waste, and reduce reaction times and energy demands.
- 10. DESIGN FOR DEGRADATION**
Design chemicals that degrade and can be discarded easily. Ensure that both chemicals and their degradation products are not toxic, bioaccumulative, or environmentally persistent.
- 11. REAL-TIME POLLUTION PREVENTION**
Monitor chemical reactions in real-time as they occur to prevent the formation and release of any potentially hazardous and polluting substances.
- 12. SAFER CHEMISTRY FOR ACCIDENT PREVENTION**
Choose and develop chemical procedures that are safer and inherently minimize the risk of accidents. Know the possible risks and assess them beforehand.

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Share these tips with all new lab members and during staff meetings!

Resources: [PSU Green Chemistry](#)

Sources: [NIH](#), [Cornell](#), [UCI](#), [UW](#), [PSU EHS](#), [PSU Planning and Sustainability Office](#)