Chemistry 2312 Saturday, September 10, 2022

Honors Organic Chemistry Laboratory T. R. Hoye

HANDLING OF HAZARDOUS (and nonhazardous) WASTE(s)

adapted by TRH from a document originally prepared by Professor Jane Wissinger for Chem 2311

Required Reading and Viewing

Mohrig:	Chapter 1.8	Handling Laboratory Waste, pp. 20-21.
Video:	Handling of Waste:	**http://youtu.be/_-UXFY5iNME** (note: this was filmed before the UMN made the switch to no longer use separate halogenated vs. non-halogenated waste streams)

As an experimentalist in any chemistry laboratory, you will be generating some type of waste with nearly every experiment that you perform. Therefore, you have a personal responsibility to see that your waste is identified, handled, and disposed of properly. The following information is provided with the goal of helping you to meet this responsibility in a safe and environmentally responsible manner.

In the Chem 2312H organic laboratory it is important that each student can distinguish between **hazardous** and **nonhazardous** waste, separate these materials, and dispose of them in the proper manner. **Nonhazardous** wastes include non-chemically contaminated disposable pipettes, vials, broken glassware, filter paper, gloves, etc. This waste can be disposed of either in the wastebaskets (for paper, plastic, gloves, masks, etc.) or in the boxes (for glass items only) located under or beside the sinks in the lab. Many of the inorganic compounds (salts, acids and bases) used in the laboratory are also considered nonhazardous. These include NaCl, $MgSO_4$, Na_2SO_4, sodium thiosulfate, and NaOH (often as aqueous solutions) and aqueous mineral acids (HCl, H_2SO_4, HNO_3). These **nonhazardous** inorganic compounds can be disposed of down the sink drain by flushing with excess water as long as they are NOT substantially contaminated with organic solvents or materials.

If a waste is deemed **hazardous** it must be collected and disposed of in the hazardous waste glass bottles (for liquids) or plastic jars (for solids) that are located in the waste station hood (west wall). In order to comply with government regulations, the contents of hazardous waste containers must be known as accurately as possible. Therefore, it is important that each student dispose of their waste in the correct containers. Each container should be ONE phase (a single miscible solution with not suspended solids or solid waste with no standing liquid) and the contents should be compliant with the label on that container. The categories are:
a) **Organic Waste** (including solvents, liquids, oils, and dissolved organic solids)
Note: "NOS" means not otherwise specified and small amounts of things such as $CDCl_3$ from NMR samples or solutes dissolved in acetone while cleaning glassware.
b) **Hazardous Solid Waste** (silica gel, filter paper, Celite filter aid, sand, **pipets containing Celite or silica gel, $MgSO_4$ and Na_2SO_4** drying agents that are contaminated with organics).
Because heavy metals should be treated as a separate category, we will also have a waste container dedicated to palladium-containing solids – specifically, we will be using Pd/C and Pd-containing catalysts in two of the experiments.

Procedure for Disposing of Liquid Organic Hazardous Waste - First, pour the organic liquid from your glass vessel into the designated waste container. Then use a minimum amount of acetone (acetone squirt bottles are available near the waste containers) to rinse the surface and aid in the transfer of residual organics from the glassware. Return to your bench and use soap, water, and a scrub brush to finish the cleaning. Allow the glassware to dry until the next lab period. When you leave the waste station, cap all of the waste containers you have used unless there is a student immediately behind you ready to dispose of their waste. It is recommended that you screw on the cap loosely so that any unanticipated build up of pressure (e.g., gas evolution of solvent volatilization) can naturally be released. It is state and federal regulation that all chemical waste containers in research and teaching labs be capped when not in use so as to minimize release of vapors to the atmosphere. Our teaching labs are sometimes inspected and the government (e.g., OSHA or Hennepin

County inspectors) has issued fines to departments for each bottle left open. Watch the video (url above) to review these procedures.

It is important that a waste container never be filled too full. What to do if a Waste Container is Full – A liquid waste container is considered full when the liquid level is near but not above the "one gallon" line, which is at a height *before* the bottle begins to "neck in." If you add waste to a container so that it reaches that "full" state, it is *your responsibility to immediately tell the TA*, who should *immediately* replace the full container with an empty *and properly labeled* collection vessel. A full waste container should NEVER be carried to the stockroom window or anywhere else in the laboratory; it should remain in the hood at all times. The TAs will oversee properly labeling and manifesting the waste for pick-up.

Bottom line: Use available chemical hazard resources, good judgment, and common sense in making a decision on how each waste generated in lab should be disposed. Also, when cleaning glassware only use acetone for organic materials (and collect these rinsings for disposal as "Organic Waste") and use water and soap for salts and water soluble residues. Think before each action you perform at the bench and make a difference in the impact you have on the environment. The flowchart below should be helpful.

Flowchart for waste handling