# GENERAL SAFETY GUIDELINES FOR THE UNDERGRADUATE CHEMICAL ENGINEERING LABORATORIES

Based on practices adopted by

the Department of Chemical Engineering, The University of Michigan

June 2018

Safety in the laboratory is achieved through full participation and cooperation of students, faculty, and staff. The following guidelines are put in place to protect you and your classmates from injury. This list is not comprehensive and is not a substitute for caution and common sense. **Remember: Know safety, no pain. No safety, know pain.**

**SAFETY CONTACT INFORMATION**

* [Lab Instructor/Manager Contact Information]
* [Departmental or College Safety Coordinator Contact Information]
* [University Environment Health and Safety Contact Information]
* [After-hours emergency contact]

**ADMINISTRATIVE CONTROLS**

* Find out where the emergency shower, fire extinguisher, and first aid kit are located and learn how to use them.
* Know the location of exits as well as location and proper use of safety equipment.
* Acquire and read the Safety Data Sheet (SDS) of the chemicals being used. **Remember: A week in the library can save a month in the lab.**
* Determine potential physical and chemical hazards and any safety precautions before beginning experiments. A written risk assessment document should be prepared.Be alert for unsafe conditions and inform the instructor immediately.
* In case of emergency, send a copy of SDS with the victim to the medical center.

**EXPERIMENTAL WORK**

* An instructor must be present to perform laboratory work.
* Never leave an experiment unattended.
* Never begin an experiment unless it can be completed in the remaining time allowed (including clean-up). **Remember: Haste makes waste**

**ENGINEERING CONTROLS**

* Perform operations with toxic, volatile chemicals, corrosive substances or aggressive solvents in the fume hood while maintaining correct sash height.
* Do not store chemicals in a fume hood.
* Always make sure that its suction fan works properly.
* When diluting concentrated acids, e.g. sulphuric acid, always pour the acid carefully into the water. Never the other way around!
* Using a pipette to draw toxic or highly corroding substances is preferably done with a suction bulb or a water suction installation. **Never by mouth!**

**PERSONAL PROTECTION**

* Proper protective equipment should be worn in the labs.
  + Safety glasses must be worn at all times.
    - Contact lenses **are prohibited** even with safety glasses. This is due to the possibility of chemical vapors getting between contact lenses and eyes.
    - Corrective safety glasses should be ordered wherever necessary.
  + Lab coats should be worn in the labs.
  + Gloves should be used when there is a possibility of chemical contact.
    - Nitrile gloves are the standard but do not work for every chemical. Ensure chemical compatibility when choosing gloves to use.
    - Do NOT wear gloves when in the hallway or working on computers.
    - Do NOT touch door handles, instruments etc. with contaminated gloves where someone else is expected to be bare hand.
    - Do NOT wear gloves when working with a Bunsen burner.
    - Wash hands before leaving the lab.
  + Long pants and closed-toed shoes are required.
* Eating or drinking is not permitted.
* Long hair and loose clothing should be restrained.

**CHEMICAL SAFETY**

* Before opening a new container, check that another container of the same chemical is not already in use.
* Never return reagent to its original bottle.
* Keep reagent containers closed unless actively being used.
* Toxic substances must be stored in the appropriate locked closet. Remaining quantities must be placed in the closet immediately after use. Use rubber gloves.
* All secondary containers (including sample preparation and GC vials) must be legibly labeled with sample information and with applicable warnings. **Remember: 10 seconds labelling a sample saves 30 minutes identifying it later.**
* Chemical wastes must be disposed of properly. Contact lab instructors for assistance, if needed.
  + Do not pour waste into an unlabeled waste container.
  + Ensure chemical compatibility before combining into a single waste container.
  + Do not pour chemicals down the drain.

**BIOLOGICAL SAFETY**

* Clean workspace with 70% ethanol before AND after using biological agents.
* Solid biohazardous waste must be kept separate from liquid biohazardous waste.
* Ensure that a biohazard label is on any biohazardous waste containers.
* NEVER recap syringe needles. Needles should be disposed of in a red sharps container.

**INCIDENTS**

* Report all incidents with a written report to [Lab Instructor/Manager] within 24 hours. This includes all accidents and near misses.
  + ACCIDENT - The National Safety Council defines an accident as an undesired event that results in personal injury or property damage.
  + NEAR MISS - Near misses describe incidents where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and/or injury easily could have occurred.
* Spilled chemicals should be cleaned up immediately and disposed of properly. **Remember: Cleanliness is next to successfulness.**
* Broken glass should be swept up and disposed of in the appropriate glass disposal box.
* In case of a fire, alert the instructor and all students immediately and follow the evacuation route.

***I agree to follow and enforce these safety rules as a condition of my assignment in the undergraduate chemical engineering laboratories.***

**Name Date**