Guidelines for Chemical Storage and Management

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Research Safety
Office of Research
UNIVERSITY OF GEORGIA

I. Purpose & Scope

Proper chemical management and storage is essential in assuring a safe work environment for students, staff, faculty, and visitors. These guidelines will help you manage and store chemicals safely in your workplace.

II. Chemical Procurement, Distribution, and Storage

A. Procurement

The procurement of any hazardous chemical associated with on-campus research, science laboratories and academic units of the University must be purchased via UGAmart and shipped through chemical receiving to be properly tracked. When placing such orders, the chemical's storage/use location must be provided to properly process orders for hazardous chemicals. Failing to provide this information can delay orders.

B. Distribution

Mail & Receiving Services is responsible for barcoding and entering chemical information into the CHEMATIX database, and for distributing purchasedchemicals to campus.

C. Storage

- Chemicals in the laboratory shall be segregated by hazard class and compatibility.
- Incoming containers of chemicals must have manufacturers' labels that are not missing or defaced.
- It is recommended to label each chemical container with the date it was received and the date it was opened (this is a requirement for peroxide forming chemicals)
- Work areas should not be used for long-term storage. Storage of glass chemical containers on the laboratory work area floor shall be strictly prohibited.
- If space does not allow each chemical hazard class to be kept in their own storage cabinet, incompatible groups shall be separated by secondary containment (e.g., plastic trays), with extra care taken to provide stable, uncrowded, and carefully monitored conditions.
- Avoid storing hazardous chemicals (except cleaners) under sinks. Use approved flammable storage lockers, corrosive storage lockers, shelves or cabinets.
- Open shelves used for the storage of hazardous chemicals shall be well-anchored, and made of or coated with chemical- resistant materials. Higher shelves shall be used for chemicals presenting little to no hazard.

Please use the chart below as a general guide for storage of chemicals by hazard class. This chart is not meant to be exhaustive. Sections 7 & 10 of an item's Safety Data Sheet should be consulted for detailed storage guidelines and chemical incompatibilities.

Chemical Hazard Class	GHS Pictograms	Storage Method	Chemical Examples	Incompatibles (See SDS in all cases)
Corrosives - Organic Acids		All liquid corrosives with a GHS Skin corrosion rating of 1A shall be placed in a lined acid storage cabinet or deep corrosion resistant trays. Do not store directly on metal shelves or in non-vented cabinets under fume hoods.	Acetic acid Trichloracetic acid Lactic acid Formic acid	Inorganic acids and bases, and all other hazard classes, particularly away from chemicals that can generate toxic gases on contact such as cyanides and sulfides, and active metals such as sodium, magnesium and potassium metal.
Corrosives - Inorganic Acids		All liquid corrosives with a GHS Skin corrosion rating of 1A shall be placed in a lined acid storage cabinet or deep corrosion resistant trays. Do not store directly on metal shelves or in non-vented cabinets under fume hoods. Keep oxidizing acids separate from non- oxidizing acids.	<u>Oxidizing</u> Chromic acid Nitric acid Perchloric acid <u>Non-oxidizing</u> Phosphoric acid Hydrofluoric acid Hydrochloric acid	Organic acids and bases, and all other hazard classes, particularly away from chemicals that can generate toxic gases on contact such as cyanides and sulfides, and active metals such as sodium, magnesium and potassium metal.
Corrosives - Bases		Store in a lined storage cabinet or deep corrosion resistant trays. All liquid corrosives should be placed in a secondary containment.	Ammonium hydroxide Sodium hydroxide Potassium hydroxide	Acids and all other hazard classes.
Flammable Liquids		Store in a flammable storage cabinet.	Acetone Benzene Toluene Methanol Hexanes	Corrosives, oxidizers, poisons/toxic, explosives.
Flammable Solids		Store in a dry, cool area. Keep water and air from entering the container.	Lithium aluminum hydride Calcium hydride Phosphorus Sodium borohydride	Corrosives, oxidizers, poisons/toxic, explosives.
Peroxide Forming Chemicals	 -In most cases-	Store in an air tight container in a dark, cool area alone with flammable liquids.	Diethyl ether Tetrahydrofuran (THF) 1,4-Dioxane 2-Propanol	Corrosives, oxidizers, poisons/toxic, explosives and water reactive.
Oxidizers		Store in a spill containment tray or well segregated from incompatible materials.	Peroxides Superoxides Chlorates Nitrates Bromates	Most other hazard classes, particularly organic material, corrosives, flammables/ combustibles, and reducing agents such as zinc, alkali metals and alkaline earth metals.
Poisons|Toxic		Store in cool, dry, ventilated area in a spill containment tray or well segregated from incompatible materials. Toxic chemicals shall be stored according to the nature of the chemical, with appropriate warnings and security.	Cyanides Cadmium Sodium azide Phenol Mercury	Most other hazard classes, particularly acids, bases, and oxidizers. Incompatibilities for this class can be variable. Consult Section 10 of the item's Safety Data Sheet for incompatibility details when deciding how to store these items.
Explosives		Store in a secure location where they would not be subject to shocks or falls.	Ammonium nitrate Nitro urea Sodium amide Trinitrobenzene	Away from all other chemicals and sources of ignition.
Water Reactive		Store in a dry, cool area in closed door storage cabinets away from sprinkler heads, safety showers, or other sources of water.	Sodium metal Potassium metal Sodium hydride Thionyl Chloride	Aqueous solutions, oxidizers, strong corrosives.
General Chemicals Non-Reactive	**NO IMAGE**	Store on general laboratory shelves.	Agar Citric acid Sodium chloride Sodium bicarbonate	Consult SDS

III. Secondary Container Labelling Guidelines (squeeze bottles, etc.)

- All chemicals intended for use in less than one day by a single user should be labeled with at least the identity of the chemical.
- Secondary containers for non-hazardous chemicals shall be affixed with labels listing the identities of their contents.
- Secondary containers for hazardous chemicals intended for storage and use for a period greater than one day shall be affixed with labels listing: the identity of the hazardous chemical, the date filled, & the hazard(s). The chemical identity given on a chemical label must be in plain English, and must list the chemical's common name given on the SDS or manufacturer's label, or a name listed on the accepted UGA abbreviation and acronym list. If other abbreviations are used on any chemical labeling, all abbreviations and acronyms used must be posted in the lab. (See Appendix I for Accepted Abbreviations and Acronyms for Chemical Secondary Container Labeling)
- Batches of vials or test tubes containing chemicals of the same hazard class may have the hazard labels affixed to a common carrier or box. All other such secondary containers must be appropriately labeled as noted above.
- The chemical's hazard warning may be provided by use of either the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), the National Fire Protection Association (NFPA) hazard warning system, or the Hazardous Materials Identification System (HMIS).

IV. Records

A. Laboratory's Chemical Inventory

A hazardous chemical list for each laboratory will be maintained by the laboratory staff utilizing Chematix, updated periodically (at least annually) and made accessible to laboratory personnel. The chemical inventory database maintained by the Environmental Safety Division (ESD) will provide information regarding chemicals purchased and delivered to the labs and should serve as the basis for the hazardous chemical list. Contact ESD for details on accessing and modifying this database.

ESD is charged with setting up and maintaining a centralized inventory system of chemicals for campus units. The Associate Vice President-Environmental Safety is directed to ensure that the individual units' inventory reporting practices are coordinated with the Chematix inventory system to ensure that all compliance requirements are met. ESD has the responsibility and authority for conducting internal audits of the centralized inventory system and filing the results of such audits.

B. Safety Data Sheets (SDS)

Access and record keeping of Safety Data Sheets (SDSs) can be accomplished either by hard copy or electronically:

- Hard copies of SDSs are to be alphabetized and available for each hazardous chemical present in the laboratory. SDS materials shall be placed within a labeled binder andeasily accessible to employees.
- Electronic copies of SDSs are provided via a paid subscription to MSDS Online accessible through Chematix or the UGA Environmental Safety Division Website. The laboratory shall have a desktop computer, laptop computer, or other mobile device for employee access to chemical safety information. The computer or mobile device does not have to be used exclusively for SDS access.
- PIs are required to train laboratory personnel on how to find SDS information relevant tothe chemical hazards found within their lab.

V. Contacts

Office of Research Safety: 706-542-5288
Environmental Safety Division: 706-542-5801
Radiation Safety: 706-542-0107

VI. References

Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, National Research Council, 2011

Design Criteria for Laboratories, 5th Ed., Board of Regents of the University System of Georgia, 2019

APPENDIX I

Accepted Abbreviations and Acronyms for Chemical Secondary Container Labeling

Acetic Acid: $C_2H_4O_2$
Benzene: C_6H_6
Calcium Chloride: $CaCl_2$
Carbon Tetrachloride: CCl_4
Chloroform: $CHCl_3$
Cupric Chloride $CuCl_2$
Ethidium Bromide: EtBr
Ethyl Acetate: EtOAc
Ethylene Diamine Tetraacetic Acid: EDTA
Ethanol: EtOH
Water: H_2O
Hydrogen Peroxide: H_2O_2
4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid: HEPES
Hydrochloric Acid HCl
Hypochlorous Acid: HOCl
Hydrofluoric Acid: HF
Isopropanol: IPA
Magnesium Chloride: $MgCl_2$
Magnesium Sulfate: $MgSO_4$
Methylene Chloride: $MeCl_2$ or CH_2Cl_2
Methanol: MeOH
Methyl tert-butyl Ether: MTBE
4-Morpholinepropanesulfonic Acid: MOPS
Nitric Acid: HNO_3
Perchloric Acid: $HClO_4$
Phenol/Chloroform/IsoAmyl: PCI
Phosphate Buffered Saline: PBS
Potassium Nitrate: KNO_3
Potassium Hydroxide: KOH
Potassium Phosphate: K_3PO_4
Potassium Chloride: KCl
Potassium Chlorate: $KClO_3$
Potassium Nitrite: KNO_2
Sodium Chloride: NaCl
Sodium Chlorate: $NaClO_3$
Sodium Nitrite: $NaNO_2$
Sodium Dodecyl Sulfate: SDS
Sodium Nitrate: $NaNO_3$
Sodium Hydroxide: NaOH
Sodium Phosphate: Na_3PO_4
Sulfuric Acid: H_2SO_4
Trichloroacetic Acid: TCA
Trichloroethylene: TCE
Tetrahydrofuran: THF
Tris(hydroxymethyl)aminomethane: TRIS
Tris-Acetate-EDTA Buffer: TAE
Tris-Borate-EDTA Buffer: TBE
Tris-EDTA Buffer: TE