

Drexel University's Department of Environmental Health & Safety

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1. What are Laboratory Audits?

The Department of Environmental Health and Safety audits all research and academic labs on the University City, East Falls, Center City and Doylestown campuses to ensure that the laboratory remains in compliance with regulatory safety standards.

Issues reviewed include:

- Chemical Storage
- Chemical Waste
- Gas Cylinder Storage
- Hazard Communication
- Personal Protective Equipment
- Chemical Fume Hood usage
- Physical Hazards
- Biological Safety
- Fire Safety

Audit Summary Reports are generated from these audits and sent to the Principle Investigator (P.I.) usually within 48 hours.

Laboratory Audits are conducted twice a year by Drexel University's Department of Environmental Health & Safety. The first cycle of audits is typically done from January through April, while the second cycle is performed from July through October. The time between audit cycles are for follow-ups. Before each audit period, a memo goes out to the P.I.'s and Department Heads giving a notice that they are about to begin. At this time, Faculty members, Lab Personnel, Lab Managers, Chemical Hygiene Officers, or Department Safety Officers can arrange a time with the auditor to be present at the lab audits.

During the course of their other duties or through routine walkthrough's of buildings, members of the Department of Environmental Health and Safety may quickly look over labs and point out obvious issues that need to be corrected to any lab personnel present and/or to the P.I. via an e-mail message or phone call. Some common issues raised during these include, but are not limited to: Eating & drinking in lab, lack of proper Personal Protective Equipment, unsecured gas cylinders, wearing gloves and/or lab coats out of the lab, and so forth.

2. How long do I have to address an issue raised during the audit, and what do I do when the issue is corrected?

Any issues listed in the Audit Summary Report must be addresses within 30 – 90 days, depending on the severity of the issue. Any issue of Importance Level 5 must be addressed within 30 days. Any issue of level 4 or lower must be addressed within 90 days. If there are any questions or problems in addressing any issue, please contact the Department of Environmental Health & Safety.

A report must be sent by each lab, listing what actions were taken to address any issues. There is no set format for the report. Many labs list their actions on the Audit Summary Report and send it back either to the Department of Environmental Health and Safety or directly to the auditor.

3. Who is required to undergo Laboratory Safety Training and how is it done?

All research laboratory personnel and Principal Investigators are required to undergo annual safety training. Specific issues raised during a laboratory audit may make it necessary for the all personnel to retake the training.

Laboratory Safety Training can be done online at the Drexel Environmental Safety & Health training web site:

<http://www.drexelehstraining.com/>

Log in to begin the training exercises. Relevant information will be reviewed and questions must be answered after each section. It is recommended that notes be taken while reviewing the information for future reference.

If a new user select the “New Here” button under the login box.

Fill in the requested information and click “submit”. Please remember to enter full email address complete with domain. The user will receive an email shortly thereafter that will contain their password. Once received please go back to the login page and begin the training. The user will be able to stop and save progress at their convenience but must complete the program within thirty days. If they fail to complete the required training within thirty days they will need to start again from the beginning.

4. What is required for the Chemical Inventory and where should it be kept?

Each lab is required to keep an up to date inventory of all chemicals present the lab. One copy of this inventory will be maintained by the P.I./Faculty Member, a second copy will be maintained in each lab as the first page of the MSDS book or posted near the entrance door, and a third electronic copy will be sent to the University Department of Environmental Health & Safety. The up-to-date copy of the inventory must be sent annually to the Department of Environmental Health and Safety via safeheal@drexel.edu.

The Inventory should contain at least the following:

- P.I. Name
- Building and Room ID
- Full chemical name
- Date the inventory was compiled
- Volume/Quantity of chemical

Optional information includes vender/manufacturer, NFPA hazard ratings, and whether or not an MSDS for the chemical is present. Hard copies of the inventories must be prepared at least annually. As new chemicals are obtained, chemical inventory sheets must be updated accordingly.

Remember, in all labs, cleaning products, house hold chemicals, and compressed gas cylinders are considered chemicals and must be inventoried.

The P.I./Laboratory Supervisor/Faculty Member is responsible for reviewing the MSDS's and recording which materials are carcinogenic, mutagenic, or teratogenic. This information must be conveyed to all students and/or employees engaged in research in his/her laboratories, including

locations used and stored within the lab. This information must be posted at the entrance to each lab in an effort to inform any individual who may need to enter that space.

In accordance with state and federal regulations, a list of these carcinogenic, mutagenic, and/or teratogenic materials should be sent to the University's Department of Environmental Health & Safety.

For P.I.'s with multiple labs, each lab must have its own separate chemical inventory, specific for that room.

5. What Material Safety Data Sheets are required and where should they be kept?

The Department of Environmental Health and Safety maintains an online database of material safety data sheets at <http://hq.msdsonline.com/drex3646/Search/Default.aspx>. It can be searched using either chemical name or location (i.e. building & room number). The list of MSDS on this website is compiled based upon the chemical inventories received by the Department of Environmental Health and Safety from the laboratories. This complies with OSHA regulations. All lab personnel must know how to access and use the database. Signage

It is recommended, but not required, that each lab keep hard copies of the MSDS for all of the chemicals within their lab. At the very least, the hazardous chemicals so they are immediately available if one is needed, such as to accompany lab personnel exposed to it to receive medical assistance. The hard copies should be kept in a labeled binder, sorted in alphabetical order. The MSDS must be kept in a visible location in the laboratory, near the entrance door to the laboratory.

The PI/Laboratory Supervisor/Faculty Member is responsible for the entire MSDS book from each laboratory, including the chemical inventory and annual updates. MSDS's are available from the manufacturer/vender of the chemical. They can also be found online, usually at the manufacturer's web site, although there are other web sites that can supply MSDS's, such as:

<http://www.msds.com/>
<http://www.msdssearch.com/>
<http://www.ilpi.com/msds>
<http://www.hazard.com/>
<http://www.msdsonline.com>

6. How should chemicals be labeled?

All chemicals must be properly labeled, whether they were purchased from a vender or blended in the lab. As per OSHA, labeling will be the same as in the Hazard Communication Standard 1910.1200. Therefore, all containers in the workspace shall contain the following information:

- Identity of the Substance (Complete Chemical Name – Do **not** abbreviate or use symbols)
- Appropriate Hazard Warning (Completed NFPA Diamond, HMIS Label, or listing the Hazard Class (**see #7**) is acceptable)
- Name and Address of Chemical Manufacturer, importer, distributor or other responsible party. This is not required for chemicals blended in the lab (i.e. dilutions, buffers, etc.).

All labels must be prominently displayed and legibly written (printed) in English and other language as appropriate for employees. **It is the responsibility of the principal investigator to inspect all incoming shipments of containers of hazardous chemicals to ensure that they bear labels with the appropriate information.**

If a container is improperly labeled, the PI/Laboratory Supervisor/Faculty Member or the PI's /Laboratory Supervisor's/Faculty Member's designee must contact the Safety Office (215-895-5907), who will notify the vendor for correction, and the receiving department for informational purposes.

Writing abbreviations on secondary chemicals for commonly used buffers (Tris, TAPS, HEPES, MOPS, etc.) or other chemicals with particularly long names is acceptable, provided that the full names of these abbreviations are made available on a list in a clearly visible area of the lab. Near the entrance of the lab is usually the best place. Remember that hazard warning information is still required on these containers.

It is recommended to write the receive date and open date on all chemicals to better track their usage and to help identify any old chemicals that may require disposal. Writing the receive and open dates on the label is required for all peroxide-forming chemicals (**see # 10**).

7. The sample vials I use are too small and/or the chemical name is too big to write on the container. What should I do?

Sometimes you may work with a chemical with a particularly long name, or may only know what the chemical formula or structure is. Or you may be working with sample vials too small to write all of the required information on them, such as known hazard information, name or other information. In such cases, you may generate a code to write on the secondary containers. The code should be relatively simple and easy to decipher.

For commonly used materials, the key to the code may be printed on a sheet of paper and placed in a clearly visible section of the lab. For larger experiments with multiple different samples and/or less common, experiment specific chemicals, this information can be written in your lab notebook. The code key should be kept at or near the work area. If in the lab notebook, signage is required denoting the location where the notebook is stored. The notebook should be kept in a visible location within the lab and should always be returned to that location when the experiment or day's work is done. It does not do anyone any good in an emergency if the key code is buried on your desk and no one knows where it is.

8. How should chemicals be sorted?

The Chemistry Department stores their chemicals based upon the Flinn Scientific Guidelines. All other departments must separate their chemicals in some logical manner that avoids storage of incompatible chemicals. One of the easiest is based on Hazard Class.

Chemicals must be sorted based on the following Hazard Classes:

- Acids
 - Organic – Examples: Acetic, Formic, & Picric Acids
 - Inorganic – Examples: Sulfuric, Hydrochloric, Nitric, & Phosphoric Acids
- Bases
 - Organic: Examples – Amines and Nitrogen-containing heterocyclic compounds. These are often also flammable.
 - Inorganic: Examples – Potassium Hydroxide, Sodium Hydroxide, Ammonium Hydroxide.

- Flammables: Examples:
 - Liquids: Alcohols, Acetone, Many organic solvents.
 - Solids: Many metal powders, Oily fabrics, Elemental sodium, Picric Acid, Calcium carbide.
- Oxidizers: Examples – Hypochlorites, Chlorates, Peroxides, Permanganates, Certain Nitrates and Nitrites, Sulfoxides, Halogens.
- Poisons (Toxic)
- Reactives: React violently with air or water; Examples – Sodium Metal, Thionyl Chloride,
- Non-Hazardous: Includes any chemical NOT labeled as Flammable, Combustible, Poisonous (Toxic), Oxidizer, or Corrosive (acid or base).

After being sorted out, the individual hazard classes can be organized alphabetically or by chemical family.

Sorting by hazard class is the preferred method, but not the only acceptable method. Following the Fisher color scheme or the Flynn Scientific Guidelines, among others, are also acceptable. Contact the Department of Environmental Health & Safety to discuss options.

Solid (dry) and Liquid chemicals MUST be stored separately. Liquids are always stored under solid chemicals.

Chemicals labeled as “Irritants” may either be stored as their own category, or with the Non-Hazardous chemicals.

Any solution with a concentration of 1M or less may be considered non-hazardous, unless the material is particularly dangerous.

Organic and Inorganic chemicals should be separated from each other, as space allows.

Organic and Inorganic Acids, as well as Organic and Inorganic Bases, MUST be separated from each other as they are often incompatible with each other. Nitric Acid and Acetic Acid are particularly incompatible and may react violently with each other.

Some Acids may be very reactive, highly corrosive, and may even act as oxidizers. Where possible, Nitric Acid, Picric Acid, Sulfuric Acid, Hydrofluoric and Perchloric Acid should be stored separately from all other chemicals, and each other, space permitting. Picric acid should never be allowed to dry as the solid form is potentially explosive. Always check around the bottle cap for precipitants. If precipitation is evident in picric acid, leave the lab and contact Environmental Health and Safety immediately.

Some chemicals can be classified in multiple hazard classes. For example, some amines may be labeled as both flammable and corrosive. Most labs generally store the chemical under the first hazard class that is listed on the label.

While it can be stored with other inorganic acids, Hydrofluoric Acid (HF) should always be stored in its own plastic secondary spill container. HF may react with the glass of other acid containers. Contact the Department of Environmental Health & Safety to obtain the required training, HF Standard Operating Procedure, and tube of calcium gluconate gel to treat HF burns, before your lab starts to use HF.

Weak acids (Citric acid, EDTA, etc.) and weak bases (sodium bicarbonate, etc.) can often be considered non-hazardous or irritants. They can be considered thus so long as the container is

not labeled as “Corrosive.” Any container labeled “Corrosive” must be segregated from non-hazardous chemicals.

Oxidizers must be stored as far away from other chemicals as possible, especially flammables and other organic compounds.

9. How can I tell what hazard class the chemicals are?

Many chemical companies place symbols on the labels of their products to inform the user what hazard class their product is.

Using Sigma-Aldrich as an example, these symbols are often found in the orange section of the label.

- Non-Hazardous: No symbol.



- Irritant:



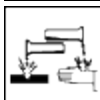
- Poison or Toxin:



- Flammable:



- Oxidizer:



- Corrosive:



- Explosive:



- Biohazard:



- Radioactive:

Other companies also use the above symbols.

Some companies may not use the above symbols, such as Fisher. In these cases, look for key words on the labels such as Poison, Toxic, Corrosive, Oxidizer, Combustible, Flammable, or Irritant.

Generally, if none of these key words or symbols appear on the chemical container, it can usually be considered non-hazardous.

In any case, read the label and MSDS carefully as they often list other hazard issues, such as incompatibilities. Two common examples of improper storage due to not reading the label or MSDS are:

- While labeled as a corrosive, Thionyl Chloride is sometimes incorrectly stored with aqueous acids, despite the label clearly stating that it reacts violently with water.
- The labels of some strong oxidizers, such as Nitric Acid, state that they may cause combustible materials to ignite, but every so often, we find them stored in wooden cabinets or shelves, or even in a cardboard container.

“Corrosive” covers both acids & bases so further research into the label and/or MSDS may be required as to determine where it should be stored. This is especially important for liquids and solutions. Separating different corrosive solid chemicals is not as important.

If there is any question on how a chemical might be stored or characterized, please contact Environmental Health & Safety.

10. How should I separate the different chemical hazard classes and where should they be stored?

Whether sorted by Hazard Class or the Flinn Scientific Method, incompatible chemicals must be stored separately from each other. While it is acceptable to have incompatible chemicals sitting side-by-side while in the process of performing an active experiment, they must be returned to their appropriate, separate storage areas when the activity is completed.

Ideally, each hazard class (or chemical family if using the Flinn Scientific Method) should have its own chemical storage cabinet or shelf, with the cabinet/shelf labeled to show the hazard class.

However, space limitations often force different hazard classes into the same cabinet or on the same shelf.

Storage of incompatible liquid chemicals in the same area is only permissible if overspill containers (i.e. secondary containers) are used to contain any spills or leaks. Also containers must be large enough to contain any leaks/spills (for example dinner trays (like those found in the cafeteria) are not acceptable). Cardboard is not sufficient to act as a secondary spill container for liquid chemicals. Also, many organic solvents will dissolve Styrofoam. Always check the MSDS to determine a compatible material for the secondary spill container.

Chemicals are generally stored in cabinets and on shelves. Refrigerators are also used for certain perishable chemicals.

Avoid storing chemicals on the floor, in chemical fume hoods, and on bench tops. Chemicals can be stored temporarily in fume hoods and bench tops while they are actively being used in an experiment. However, as soon as the experiment is completed, the chemicals must be returned to the appropriate storage area.

Liquid chemicals must be stored below dry (solid) chemicals.

Flammable materials should be stored in either an explosive proof refrigerator or a grounded flammable storage cabinet with self-closing doors and overspill protection.

Avoid storing chemicals at high elevations, such as on top of cabinets and refrigerators.

Liquids in particular must be stored at lower elevations.

Hazardous liquids cannot be stored above 5”, or above the eye-level of the shortest person working in the lab. This is a particular concern for corrosive liquids.

Non-Hazardous liquids (i.e. buffers, etc.) should also be stored below 5” unless there are space limitations within the lab.

Solid (Dry) chemicals can be stored over 5" if necessary.

Finally, only household chemicals may be stored under the sink.

11. What are Peroxide-Forming Chemicals and why must I write the receive and open dates on the label?

Peroxide-forming chemicals are chemicals that can spontaneously produce potentially explosive peroxides, usually requiring exposure to air to do so. As such, these compounds should not be distilled or evaporated to dryness.

Common peroxide-forming chemicals include:

- **Tetrahydrofuran (THF)**
- **Ethyl Ether**
- **Benzyl Alcohol**
- **Dioxanes**
- **Vinyl Pyridine**
- **Vinyl Ethers**
- **Diethyl Ether**
- **Isopropyl Ether**
- **Cyclohexene**
- **Acrylic Acid**
- **Acetal**
- **Styrene**

Perchloric acid can also become explosively unstable under certain conditions, such as if it is concentrated or heated, and is listed in some references as a peroxide-forming chemical. Health & Safety treats it as such.

Most peroxide-forming chemicals should only be kept for 12 months after opening before having to be disposed of. Unopened peroxide-formers may be kept for 15 months. After that, the chemicals are much more likely to become unstable. Some peroxide-formers are stable for a significantly less time. In order to safely track the age of these chemicals, the Receive date and the Open date **MUST** be written on the label of these chemicals.

Isopropyl Alcohol (AKA 2-Propanol) is a very common solvent used on campus. Few realize that it is also a peroxide-forming chemical. While not nearly as potentially hazardous as the other commonly used peroxide formers, precautions should be taken during its use, such as proper personnel protective equipment. 2-Propanol rarely forms peroxides unless being concentrated via evaporation or distillation. That being said, 2-Propanol may be kept longer than the 12-month time period of other peroxide-formers. Still use caution if using very old 2-propanol. While low, the potential for forming explosive peroxides does exist.

For a more extensive list of peroxide-forming chemicals, please contact the Department of Environmental Health & Safety (215-895-5907; safeheal@drexel.edu) or check the Chemical Hygiene Plan.

DO NOT handle any peroxide forming chemical if there are signs of crystal growth or precipitation in the bottle or around the cap. This is a sure sign that **EXPLOSIVE**-peroxides may have formed. Contact Environmental Health & Safety (215-895-5907) **IMMEDIATELY** if this occurs.

12. How do I exchange Mercury Thermometers for alcohol-filled thermometers?

Mercury-filled thermometers can be problematic, should they break. Should they break, the lab personnel must contact the Department of Environmental Health & Safety for clean-up.

For the past few years, The Department of Environmental Safety & Health has been exchanging mercury thermometers with alcohol-filled thermometers. Most have been swapped out by now.

If you still have mercury thermometers and still wish to exchange them, please contact us. Please include your name, contact information, location of lab, and as much information about the mercury thermometers as possible. Having the vender, model number, and temperature range would assist in finding a fitting replacement.

13. How do I dispose of hazardous chemicals?

Hazardous chemical wastes (consisting of chemicals that are Flammable, Oxidizer, Poisonous, Corrosive, and/or Reactive), whether spent in an experiment or just sitting around the lab, no longer in use, can be disposed of by contacting the Department of Environmental Safety and Health. A Chemical Pick-up form can be submitted through our website. Alternatively, a list of the chemicals that need to be disposed of can be faxed to us, although via our website is preferred. Usually, waste materials will be picked up within 72 hours of our receiving the request.

14. Where do I store hazardous chemical waste and how much store before requesting a pick-up?

Chemical wastes are stored in the Satellite Accumulation Area. This is a clearly marked area for the sole purpose of storing used or old chemicals awaiting disposal. Often it is a specially designated shelf or cabinet, although short-term storage in the fume hood is acceptable. Remember that incompatible wastes must be segregated from each other much as the other chemicals are stored. (**See #7**). Some departments choose a single location for the waste of all of their labs.

Labs are allowed to accumulate up to 5 gallons (combined) of any hazardous waste, or 1 quart of acutely hazardous waste (immediately hazardous to life or health). If any full containers are present, arrangements should be made to have them picked-up immediately.

15. How should chemical waste be labeled?

All containers must be labeled with the complete chemical name of each primary component. Formulas, acronyms and abbreviations are not acceptable. If possible, the label should include the approximate percentage of each chemical, should compatible chemicals be mixed together. Do not place the date or the words "Hazardous Waste" on the container. Write "Used", "Discarded", or similar. The Drexel Department of Environmental Safety and Health will re-label the container during pick-ups as either a recyclable/redistributable material or as a hazardous waste at which time the container will be dated and moved to the temporary storage vault.

16. How do I dispose of my empty chemical bottles?

Residual materials (less than 1 milliliter) may be rinsed from containers and disposed of down the drain. The remaining glassware should be cleaned, triple rinsed, labels defaced, and disposed of as municipal waste. All broken glassware should be disposed of in approved sharps containers.

17. Can I dispose of any chemicals down the drain?

Drain disposal is permitted on a limited basis. Aqueous corrosives may be disposed of in this way if the solution is neutralized to a final pH value between 6 and 8. The limit of material that may be neutralized is 1 Liter.

Common salts, sugars and agars in both liquid and solid form may be allowable for drain disposal, provided they display no hazardous characteristics (corrosive, poison, reactive, and

flammable). Solids must be dissolved in tap water first. The limit of material that may be disposed of is 1 kg of solid or 1 liter of liquid.

The following are strictly prohibited from drain disposal:

- Flammable or explosive pollutants
- Pollutants that will cause corrosive structural damage to the Publically Owned Treatment Works (POTW), but in no case discharges with pH lower than 5.0.
- Solid or viscous pollutants that may cause an obstruction of flow in the POTW.
- Pollutants capable of releasing fumes or vapors
- Pollutants, including oxygen-demanding pollutants (high biological oxygen demand), which may interfere with the POTW
- Petroleum, oil, non-biodegradable cutting oil or products of mineral oil origin in amount that will cause interference or pass through
- Organic chemicals
- Heavy metal solutions
- Nitric, Hydrofluoric, Perchloric, and Chromic Acids
- Toxic/Poisonous solids and liquids.

18. How should compressed gas cylinders be stored?

The Department of Environmental Health & Safety requires compressed gas cylinders of all sizes, whether empty or full, to be secured at all times. The use of straps, chains, or a suitable stand to prevent them from falling is an acceptable practice. Cylinders not in use must be capped at all times to protect the valve stems.

They must also be separated into the following hazard classes when not in use:

- Flammable – a gas the forms a flammable mixture with air, such as Methane
- Asphyxiant – A gas that can displace Oxygen, such as Argon, Nitrogen, CO₂
- Oxidizing – Can support or accelerate combustion, such as Oxygen, Chlorine, N₂O
- Corrosive
- Toxic
- Cryogenic – Liquid Oxygen, L. Hydrogen, L. Nitrogen, Liquefied Natural Gas, etc.
- High Pressure
- Pyrophoric – Arsine, Diborane, Phosphine, Silane

Oxidizing gases should never be stored near flammable gases.

19. How can compressed gas cylinders be properly secured?

The use of straps, chains, or a suitable stand to prevent compressed gas cylinders from falling is an acceptable practice.

In an effort to assist in maintaining compliance, the Department of Environmental Health & Safety can supply a securing bracket (attaches to bench top ledge) for a fee of \$49.00 or you can contact the Facilities Management office

- Center City Campus: 215-762-6500
- Doylestown Campus: 215-489-4947
- Queen Lane Campus: 215-991-8484
- University City Campus: 215-895-1700

to submit a work order to install a chain securing system. If you fail to secure these cylinders with the appropriate means, whether with our brackets or a chain system, then the cylinders will be removed from the laboratory.

20. What are Hazard Communication Labels and where should they be placed?

Hazard communications Labels assist any person entering the lab in determining any potential hazards they may encounter. These are required not just for the lab personnel, but also to assist any emergency responders.

The primary Hazard Communication Labels are posted on the entrance doors to the lab. These include the NFPA diamond and other hazard warnings, as well as the emergency contact information for emergency responders to contact the Principle Investigator and/or responsible lab personnel. **See #19** for more information.

Inside the lab, every chemical storage area (i.e. shelf, cabinet, desiccator, refrigerator, etc.) must be labeled as to what chemical hazard is stored there (i.e. Acid, Base, Flammable, Oxidizer, Poison, Reactive, Non-Hazardous (The Chemistry Department posts the chemical family based on the Flinn Scientific method)). This includes the any storage areas for cleaning products. NFPA diamomds are also sufficient.

All refrigerators and freezers must have labels stating that no food or drink should be stored in them. In fact, an additional label on the front door prohibiting food, drink, the application of cosmetics and smoking in the lab is highly recommended. Any food-bearing refrigerator or cabinet outside the lab (i.e. in the office or out in the hall), should have signage stating that they are for food only and that no chemicals should be stored within. Remember, no eating, drinking, applying of cosmetics, or smoking is permitted in the lab.

Any sources of Ultra-Violet (UV) Light must be labeled as such. Lasers must be labeled with the Laser Class. All radioactive storage/testing areas must be properly labeled as well.

Any equipment that can potentially come into contact with biohazardous/infectious waste must be labeled with a Biohazard Sticker.

The Drexel Department of Environmental Health and Safety can supply labs with some labels, such as Laboratory Emergency Information stickers for the entrance doors, and biohazard labels. If you need such labels, contact Health & Safety.

For other labels (such as identifying Hazard Classes/Chemical Families), it is often easier for the lab personnel to print up their own labels and tape them to the appropriate shelf/cabinet. Writing legibly on a piece of tape placed on the cabinet or shelf is also acceptable.

Contact Radiation Safety for information about Radioactive Labels and tape.

Some labels can be obtained through laboratory supply companies, such as Lab Safety & Supply.

All of the above information is necessary to assist any emergency responders in case of an emergency.

21. What information is required for the Entrance Door of the Laboratory?

For consistency and to ensure all required information is present, the Department of Environmental Health & Safety supplies labs with Laboratory Emergency Information stickers for the lab's entrance door. This label displays all required information, which includes:

- Contact Name and Phone Numbers, including the Principle Investigator/Faculty Member and relevant lab personnel
- After Hours Contact Information
- Department Information
- An NFPA Diamond
- Biohazard and Radiation Warnings, if appropriate
- Other warnings, such as “Carcinogen in use”, “Water Reactive Materials”, “Inhalation hazards, respiratory protection required”, “UV Light,” “Biohazard”, etc. as needed.

All of the above information is necessary to assist any emergency responders in case of an emergency.

Remember, ALL entrances to the lab must be labeled as above.

22. How do I fill out the NFPA diamond on the entrance door?

The National Fire Protection Association (NFPA) Diamond must be filled out completely on all laboratory entrance doors, with the highest hazard ratings pertaining to the laboratory.

The red, yellow, & blue areas of the diamond must be filled with a number ranging from 0 – 4, depending on the highest hazard rating found among the lab’s chemical inventory. This information is often found on the chemical’s label and/or MSDS, either as a similar diamond or as a listing. Corrosives and poisons tend to have the highest Health Hazard Rating (blue). Flammables, naturally, have the highest Flammable Hazard Rating (red). Corrosives, Oxidizers, and reactive chemicals tend to have the highest Reactivity Hazard Rating (yellow). If there are no chemicals in the lab, place zeros in the red, yellow and blue areas.

In the white area of the NFPA Diamond, place any special hazard warnings as listed on the label.

23. What emergency contact numbers should I have posted by the phones in the lab?

To better assist your laboratory in finding important phone numbers, the Drexel Department of Environmental Health & Safety requires that a list of emergency numbers be placed by every phone in the lab. It is recommended that said list also be placed by every office phone. The Lab Compliance Packet (**see #22**) contains an extensive list of emergency numbers for each campus.

These lists include numbers for:

- The Emergency Operator
- Public Safety
- Student Health
- Occupational Health
- Environmental Health & Safety personnel
- Radiation Safety
- Facilities
- Security
- Maintenance
- Environmental Services

For each campus

It is recommended any additional numbers relevant to the lab be added to the list.

The Department of Environmental Health and Safety has already put stickers on most lab phones with the basic emergency numbers: Public Safety, Facilities, Safety & Health, and Radiation Safety. Contact the Department of Environmental Health and Safety if your phone does not have this sticker.

24. What laboratory safety manuals are required to be in the laboratory?

All laboratories are required to have bound hard copies of the **Chemical Hygiene Plan** and the **Lab Compliance Packet** placed in a visible location. They are commonly stored by the Material Safety Data Sheets & Chemical Inventory.

Any lab that uses Hydrofluoric Acid must have available a **HF Standard Operating Procedure**. This details the proper use and precautions for the use of Hydrofluoric Acid. A tube of Calcium Gluconate gel is also required if HF is used in the lab.

The above materials are supplied by the Drexel Department of Environmental Health & Safety and can be found either on our website or otherwise supplied to the lab by our office. These materials can be e-mailed, sent by inter-office mail, or hand-delivered, depending on the situation.

All lab personnel must be familiar with the Chemical Hygiene Plan and Lab Compliance Packet. Some labs keep electronic copies on all lab computers in addition to the hard copies. Some even send electronic copies to all lab personnel so they may review it at their own pace.

All lab personnel should become familiar with other documents that can be found on our web page, www.drexel.edu/facilities/healthSafety/. These include Lab Safety Manual, Emergency Spill Response Plan, Chemical Fume Hood & Biological Safety Cabinet Policy, Fire Safety Policy, Biosafety Policy for Research & Clinical Practice Groups, and Hazardous Waste Management Plan. While not mandatory, it is recommended that all laboratories have hard copies made available for the lab personnel.

Any lab that uses radioactive materials must have the Radiation Safety Manual, which is supplied by Radiation Safety (<http://www.research.drexel.edu/compliance/radiation/default.aspx>).

25. What Personal Protective Equipment is required when working in the lab?

When working in the lab area, lab coats, safety glasses/goggles, and gloves appropriate for what chemicals/materials you are working with are required at ALL times. Additional personal protective equipment (PPE) may be required, depending on the chemical you are working with.

Always check the material safety data sheets of the chemicals you will be working with as to determine what appropriate and additional PPE is required.

If you have any question as to what gloves are compatible to the chemicals you are working with, please contact the Department of Environmental Safety and Health.

Protective eyewear are required in any lab where chemicals are used or stored. Regular prescription eyeglasses are not acceptable as protective eyewear. Contact lenses should not be worn at all in the lab as some chemicals may react with the lenses increasing the damage to the eye.

Lab coats are required to protect your street clothing when working in the lab.

It is the responsibility of the Principle Investigator to supply all necessary personal protective (PPE) equipment. Lab personnel cannot do any lab work until the appropriate PPE are available.

Wear comfortable clothing that does not leave any undue exposed skin.

Pants and dresses should be ankle-length. Shorts, short skirts, and other clothing that presents significant exposure to bare skin must not be worn in the lab, unless covered by an ankle-length lab coat.

Appropriate footwear must be worn in the lab. It must cover the entire foot. Sandals, flip-flops, perforated shoes, any shoe made from canvas, or any other open-toed or open-top footwear are prohibited in the lab.

The above does not just cover those working in the lab. Visitors to the lab must also dress appropriately and at least wear protective eyewear. Protective eyewear may also be required for any lab personnel desks located within the lab as well.

26. How often should I check the eyewash station?

Eyewash stations should be checked/tested weekly by lab personnel to ensure that they are working properly. A record must be kept of this weekly check, which should include the date of the check, the name of the individual who checked it, and whether or not it was working properly. It is recommended that this record be kept near the eyewash station. A template of the weekly log can be found at www.drexel.edu/facilities/healthSafety/ under "request service forms". If the eyewash station is not functioning properly, contact the Department of Environmental Safety & Health immediately.

Labs that have eyewash stations that lack a basin or sink to catch the water and/or are not connected to a drain are excused from the weekly inspection. It is recommended, however, that these eyewashes be checked on some other regular basis, if nothing else than to routinely flush the lines.

DO NOT inspect the safety showers. The Department of Environmental Safety & Health inspects all safety showers once a year. The Department also does their own annual inspection of all eyewash stations.

27. Where can my lab obtain a chemical spill kit?

All labs are required to have a chemical spill kit. The Department of Environmental Health & Safety can supply a spill kit (free of charge) to any lab that requests one through our web site. These spill kits are designed to clean up minor spills. Major spills must be handled by the Department of Environmental Health & Safety.

The spill kits can be used to clean minor acid, base, organic solvent, and formaldehyde spills. For any other kinds of spills, contact the Department of Environmental Health & Safety.

28. What is the difference between a minor spill and a major spill?

The University Department of Environmental Health and Safety defines **minor spill** as a small spill that is less than 500 gm or 500 ml of non-acutely hazardous materials. Minor spills may be cleaned up by the lab personnel.

The University Department of Environmental Health and Safety defines **major spill** as a large spill that is greater than 500 gm or 500 ml or any amount of an acutely hazardous material. An acutely hazardous material is any material that is imminently dangerous to life and health.

The accidental release of spill of the following are also considered Major Spills: Select Release Agents, Hazardous Gas Releases, and Mercury spills (i.e. a broken mercury thermometer).

In the event of a major spill, all lab personnel must leave the area and contact the Department of Environmental Health and Safety or Public Safety.

See the Chemical Hygiene Plan and the Lab Compliance Packet for more detailed information on how to handle spills (**See #22**).

29. At what height should I keep the sash on the Chemical Fume Hood?

When working in the fume hood, the sash should be kept at the lowest position possible and still allow comfortable working conditions. To avoid chemicals splashing onto the lab personnel, the Drexel Department of Environmental Health & Safety recommends the sash height to be 15 – 21 inches. However, in cases where Chemical Fume Hoods have failed certification due to high Air Face Velocities (>120 fpm), the sash should be raised to the highest possible position to reduce it to an acceptable working velocity.

When not in use for any “Hands on” part of the experiment, the sash should be lowered to its lowest possible point. However, due to the nature of the fan systems in the New College Building at the Center City Campus, the sash heights should be kept at 18” when idle until further notice.

30. What can be stored in the Chemical Fume Hood?

Large equipment or apparatus (i.e. centrifuges, water baths, etc.) cannot be stored in the fume hood. Large equipment can cause areas of dead air flow and reduce the efficiency of the hood. Smaller equipment (i.e. boiler/spin plates) can be placed in the hood provided that they are separated and elevated (using racks or bricks) to allow air flow around them. Any equipment should be placed as far back in the hood as possible without blocking the baffles. The slots of the baffles should be open and unobstructed.

In addition, large objects, such as desks, compressed gas cylinders, and filing cabinets should not be placed in front of a fume hood as they may disrupt the air flow.

Waste or unwanted chemicals waiting for pick-up may be stored in the fume hood. Unless they are presently in use, all other chemicals must be removed from the fume hood and placed in its appropriate storage area.

31. My Fume Hood does not seem to be working. What should I do?

If the fume hood does not appear to be working properly, contact the Drexel University Department of Environmental Health & Safety. Requests for hood certifications/inspections can be submitted through the web site. The hood will be inspected as soon as possible, and if anything appears to be amiss, Health & Safety will work with Facilities Management to fix the problem.

If your hood is equipped with an alarm, contact the Department of Environmental Health and Safety immediately if it should go off. DO NOT disconnect the alarm under any circumstances.

32. What should I do if my fume hood failed certification?

Once a year, the Drexel University Department of Environmental Health & Safety inspects all fume hoods on campus. If the fume hood fails to pass certification, a notice will be placed on it. Facilities will be contacted by Health & Safety to fix the fume hood.

The desired average Air Face Velocity (AFV) of the fume hoods should fall between 80 and 120 Feet per Minute (fpm).

If the AFV < 70 fpm, the fume hood should not be used at all. Any work requiring a fume hood must be done at a different hood in the lab or department.

If the AFV > 120 fpm, the fume hood can still be used, but special precautions must be made. Because the air flow patterns may become unpredictable, face shields and/or safety goggles must be worn. Also the sash should be raised to the fully open position to reduce the air velocity.

33. Can I use radioactive materials and perchloric acid in chemical fume hoods?

Radioactive materials and perchloric acid require special considerations if to be used in a fume hood. Often they require special fume hoods for their use. Do not use these materials in the fume hood unless you have received permission from Radiation Safety or the Department of Environmental Health & Safety, respectively.

34. What are considered Biohazardous materials?

Biohazards are any materials that have been exposed to blood or other potentially infectious agents that could pose a threat to human health. Biohazardous materials include any item or material that have been exposed to any of the following:

- Any of the following Human body fluids:
 - Blood
 - Semen
 - Vaginal Secretions
 - Cerebrospinal Fluid
 - Synovial Fluid
 - Pleural Fluid
 - Pericardial Fluid
 - Peritoneal Fluid
 - Amniotic Fluid
 - Any body fluid visibly contaminated with blood
 - All body fluids in situations where it is difficult to differentiate between body fluids
- Any Unfixed Human Tissue or Organ (other than Intact Skin)
- HIV-Containing Cell or Tissue cultures, Organ Cultures, and HIV or HBV-containing culture medium or other solutions
- Microbiological Cultures and Stocks of Infectious Agents

35. Where should I place Biohazard Labels and where can I get them?

Biohazard warning labels can be supplied by Drexel's Department of Environmental Health & Safety.

Biohazard warning labels should be placed on the entrance doors to all labs that use potentially infectious materials as well as all equipment that they may come into contact with. This includes incubators, Biological Safety Cabinets, refrigerators, centrifuges, etc.

36. How do I dispose of non-sharp biohazardous waste?

All soft biohazard-contaminated waste should be placed in the Red biohazard/infectious waste bags provided to your lab by the Drexel Department of Environmental Health & Safety. These bags can be placed in biohazard cardboard boxes (supplied upon request) or another container available in the lab (For example, a specially designated garbage can). Any container used to hold a Red Bag must be labeled for Non-Sharp Biohazard or Infectious Waste.

Non-Sharp contaminated waste may include:

- Gloves
- Bench Paper
- Packaging Materials
- Foil
- Plastic Bags
- Paper Towels
- Weighing Boats

- Filter Paper
- Fly Media

UNDER NO CIRCUMSTANCES are sharps to be placed in the biohazard red bags or the regular trash. They must be placed in appropriate sharps containers.

Infectious waste containers must not be left outside the lab in the hallway. It must remain in the lab until the scheduled pick-up. Our outside vendors do not have access to the labs, so someone must be present within the lab to allow them access.

37. What are Sharps and how do I dispose of them?

A Sharp is considered any object that is capable of scratching or penetrating the skin and/or the red biohazard disposal bags. Examples include:

- Broken Glass/Pyrex Chemical Bottles
- Needles
- Syringes
- Blades (Scalpels, razors, etc.)
- Pasteur Pipettes
- Blood Vials
- Culture Plates
- Glass Slides
- Pipette Tips
- Wood-Stemmed Cotton Swabs
- Centrifuge Tubes
- Any hard plastic item that could crack or break during routine handling

Sharps containers are supplied the Drexel Department of Environmental Health & Safety (EHS). Seventeen Gallon containers are supplied unless a smaller size is requested. Sharps containers can be ordered through EHS's website.

Sharps containers must be kept closed unless an item is being placed into it.

Remember, to avoid increased risk of exposure, do not recap your needles before throwing them out.

All supplied sharps containers are labeled for Biohazardous materials. Despite this, Non-Biohazardous Materials (i.e. broken glass chemical bottles) can be placed in the containers.

Infectious waste containers must not be left outside the lab in the hallway. It must remain in the lab until the scheduled pick-up. Our outside vendors do not have access to the labs, so someone must be present within the lab to allow them access.

Some labs participate in a glass recycling program. Remember that only white glass is allowed.

38. What is the Sharps and Biohazardous Waste Pick-Up Schedule?

The Pick-Up Schedule for the Red Biohazard Sharps Containers and the Red Biohazard Infectious Waste Bags depends upon the campus.

University City Campus:

- Biohazard Sharps Containers – Replaced during the weekly Friday pick-up by an outside contractor between 9:00AM and 1:30PM. If not listed for pick-up, contact EH&S at 215-895-5919.

- Red Biohazard Infectious Waste Bag - Replaced during the weekly Friday pick-up by an outside contractor between 10:00AM and 1:30PM. If not listed for pick-up, contact EH&S at 215-895-5919.

Center City Campus:

- Biohazard Sharps Containers - Replaced during the weekly Thursday pick-up by an outside contractor between 9:00AM and 1:30PM. If not listed for pick-up, contact EH&S at 215-895-5919.
- Red Biohazard Infectious Waste Bag – Will be removed by building custodial staff at any time upon request. Contact Facilities Management at 215-762-6500.

Queen Lane Campus:

- Biohazard Sharps Containers – Replaced during the weekly Friday pick-up by an outside contractor between 9:00AM and 1:30PM. If not listed for pick-up, contact EH&S at 215-895-5919.
- Red Biohazard Infectious Waste Bag – Will be removed by building custodial staff at any time upon request. Contact Facilities Management at 215-991-8145.

Infectious Waste Containers MUST remain inside the laboratory at all times prior to pick-up. Containers must not be placed in the hallway at any time.

Laboratory personnel must be present at the time of pick-up. The contractor does not have keys to access the laboratories to remove the materials. If you are not present at the time of pick-up, then the material will not be removed until the next scheduled pick-up.

39. Can I wear gloves and lab coats outside of the lab?

Gloves and lab coats are for your protection when working in the lab, reducing your risk of exposure. Outside of the lab, you run the risk of exposing others with your potentially contaminated gloves and lab coats. These must be removed before exiting the lab. If work is performed in multiple labs, additional gloves and lab coats must be kept in the other labs.

Sometimes gloves are needed to transfer materials from one lab to another. There are two options:

- Carry the item in one gloved hand and use the ungloved hand to open doors, push elevator buttons, etc.
- Use a cart or tray to carry the materials.

40. How do I address trip hazards?

The most common trip hazards are electrical cords and hoses running across walk-ways within the lab.

If the equipment is set-up in their permanent location, the easiest thing to do is to tape down the cords.

If the equipment and cords are frequently being moved around the lab, or are only set up intermittently, the easiest solution is to place a rubber or otherwise insulated mat across the cords.

Contact the Department of Environmental Health and Safety for assistance on dealing with these and other trip hazards.

41. Can I eat and drink in the lab?

No.

It is strictly prohibited to eat or store food and drink in laboratories.

Infrequently, labs may be able to designate a safe area for lab personnel to eat and drink, provided the area is away from any biological, radiological, or chemical hazards. Most often, this safe area is near the entrance to the lab, a sufficient distance away from the work areas, or are located in an isolated side office of the lab. Safe areas approved by the Department of Environmental Health & Safety must be properly identified, usually taped off and/or with appropriate signage posted.

Refrigerators for the storage of food items cannot be located anywhere within the lab area. Most labs store these outside their lab door or in their offices. Make sure these refrigerators are labeled as "Food Only".

Contact the Department of Environmental Health and Safety to see if you can set up a safe area for eating and drinking within your lab. Although be prepared. The answer is usually "No".