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Chemical Hygiene Plan

1.0 Purpose

To establish an effective Chemical Hygiene Plan which enables the University of the District of Columbia to protect all laboratory personnel (e.g. faculty, researchers, staff, student employees and students) from the health hazards associated with hazardous chemicals stored and used in its laboratories, and to ensure that exposures to each chemical does not exceed the permissible exposure limits as specified in 29 CFR part 1910, subpart Z.

2.0 Scope

This program applies to all laboratory personnel (e.g. faculty, researcher scientists, student employees and students) storing, handling, transporting and disposing of hazardous chemicals associated with laboratory processes. Laboratory is defined as a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

3.0 Responsibility

3.1 Vice President for Academic Affairs

The Vice President for Academic Affairs has the ultimate responsibility and accountability for chemical hygiene at the University. The Vice President for Academic Affairs shall:

- Provide University legal counsel to the Chemical Hygiene Officer and other University faculty and staff who have need to consult with counsel on matters related to chemical hygiene;
- Include provisions for appropriate storage and disposal of chemicals in the long range strategic plans for facilities development;
- Actively support and promote the University's chemical hygiene plan within the University community;
- Provide adequate resources for the support for institutional chemical hygiene; and
- Respond to reports and/or requests from the Deans regarding matters of chemical hygiene.

3.2 Deans

- Anticipate future chemical storage and disposal needs and provide all appropriate information to VP Academic Affairs for incorporation into long range plans for each department's growth and development;
- Provide adequate and continuous support to department personnel leading to attaining and maintaining compliance with the University's chemical hygiene plan;

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- Respond to reports and/or requests from Chairs regarding matters of chemical hygiene to the appropriate individual;
- Ensure that the supervisors of all students be informed of and know the basic rules of chemical safety and that these rules are followed in all laboratory courses; and
- Provide a list of Department Chairs and laboratory supervisors to the Office of Environmental, Health and Safety as needed (e.g. when individuals to those positions change due to promotion, retirement, etc.) or upon request of the Office.

3.3 Department Chairs

In University departments or buildings containing laboratories where hazardous or potentially hazardous chemicals are used, the Department Chair must:

- Develop plans, in consultation with Risk Management, for the appropriate storage of chemicals within the department/building;
- Develop a departmental chemical waste collection plan, in consultation with Risk Management, to facilitate proper waste handling, storage, transportation, and disposal;
- Ensure that all new faculty members, researchers, student employees, and other departmental employees, as appropriate, are informed of the chemical hygiene plan;
- Ensure that all laboratory supervisors, technicians and student laboratory assistants are informed of and know the basic rules of chemical safety and that these rules be followed in all student laboratory courses and research laboratories;
- Notify Risk Management of any known chemically-related facility deficiencies;
- Investigate all identified unsafe practices and forward any investigative reports to Risk Management; and
- Ensure that all common areas of the building are free of chemical hazards.

3.4 Laboratory Supervisor/Research Scientist

The laboratory supervisor/research scientist has overall responsibility for chemical hygiene in the laboratory including the responsibility to:

- Provide chemical hygiene training to new faculty, research scientists and student employees.
- Ensure that laboratory personnel and students know and follow the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided;
- Provide regular chemical hygiene and housekeeping inspections including routine inspections of emergency equipment;

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- Be aware of the current legal requirements concerning regulated substances used in her/his laboratories;
- Determine what eye protection and other protective apparel/equipment are needed and ensure that all laboratory personnel use it;
- Ensure that facilities and training for use of any material being ordered are adequate;
- Ensure that appropriate signs and notices of hazards and restricted activities are posted in the laboratory; and
- Report any chemical-related problems to the appropriate department chair.

3.5 Laboratory Personnel – Faculty

- Ensure students follow the chemical hygiene rules, that protective equipment is available and in working order and worn as appropriate;
- Ensure all students have received the appropriate chemical hygiene training;
- Conduct all student laboratories in accordance with chemical hygiene procedures; and
- Report any chemical-related problems involving students to the department chair.

3.6 Laboratory Personnel – Technician, Research assistant and Student

- Plan and conduct each operation in accordance with chemical hygiene procedures;
- Develop good personal chemical hygiene habits; and
- Inform his/her supervisor of any incident or irregularity regarding the use of any chemical.

3.7 Chemical Hygiene Officer

- Work with appropriate faculty, researchers and staff to develop and implement appropriate chemical hygiene policies and practices;
- Monitor purchase, use and disposal of chemicals used in the laboratories;
- See that appropriate audits are conducted and records maintained;
- Provide information to Deans, Vice Presidents and Directors as necessary to ensure that adequate facilities are provided;
- Assist faculty, researchers and staff in developing safe handling techniques for chemicals;
- Stay current on legal requirements concerning regulated substances;
- Seek ways to improve the chemical hygiene plan; and
- Ensure that appropriate sections of the chemical hygiene plan are reviewed annually.

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4.0 Applicable Forms and Reference Documents

- 29 CFR 1910.1450 Appendix A

5.0 Safety Precautions

All laboratory personnel including but not limited to faculty, research scientists, staff, student employees and students must know and follow the rules and procedures listed below.

6.0 Procedures

6.1 General Safe Laboratory Conduct

6.1.1 Safety Awareness

Be alert to unsafe conditions and see that they are corrected immediately when detected.

6.1.2 Consumption of Food, Beverages, Smoking, Personal Grooming, etc.

- Do not eat, drink, smoke, chew gum, or apply cosmetics in areas where laboratory chemicals are present. Wash hands before doing any of these activities.
- Do not use laboratory storage areas, refrigerators, glassware or utensils for food or beverages.

6.1.3 Unattended Operations

It is the policy of UDC that no experiments and/or laboratory operations shall be unattended. Below are some tips to aid you in planning your experiment:

- Review your operating procedures at least two day prior to performing the experiment.
- Prep all materials for the experiment at least 24 hours prior to the experiment.
- Do not start experiments at the end of the day or when you do not have ample time to attend the entire experiment.

6.1.4 Working alone

Do not work alone in a laboratory if the procedures being conducted are hazardous. At a minimum, when working alone anywhere, ensure someone knows of your whereabouts, preferably someone in a nearby location.

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6.1.5 Exiting Laboratory

Wash areas of exposed skin before leaving the laboratory.

6.1.6 Horseplay

Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.

6.1.7 Personal Apparel

- Confine long hair and loose clothing.
- Wear sturdy shoes at all times in the laboratory.

6.1.8 Individual Work Stations

- Keep the work area clean and uncluttered.
- Properly label and store chemicals and equipment.
- Clean up the work area on completion of an operation or at the end of each day.

6.1.9 Equipment and Glassware

- Inspect equipment or apparatus for damage before adding a chemical. If equipment is found defective, do not use.
- Shield or wrap Dewar flasks and other evacuated glass apparatus to contain chemicals and fragments should implosion occur.
- Use equipment only for its designed purpose.

6.1.10 Pipetting/Transferring Chemicals

- Use a pipette bulb or other filling device. Never use mouth suction for pipetting or starting a siphon.
- Electronically ground and bond containers using approved methods before transferring or dispensing a flammable liquid from a large container.

6.1.11 Prior to Initializing Activity

- Gather pertinent information from appropriate sources on the hazards or potential hazards that may be present by the chemicals to be used.
- Develop safe procedures to minimize the hazards and/or potential identified.

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- Obtain personal protective equipment and plan positioning of equipment before beginning any new operation.

6.2 Personal Protective Equipment

The laboratory supervisor, research scientist or Office of Environmental Health & Safety will determine which personal protective devices are required for each task. However, use common sense; there is no harm in being overprotected. Each department must provide its personnel with the personal protective equipment needed to safely perform the work.

Each chemical has a Material Safety Data Sheet (MSDS) which recommends personal protective equipment for use with that chemical. The MSDS usually addresses "worst case" conditions; therefore, all the equipment shown may not be necessary for a specific job. Again, there is no harm in being overprotected.

6.2.1 Engineering and Administrative Controls

Engineering controls and administrative controls must be used whenever possible to reduce or eliminate hazards or potential hazards.

Use personal protective devices only where engineering and administrative controls cannot be used or made adequate, or while controls are being implemented. Examples of engineering controls include:

- Substitution with a less hazardous substance
- Substitution with less hazardous equipment or process (e.g., safety cans for glass bottles)
- Isolation of operator or the process
- Local and general ventilation (e.g., use of fume hood)
- Hazard education
- Job rotation

Wear all appropriate personal protective equipment (e.g. safety glasses, goggles, face shield, chemical resistant gloves, etc.) where chemicals are stored or handled. Ensure that others, including visitors, do so also.

6.2.2 Eye and Face Protection

Avoid use of contact lenses in the laboratory unless necessary. If they are used, inform supervisor so special precautions can be taken. Since contact lenses by themselves afford no protection from chemical splashes or projectiles, appropriate eye protection must also be worn.

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Eye and face injuries are prevented by the use of the following:

- Safety glasses with side shields for dust and flying object protection.
- Chemical splash goggles for chemical splash, spray and mist protection.
- Face and neck shields for head and neck protection from various hazards must be used in conjunction with safety glasses or goggles.

6.2.3 Hand Protection

Wear protective gloves when the potential for contact with toxic materials exists. When using reusable gloves, inspect and test before each use, wash before removal, and replace periodically.

6.2.4 Skin and body protection - Protective Clothing

Skin and body protection involves protective clothing to protect various parts of the whole body either completely or partially.

Lab coats, coveralls, aprons or protective suits must be used where there is a potential for skin or personal clothing contact with a hazardous material. General categories of contaminants include:

- Dirt and grease
- Toxic dust
- Laboratory chemicals
- Radioactive materials
- Bacteriological agents

Do not remove protective clothing from the workplace. For heavily contaminated work, give special attention to sealing all openings in clothing; use tape for this purpose. Wear caps to protect hair from contamination. Remove laboratory coats immediately upon significant contamination.

Exposure to strong acids, acid gases, organic chemicals, oxidizing agents, radioactive material, etiological agents, carcinogens and mutagens requires the use of protective equipment that prevents skin contamination. Use impervious protective clothing such as:

- Rubber gloves
- Rubberized suits
- Rubber boots
- Special protective equipment

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Protective clothing selection is based on the specific chemical(s) to be used as not all clothing offers the same protection with all chemicals. Some chemicals will "break through" protective clothing in a very short time. Therefore, general selection criteria are as follows:

S - Superior E - Excellent G - Good F - Fair NR - Not Recommended

Determine what chemicals you will use, then contact the laboratory supervisor, research scientist or Risk Management for information regarding chemical protective clothing.

6.2.5 Respiratory Protection

Respirators are designed to protect only against certain specific types of substances and in certain concentration ranges, depending on the type of equipment used. Respirator selection is based on the hazard and the protection factors required. Types of respiratory protective equipment include:

- Particle-removing air purifying respirators
- Gas and vapor-removing air purifying respirators
- Atmosphere supplying respirators

Personnel required to wear a respirator should familiarize themselves with the limitations of each type of respirator they will use and the signals for respirator failure (odor breakthrough, filter clogging, etc.).

If a task requires the use of a respirator, each person performing that task must receive training from Risk Management. Personnel are not permitted to use a respirator until they have received proper training.

6.2.5.1 Laboratory Personnel Surveillance

Respiratory protection is to be used when air contaminant concentrations are not sufficiently contained by engineering controls.

- **Initial monitoring** - The University will measure exposure by laboratory personnel to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or on the absence of an action level, the PEL).

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- **Periodic monitoring** – If the initial monitoring prescribed by the initial monitoring stated above discloses laboratory personnel exposure over the action level (or in the absence of an action level, the PEL), the University will immediately comply with the exposure monitoring provisions of the relevant standard.
- **Termination of monitoring** – Monitoring may be terminated in accordance with the relevant standard.
- **Employee notification of monitoring results** – The University will, within 15 working days after the receipt of any monitoring results, notify laboratory personnel of these results in writing either individually or by posting results in an appropriate location that is accessible to the laboratory personnel.

Inspect the respirator before use. (Many types of respirators are available. The choice of an appropriate respirator depends on many factors including type of contaminant and its air concentration, legal exposure limits, and warning properties (i.e., eye irritation, odor detection threshold, etc.). Before procuring a respirator, contact Risk Management to schedule fit testing, medical exam and training.

6.3 Eyewashes and Safety Showers

Emergency eyewashes and showers must be available, accessible, and operative where there is a potential for contamination of the eyes, face, or body by irritant, corrosive, flammable, radioactive, or other injurious materials. Immediate flooding with large amounts of water can minimize serious injury. Emergency showers may be omitted only when an eyewash fountain alone is judged adequate to treat injuries that can be reasonably expected to occur in an area.

Locate the eyewash/shower as close as possible to the hazard without physically causing another hazard (e.g., electrical shock). The maximum time to reach the fixture should be determined by the potentially hazardous effect or degree of hazard of the materials being used.

Maintain free access to the eyewash/shower all times. Keep an area of at least 36 x 36 inches (1 x 1 meter) clear in front of the units. Test emergency showers monthly to make sure water is flowing freely from both sides. Testing of the emergency eyewash must be weekly to make sure water is flowing freely and to verify operations.

6.4 Ventilation

Ventilation recommendations must be adapted to the workplace and the specific process.

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- Do not allow release of toxic substances in cold rooms and warm rooms, since they contain recirculated air.
- Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.
- Use a hood for operations which might result in release of toxic chemical vapors or dust.
- As a general guide, use a hood or other local ventilation device when working with any appreciably volatile substance with a TLV of less than 50 ppm.
- Confirm adequate hood performance before use; keep hood sash under the 100 feet per minute indicator at all times except when adjustments within the hood are being made; keep materials in hoods to a minimum and do not allow them to block vents or air flow.
- Leave the hood "ON" at all times.

Also check the MSDS for special ventilation requirements, such as:

- Use with adequate ventilation
- Use in a fume hood
- Avoid inhalation of vapors
- Provide local ventilation

6.5 Chemical Hazards

- Before using a new chemical or in combination with other chemicals, read the container label and the MSDS. The MSDS will detail special handling information.
- When transferring a chemical to another container, label the new container with the name of the chemical and principal hazards (e.g. flammable, corrosive, toxic, etc.). This will ensure others will know what is in the container and also ensure that you will not mistake the chemical for another substance at a later time.

6.6 Avoid "Routine" Exposure

- Develop and promote safe laboratory habits to avoid unnecessary exposure to chemicals by any route (e.g. inhalation, ingestion, dermal, etc.). Do not smell or taste chemicals.
- Avoid direct contact with chemicals. Keep chemicals off of hands, face, clothing, and shoes.
- Wash hands thoroughly with soap and water after handling chemicals.

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6.7 Chemical Handling and Use

- Use chemicals only for their intended purpose.
- Use only those chemicals for which the quality of the available ventilation system is appropriate.
- Dispense only the amount of chemical needed for immediate use.
- Wherever practical, use existing chemical stocks before purchasing new stock.
- Avoid bulk purchase of chemicals and order the smallest amount needed for the project.
- Use chemicals (e.g., cleaning solvents) in strengths specified by the manufacturer.

6.8 Chemical Storage

Carefully read the label before storing a hazardous chemical. Also read the MSDS which will provide any special storage information and incompatibilities. Some safe storage tips:

- Assure that all containers are properly labeled.
- Label a chemical container with the date received.
- Use approved storage containers and safety cans for flammable liquids.
- Use spill trays under containers of strong reagents.
- Dispose of old chemicals promptly. See waste disposal section of this manual.
- Store liquids no higher than eye level.
- When storing significant quantities of chemicals, use chemical storage cabinets. These are commercially available for flammable and corrosive materials.
- Separate incompatible chemicals. Do not store chemicals strictly by alphabetical order. Separate hazardous chemicals in storage as recommended below. Once separated into hazard classes, chemicals may be stored alphabetically.

Solids: oxidizers, flammables, water reactives, general chemicals

Liquids: acids, caustics, oxidizers, perchloric acid, flammables/combustibles, general chemicals

Gases: toxics, flammables, oxidizers, corrosives, inert

Refrigeration

When there is a need to store chemicals in a refrigerator, the refrigerator must not be used to store food or drinks. Indicate with a label or sign on the refrigerator that storage of food and beverages are prohibited.

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Flammable liquids that require refrigeration must be stored in an explosion-proof refrigerator or freezer.

6.9 Waste disposal

Assure that the plan for each laboratory operation includes plans and training for waste disposal.

- Store chemical waste in compatible and appropriately labeled containers and place in a designated storage cabinet.
- Do not discharge to the sewer, concentrated acids or bases; highly toxic, malodorous, or lachrymatory substances; or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow.

6.10 Working with Chemicals that Have Special Toxicity

Chemicals that are known or suspect allergens, carcinogens, embryotoxins, genotoxins, or have moderately chronic toxicity or high acute/chronic toxicity need to be handled with utmost care. UDC requires a written standard operating procedure (SOP) for use of these materials. Risk Management is available to assist with the development of these procedures. All SOPs must be submitted to Risk Management for review and approval prior to use of particularly hazardous materials listed in Appendix A. Appendix A is a list of known or suspect allergens, carcinogens, embryotoxins, genotoxins, and chemicals having moderately chronic toxicity or high acute/chronic toxicity. This list is reviewed and updated annually by federal National Toxicology Program.

Wearing personal protective apparel to prevent skin contact and washing after use is very important. It is also important to prevent inhalation by working in a well-operating hood, glove box, or other effective means of local exhaust ventilation and containment. Some additional precautions to take, depending on circumstances, include:

- Use and store these substances in areas of restricted access with special warning signs.
- Use unbreakable secondary containers.
- Store materials and work on chemically resistant trays; also mount apparatus above such trays or cover work or storage surfaces with removable, absorbent, plastic backed paper.
- Conduct all transfers and work with highly toxic substances in a "controlled area" which includes a restricted access hood, glove box, or designated portion of a laboratory. All people with access to controlled areas must be aware of the substances being used and must take necessary precautions.

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- Develop written procedures for the storage, use, and disposal of highly toxic materials. Review procedures with the laboratory supervisor, research scientist and Risk Management. See Appendix B for sample template for written procedure.
- Continually evaluate the continued need for the especially toxic substance. Switch to using a less hazardous material if possible.
- Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood. Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area.
- Decontaminate the controlled area before normal work is resumed there.
- On leaving a controlled area, remove any protective apparel, placing it in an appropriate, labeled container for cleaning or disposal.

If using toxicologically significant quantities of chemicals of high chronic toxicity on a regular basis (e.g. 3 times per week), consult with Risk Management and Human Resources concerning desirability of regular medical surveillance.

- If an incident, such as a spill or exposure occurs, notify the laboratory supervisor immediately. Ensure that cleanup personnel wear suitable protective apparel and equipment.
- If a major spill occurs, evacuate the area and inform Campus Police immediately at 202-274-5050.
- If the toxic substance is a dry powder, for cleanup, use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping.
- Maintain records of the amounts of highly toxic materials on hand, amounts used, and the names of people involved with their use.
- Since a waste chemical may potentially be contacted by outsiders with little knowledge of the chemical's hazards, it is important to package waste properly. Contact Risk Management for assistance in developing waste handling procedures.

6.11 Chemical Spills

General Procedure for All Spills

Prepare for spills by having the proper safety equipment and spill clean-up equipment on hand. In the event of a spill, take the following steps:

- Alert personnel in the area that a spill has occurred.
- Take necessary steps to protect the health and safety of individuals that are or may be affected by the spilled chemical.
- Review the MSDS for special spill clean-up information, if necessary.
- Wear appropriate protective gear. As a minimum use impermeable gloves and chemical goggles.

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- Confine the spill with sorbents, if possible.
- **If the spill is too large** for you to handle, is a threat to personnel or the public, involves an infectious agent or a corrosive, highly toxic, or reactive chemical, call Campus Police at 202-274-5050 to obtain assistance.
- If a spill involves radioactive materials, also contact the Radiation Safety Officer at 202-274-5867.

6.11.1 Low Hazard Material Spills

A low hazard material spill is one that creates no fire hazard, is not particularly volatile, toxic or corrosive (e.g., salt solutions).

To clean up the spill use a sorbent material, such as one of the following, that will neutralize the spill if possible:

- Trisodium phosphate
- Sand
- Sodium bicarbonate for acids
- Powdered citric acid for bases
- "Oil-Dri," "Zorb-All," "Speedi-Dri," Bentonite, etc.
- Paper towels

For pick up, use a dust pan and brush and wear rubber gloves and goggles. Decontaminate area with soap and water after clean-up. Place residue in a container for waste collection. Contact Risk Management for disposal information.

6.11.2 Volatile, Flammable or Toxic Material Spills

Notify all personnel in the area. Remove all sources of ignition. Maintain fume hood ventilation. Vacate the area and call Campus Police at 202-274-5050 for assistance.

Below is a list of very hazardous compounds. You should not clean them up yourself.

- aromatic amines
- cyanides
- nitriles
- bromine
- ethers
- nitro compounds
- carbon disulfide
- hydrazine
- organic halides

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If you spill a highly toxic material, immediately contact Campus Police at 202-274-5050.

6.11.3 Acid/Base Spills

Immediately, call Risk Management at 202-274-7180 or Campus Police (274-5050) and report the spill to your supervisor. If this is a small spill, absorb the spill with "Oil-Dri", "Zorb-All", "Speedi-Dri", Bentonite or other clay-type sorbent and neutralize. Contact Risk Management for final neutralization survey and waste removal. Prevent contact with skin and clothing by wearing rubber gloves, apron, goggles and/or face shield, rubber booties, as needed. Place residue in container for waste collection.

If the spill can not be cleaned up due to the quantity spilled or amount of area the spill covers, evacuate the area and call Campus Police at 202-274-5050.

6.11.4 Mercury Spills

Use a mercury spill kit if it is available or follow the procedure below to minimize the extent of air contamination resulting from the spill:

Use a trapped vacuum line attached to a tapered glass or plastic tube, similar to a medicine dropper, to pick up mercury droplets. (In order to minimize waste disposal costs, as much of the mercury as possible should be recovered by vacuum.). Do not use a domestic or commercial vacuum cleaner.

If the spill can not be cleaned up due to the quantity spilled or amount of area the spill covers, evacuate the area and call Campus Police at 202-274-5050.

6.11.5 Alkali Metal Spills

Smother with powdered graphite or "Met-L-X."

6.11.6 White Phosphorus

Smother with wet sand or wet sorbents.

6.12 Workplace Chemical Inventory

The University is required to compile and maintain a workplace chemical list for all chemicals that require a Material Safety Data Sheet. The list provides information regarding the types and quantities of hazardous chemicals in each work area. The chemical list contains the following information:

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- Trade name, chemical name, and/or common name
- Work area where the chemical is normally used or stored
- Typical amount of the chemical that is generally on hand

New or newly assigned employees are to be made aware of the chemicals in their work area and the nature of the hazards in their workplace as part of their training. Departments are to update their chemical list annually. These lists will be located in an easily accessible location (e.g. posted beside exit door).

A copy of the updated chemical inventory will be forwarded to Risk Management upon completion.

6.13 Waste Minimization and Pollution Prevention

The University of the District of Columbia is committed to the protection of human health and the environment. As part of meeting these commitments, the University promotes minimizing the quantity and toxicity of wastes generated. While these efforts increase protection of the public and the environment, they also benefit the University by reducing:

- waste management costs
- compliance costs
- use of resources
- chemical inventory
- releases of hazardous chemicals.

Waste minimization and pollution prevention pertains to all activities on campus including research, teaching labs, facility maintenance, custodial activity, and grounds maintenance and pest control. For additional information regarding UDC's hazardous waste management program, refer to the UDC Environmental Protection Plan available in your department or on UDC's website.

6.13.1 Management

Do not stockpile chemicals. Audit chemical supplies and use inventory control. Obtain and stock only the chemicals and the quantities required for the specific work, experiment, research project, or what is reasonably expected to be consumed in one year. This is particularly critical when dealing with chemicals that have a shelf life and degrade, e.g., ethers. Dispose of chemicals no longer needed.

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6.13.2 Purchasing

Purchase only the quantity of chemicals needed. Find the minimum unit required for the work planned and order accordingly. Due to the high cost of chemical disposal, any savings realized by purchasing chemicals in bulk quantities are quickly erased when even a portion of the chemicals cannot be used and must be discarded.

6.13.3 Chemical Redistribution

Unopened and uncontaminated, unused portions of chemicals that you no longer need may find use elsewhere in the University. The Office of Environmental Health and Safety will post a list of unneeded chemicals, and offer them for redistribution on campus. Call Risk Management at 202-274-7180 to have a chemical you no longer need picked-up or to get a list of available chemicals.

Note: Chemicals include maintenance supplies (e.g. paint thinner, antifreeze, paints, etc.) and copier chemicals (e.g. toner).

6.13.4 Process Modification and Product Substitution

Look for ways to decrease the quantity and/or toxicity of chemicals you use. There are many cases in which this can be done without compromising research, teaching in the laboratories, or in performing maintenance activities. Try to:

- modify experiments or standard processes
- use micro and semi-micro techniques
- use water-based instead of organic solvent-based materials
- clean with detergents and enzymatic cleaners rather than sulfuric acid/potassium dichromate cleaning solutions or ethanol/potassium hydroxide cleaning solutions.
- use citrus-based cleaners/degreasers instead of flammable/toxic solvents like acetone/benzene.
- avoid using known carcinogens, mutagens, or extremely hazardous chemicals.

6.13.5 Recycling

Determine if there are ways your used chemicals can be re-used or recycled rather than disposed. Risk Management collects some precious metals and valuable chemicals for recycling by outside contractors to reduce waste treatment costs. Also, some campus departments are involved in the reclamation of precious metals and chemicals from laboratory processes. Call for guidance if you have materials that you think may be recyclable. Some examples are:

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- Reclamation of silver from photo fixing chemicals
- Collection of mercury for distillation by an outside recycler
- Reprocessing of vacuum pump oil.

6.13.6 End of Process Treatment

Include waste chemical minimization and treatment techniques as part of standard operating procedures for maintenance, research projects and teaching labs. A laboratory example would be to neutralize (to pH between 6 and 10) an acid with a base or vice versa and thus eliminating the hazardous characteristic of corrosivity. Since waste treatment may be regulated, consult with Risk Management prior to attempting any chemical treatment.

6.13.7 Waste Disposal

In collecting wastes for disposal, do not mix hazardous wastes with nonhazardous waste, since this unnecessarily increases the volume of the hazardous waste generated and increases waste disposal costs. Also, do not mix different types or classes of waste together unless required as part of the job or experiment (e.g., flammables with non-flammables, chlorinated with non-chlorinated hydrocarbons, inorganics with organics, etc.)

Accurately label waste bottles as to their exact content and approximate percentages. Segregation and characterization simplifies the waste stream thus minimizing the cost of disposal. If the waste is not properly characterized by chemical constituents and estimated percentage of each, it may be necessary to analyze the waste prior to disposal.

7.0 Laboratory Personnel Information and Training

The University will provide laboratory personnel (e.g. faculty, researcher scientists, student employees and students) with information and training to ensure that they are apprised of the hazards of chemicals in their work area. This information will be provided to laboratory personnel at the time they are initially assigned to the work area where hazardous chemicals are present and prior to performing assignments involving new exposure situations (e.g. the use of a "new" chemical). Note: The chemical may not be "new" to the University but is "new" to the laboratory or individual using the chemical.

The frequency of refresher information and training will be determined by the University.

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7.1 Information

Information to be provided to all laboratory personnel will include at a minimum:

- The contents of the Chemical Hygiene Standard (OSHA 1910.1450) and its appendices;
- The location and availability of the University's Chemical Hygiene Plan;
- The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;
- Signs and symptoms associated with exposure to hazardous chemicals used in the laboratory; and
- The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory, including but not limited to, Material Safety Data Sheets received from the chemical supplier.

7.2 Training

Training to be provided to all laboratory personnel (e.g. faculty, research scientists, student employees and students) will include at a minimum:

- Methods and observations that may be used to detect the presence or release of a hazardous chemicals (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- The physical and health hazards of chemicals in the work area;
- The measures laboratory personnel can take to protect themselves from the hazards, including specific procedures the University has implemented to protect laboratory personnel from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
- The applicable details of the University's written Chemical Hygiene Plan.

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Note: This list is comprised from the U.S. Department of Health and Human Services National Toxicology Program latest Report on Carcinogens – Eleventh Edition. The list is neither definitive nor exhaustive. You should refer to the material safety data sheet to determine whether a chemical is a carcinogen, reproductive toxin or chemical with high acute toxicity.

| Chemical Name | CAS Number | Hazard |
|---|------------|-----------------------------------|
| A | | |
| A-alpha-C (2-Amino-9H-pyrido[2,3-b]indole) | 26148-68-5 | Carcinogen |
| Acetaldehyde | 76-07-0 | Carcinogen, Reproductive Toxin |
| Acetaide | 60-35-5 | Carcinogen |
| Acetochlor | 34256-82-1 | Carcinogen |
| 2-Acetylaminofluorene | 53-96-3 | Carcinogen |
| Acifluorfen | 62476-59-9 | Carcinogen |
| Acrolein | 107-02-8 | High acute toxicity |
| Acrylamide | 79-06-1 | Carcinogen |
| Acrylonitrile | 107-13-1 | Carcinogen |
| Actinomycin D | 50-76-0 | Carcinogen |
| Adriamycin (Doxorubicin hydrochloride) | 23214-92-8 | Carcinogen |
| AF-2; [2-(2-furyl)-3-(5-nitro-2-furyl)]acrylamide | 3588-53-7 | Carcinogen |
| Aflatoxins | ---- | Carcinogen, Reproductive Toxin |
| Alachlor | 15972-60-8 | Carcinogen |
| Aldrin | 309-00-2 | Carcinogen |
| Allyl chloride | 107-05-1 | Carcinogen |
| Aluminum chloride | 7446-70-0 | Reproductive Toxin |
| 2-Aminoanthraquinone | 117-79-3 | Carcinogen |
| p-Aminoazobenzene | 60-09-3 | Carcinogen |
| ortho-Aminoazotoluene | 97-56-3 | Carcinogen |
| 4-Aminobiphenyl (4-aminodiphenyl) | 92-67-1 | Carcinogen |
| 3-Amino-9-ethylcarbazole hydrochloride | 6109-97-3 | Carcinogen |
| 1-Amino-2-methylantraquinone | 82-28-0 | Carcinogen |
| 2-Amino-5-(5-nitro-2-furyl)-1,3,4-thiadiazole | 712-68-5 | Carcinogen |
| 2-Aminopyridine | 462-08-8 | High acute toxicity |
| Amitrole | 61-82-5 | Carcinogen |
| Anesthetic gases | --- | Reproductive Toxin |

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B

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|--|------------|------------------------------------|
| Benz[a]anthracene | 56-55-3 | Carcinogen |
| Benzene | 71-43-2 | Carcinogen, Reproductive Toxin |
| Benzidine [and its salts] | 92-87-5 | Carcinogen |
| Benzo [b] fluoranthene | 205-99-2 | Carcinogen |
| Benzo [j] fluoranthene | 205-82-3 | Carcinogen |
| Benzo [k] fluoranthene | 207-08-9 | Carcinogen |
| Benzofuran | 271-89-6 | Carcinogen |
| Benzo [a] pyrene | 50-32-8 | Carcinogen, Reproductive Toxin |
| Benzotrichloride | 98-07-7 | Carcinogen |
| Benzyl chloride | 100-44-7 | Carcinogen, High Acute Toxicity |
| Benzyl violet 4B | 1694-09-3 | Carcinogen |
| Beryllium and beryllium compounds | --- | Carcinogen |
| Betel quid with tobacco | --- | Carcinogen |
| Bis(2-chloroethyl)ether | 111-44-4 | Carcinogen |
| N,N,-Bis(2-chloroethyl)-2-naphthylamine (Chlornapazine) | 494-03-1 | Carcinogen |
| Bischloroethyl nitrosourea (BCNU) (Carmustine) | 154-93-8 | Carcinogen |
| Bis (chloromethyl) ether | 542-88-1 | Carcinogen |
| Bitumens, extracts of steam-refined and air- refined | --- | Carcinogen |
| Boron trifluoride | 7637-07-2 | High Acute Toxicity |
| Bracken fern | --- | Carcinogen |
| Bromine | 7726-95-6 | High Acute Toxicity |
| Bromodichloromethane | 75-27-4 | Carcinogen |
| Bromoform | 75-25-2 | Carcinogen |
| 1,3-Butadiene | 106-99-0 | Carcinogen |
| 1,4-Butanediol dimethanesulfonate (Busulfan) | 55-98-1 | Carcinogen |
| Butylated hydroxyanisole | 25013-16-5 | Carcinogen |
| beta-Butyrolactone | 3068-88-0 | Carcinogen |

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C

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|--|-------------|-----------------------------------|
| Cadmium and cadmium compounds | --- | Carcinogen, Reproductive Toxin |
| Captafol | 2425-06-1 | Carcinogen |
| Captan | 133-06-2 | Carcinogen |
| Carbon disulfide | 75-15-0 | Reproductive Toxin |
| Carbon tetrachloride | 56-23-5 | Carcinogen, Reproductive Toxin |
| Carbon-black extracts | --- | Carcinogen |
| Cellosolve | 110-80-5 | Reproductive Toxin |
| Ceramic fibers | --- | Carcinogen |
| Chlorambucil | 305-03-3 | Carcinogen |
| Chloramphenicol | 56-75-7 | Carcinogen |
| Chlordane | 57-74-9 | Carcinogen |
| Chlordecone (Kepone) | 143-50-0 | Carcinogen |
| Chlordimeform | 115-28-6 | Carcinogen |
| Chlorendic acid | 115-28-6 | Carcinogen |
| Chlorinated paraffins | 108171-26-2 | Carcinogen |
| Chlorine gas | 7782-50-5 | High Acute Toxicity |
| Chlorine dioxide | 10049-04-4 | High Acute Toxicity |
| Chlorine trifluoride | 7790-91-2 | High Acute Toxicity |
| Chlorodibromomethane | 124-48-1 | Carcinogen |
| Chloroethane (Ethyl chloride) | 75-00-3 | Carcinogen |
| 1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea | 13010-47-4 | Carcinogen |
| 1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea (Methyl-CCNU) | 13909-09-6 | Carcinogen |
| Chloroform | 67-66-3 | Reproductive Toxin |
| Chloromethyl methyl ether | 107-30-2 | Carcinogen |
| 3-Chloro-2-methylpropene | 563-47-3 | Carcinogen |
| 4-Chloro-ortho-phenylenediamine | 95-83-0 | Carcinogen |
| p-Chloro-o-toluidine | 95-69-2 | Carcinogen |
| Chloroprene | 126-99-8 | Reproductive Toxin |
| Chlorothalonil | 1897-45-6 | Carcinogen |
| Chlorozotocin | 54749-90-5 | Carcinogen |
| Chromium (hexavalent) | --- | Carcinogen |

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| Chromium trioxide | 1333-82-0 | Carcinogen, Reproductive Toxin |
| Chrysene | 18-01-9 | Carcinogen |
| C. I. Acid Red 114 | 6459-94-5 | Carcinogen |
| C. I. Basic Red 9 monohydrochloride | 569-61-9 | Carcinogen |
| Ciclosporin (Cyclosporin A; Cyclosporine) | 59865-13-3;79217-60-0 | Carcinogen |
| Cinnamyl anthranilate | 87-29-6 | Carcinogen |
| Cisplatin | 15663-27-1 | Carcinogen |
| Citrus Red No. 2 | 6358-53-8 | Carcinogen |
| Cobalt metal powder | 7440-48-4 | Carcinogen |
| Cobalt [II] oxide | 1307-96-6 | Carcinogen |
| Conjugated estrogens | --- | Carcinogen |
| Creosotes | --- | Carcinogen |
| para-Cresidine | 120-71-8 | Carcinogen |
| Cupferron | 135-20-6 | Carcinogen |
| Cyanogen chloride | 506-77-4 | High Acute Toxicity |
| Cycasin | 14901-08-7 | Carcinogen |
| Cyclophosphamide (anhydrous) | 50-18-0 | Carcinogen |
| Cyclophosphamide (hydrated) | 6055-19-2 | Carcinogen |

D

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|---|------------|------------|
| D&C Orange No. 17 | 46-83-1 | Carcinogen |
| D&C Red No. 8 | 2092-56-0 | Carcinogen |
| D&C Red No. 9 | 5160-02-1 | Carcinogen |
| D&C Red No. 19 | 81-88-9 | Carcinogen |
| Dacarbazine | 4342-03-4 | Carcinogen |
| Daminozide | 1596-84-5 | Carcinogen |
| Dantron (Chrysazin; 1,8-Dihydroxyanthraquinone) | 117-10-2 | Carcinogen |
| Daunomycin | 20830-81-3 | Carcinogen |
| DDD (Dichlorodiphenyldichloroethane) | 72-54-8 | Carcinogen |

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| DDVP (Dichlorvos) | 62-73-7 | Carcinogen |
| Decaborane | 17702-41-9 | High Acute Toxicity |
| N,N--Diacetylbenzidine | 613-35-4 | Carcinogen |
| 2,4-Diaminoanisole | 615-05-4 | Carcinogen |
| 2,4-Diaminoanisole sulfate | 39156-41-7 | Carcinogen |
| 4,4--Diaminodiphenyl ether (4,4--Oxydianiline) | 101-80-4 | Carcinogen |
| 2,4-Diaminotoluene | 95-80-7 | Carcinogen |
| Diaminotoluene (mixed) | --- | Carcinogen |
| Diazomethane gas | 334-88-3 | High Acute Toxicity |
| Dibenz[a,h]acridine | 226-36-8 | Carcinogen |
| Dibenz[a,j]acridine | 224-42-0 | Carcinogen |
| Dibenz[a,h]anthracene | 53-70-3 | Carcinogen |
| 7H-Dibenzo[c,g]carbazole | 194-59-2 | Carcinogen |
| Dibenzo[a,e]pyrene | 192-65-4 | Carcinogen |
| Dibenzo[a,h]pyrene | 189-64-0 | Carcinogen |
| Dibenzo[a,i]pyrene | 189-55-9 | Carcinogen |
| Dibenzo[a,l]pyrene | 191-30-0 | Carcinogen |
| Diborane gas | 19287-45-7 | High Acute Toxicity |
| 1,2-Dibromo-3-chloropropane (DBCP) | 96-12-8 | Carcinogen, Reproductive Toxin |
| Dichloroacetylene | 7572-29-4 | High Acute Toxicity |
| p-Dichlorobenzene | 106-46-7 | Carcinogen |
| 3,3--Dichlorobenzidine | 91-94-1 | Carcinogen |
| 1,4-Dichloro-2-butene | 764-41-0 | Carcinogen |
| 3,3--Dichloro-4,4--diaminodiphenyl ether | 28434-86-8 | Carcinogen |
| 1,1-Dichloroethane | 75-34-3 | Carcinogen |
| 1,2-Dichloropropane | 78-87-5 | Carcinogen |
| 1,3-Dichloropropene | 542-75-6 | Carcinogen |
| Dieldrin | 60-57-1 | Carcinogen |
| Dienestrol | 84-17-3 | Carcinogen |
| Diepoxybutane | 1464-53-5 | Carcinogen |
| Diesel engine exhaust | --- | Carcinogen |

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| Di(2-ethylhexyl)phthalate | 117-81-7 | Carcinogen |
| 1,2-Diethylhydrazine | 1615-80-1 | Carcinogen |
| Diethylnitrosamine | 55-18-5 | Carcinogen |
| Diethyl sulfate | 64-67-5 | Carcinogen |
| Diethylstilbestrol | 56-53-1 | Carcinogen |
| Diglycidyl resorcinol ether (DGRE) | 101-90-6 | Carcinogen |
| Dihydrosafrole | 94-58-6 | Carcinogen |
| 3,3--Dimethoxybenzidine (ortho-Dianisidine) | 119-90-4 | Carcinogen |
| 3,3--Dimethoxybenzidine dihydrochloride(ortho-Dianisidine dihydrochloride) | 20325-40-0 | Carcinogen |
| Dimethylcarbamoyl chloride | 79-44-7 | Carcinogen |
| Dimethyl formamide | 68-12-2 | Reproductive Toxin |
| 1,1-Dimethylhydrazine (UDMH) | 57-14-7 | Carcinogen |
| 1,2-Dimethylhydrazine | 540-73-8 | Carcinogen |
| Dimethylvinylchloride | 513-37-1 | Carcinogen |
| Dimethyl mercury | 593-74-8 | High Acute Toxicity |
| Dimethyl sulfate | 77-78-1 | Carcinogen, High Acute Toxicity |
| Dimethyl sulfide | 75-18-3 | High Acute Toxicity |
| Dinitrooctyl phenol | 63149-81-5 | Reproductive Toxin |
| 1,6-Dinitropyrene | 42397-64-8 | Carcinogen |
| 1,8-Dinitropyrene | 42397-65-9 | Carcinogen |
| 2,4-Dinitrotoluene | 121-14-2 | Carcinogen |
| Diphenylhydantoin (Phenytoin) | 57-41-0 | Carcinogen |
| Diphenylhydantoin (Phenytoin), sodium salt | 630-93-3 | Carcinogen |
| Direct Black 38 (technical grade) | 1937-37-7 | Carcinogen |
| Direct Blue 6 (technical grade) | 2602-46-2 | Carcinogen |
| Direct Brown 95 (technical grade) | 16071-86-6 | Carcinogen |
| Di-sec-octyl-phthalate | 117-81-7 | Reproductive Toxin |
| Disperse Blue 1 | 2475-45-8 | Carcinogen |
| Dithane | 111-54-6 | Reproductive Toxin |

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E

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|--|------------|-----------------------------------|
| Epichlorohydrin | 106-89-8 | Carcinogen, Reproductive Toxin |
| Erionite | 12510-42-8 | Carcinogen |
| Estradiol 17 β | 50-28-2 | Carcinogen |
| Estrone | 53-16-7 | Carcinogen |
| Ethinylestradiol | 57-63-6 | Carcinogen |
| 2-Ethoxy ethanol | 110-80-5 | Reproductive Toxin |
| 2-Ethoxyethyl acetate | 111-15-9 | Reproductive Toxin |
| Ethyl acrylate | 140-88-5 | Carcinogen |
| Ethyl methanesulfonate | 62-50-0 | Carcinogen |
| Ethyl-4-4'-dichlorobenzilate | 510-15-6 | Carcinogen |
| Ethylene chlorohydrin | 107-07-3 | High Acute Toxicity |
| Ethylene dibromide | 106-93-4 | Carcinogen, Reproductive Toxin |
| Ethylene dichloride (1,2-Dichloroethane) | 107-06-2 | Carcinogen |
| Ethylene fluorohydrin | 371-62-0 | High Acute Toxicity |
| Ethylene glycol monoethyl ether | 110-80-5 | Reproductive Toxin |
| Ethylene glycol monomethyl ether | 109-86-4 | Reproductive Toxin |
| Ethylene oxide | 75-21-8 | Carcinogen, Reproductive Toxin |
| Ethylene thiourea | 96-45-7 | Carcinogen, Reproductive Toxin |
| Ethyleneimine | 151-56-4 | Carcinogen |
| 2-Ethyhexanol | 104-76-7 | Reproductive Toxin |

F

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|---|-----------|-----------------------------------|
| Fluorine gas | 7681-49-4 | High Acute Toxicity |
| 2-Fluoroethanol | 371-62-0 | High Acute Toxicity |
| Folpet | 133-07-3 | Carcinogen |
| Formaldehyde | 50-00-0 | Carcinogen, Reproductive Toxin |
| 2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole | 3570-75-0 | Carcinogen |

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| Furazolidone | 67-45-8 | Carcinogen |
| Furmecyclox | 60568-05-0 | Carcinogen |

G

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| Glu-P-1 (2-Amino-6-methyldipyrdo[1,2-a:3=,2=-d]imidazole) | 67730-11-4 | Carcinogen |
| Glycidaldehyde | 765-34-4 | Carcinogen |
| Glycidol | 556-52-5 | Carcinogen |
| Glycol ethers | --- | Reproductive Toxin |
| Griseofulvin | 126-07-8 | Carcinogen |
| Gyromitrin (Acetaldehyde methylformylhydrazone) | 16568-02-8 | Carcinogen |

H

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|---|------------|-----------------------------------|
| Halothane | 151-67-7 | Reproductive Toxin |
| HC Blue 1 | 2784-94-3 | Carcinogen |
| Heptachlor | 76-44-8 | Carcinogen |
| Heptachlor epoxide | 1024-57-3 | Carcinogen |
| Hexachlorobenzene | 118-74-1 | Carcinogen |
| Hexachlorocyclohexane (technical grade) | --- | Carcinogen |
| Hexachlorodibenzodioxin | 34465-46-8 | Carcinogen |
| Hexachloroethane | 67-72-1 | Carcinogen |
| Hexafluoroacetone | 684-16-2 | Reproductive Toxin |
| Hexamethylene diisocyanate | 822-06-0 | High Acute Toxicity |
| Hexamethylphosphoramide | 680-31-9 | Carcinogen, Reproductive Toxin |
| Hormones | --- | Reproductive Toxin |
| Hydrazine | 302-01-2 | Carcinogen, Reproductive Toxin |
| Hydrazine sulfate | 10034-93-2 | Carcinogen |
| Hydrazobenzene (1,2-Diphenylhydrazine) | 122-66-7 | Carcinogen |
| Hydrogen Cyanide | 74-90-8 | High Acute Toxicity |
| Hydrogen Fluoride | 7664-39-3 | High Acute Toxicity |

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I

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|--|------------|---------------------|
| Indeno [1,2,3-cd]pyrene | 193-39-5 | Carcinogen |
| Iodine (inhalation only) | 7553-56-2 | High Acute Toxicity |
| IQ (2-Amino-3-methylimidazp[4,5-f]quinoline) | 76180-96-6 | Carcinogen |
| Iron dextran complex | 9004-66-4 | Carcinogen |
| Iron pentacarbonyl | 13463-40-6 | High Acute Toxicity |
| Isopropyl formate | 625-55-8 | High Acute Toxicity |
| Isosafrole | 120-58-1 | Carcinogen |

K

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|-----------|----------|--------------------|
| Karathane | 131-72-6 | Reproductive Toxin |
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L

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|----------------------------|------------|--------------------|
| Lactofen | 77501-63-4 | Carcinogen |
| Lasiocarpine | 303-34-4 | Carcinogen |
| Lead (inorganic compounds) | 7439-92-1 | Reproductive Toxin |
| Lead acetate | 301-04-2 | Carcinogen |
| Lead phosphate | 7446-27-7 | Carcinogen |
| Lead subacetate | 1335-32-6 | Carcinogen |
| Lindane | --- | Carcinogen |

M

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|--|------------|------------|
| Mancozeb | 8018-01-7 | Carcinogen |
| Maneb | 12427-38-2 | Carcinogen |
| Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2,3-b]indole) | 68005-83-7 | Carcinogen |
| Medroxyprogesterone acetate | 71-58-9 | Carcinogen |
| Melphalan | 148-82-3 | Carcinogen |
| Merphalan | 531-76-0 | Carcinogen |

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| Mestranol | 72-33-3 | Carcinogen |
| Methacryloyl chloride | 920-46-7 | High Acute Toxicity |
| 2-Methoxyethanol | 109-86-4 | Reproductive Toxin |
| 2-Methoxyethyl acetate | 110-49-6 | Reproductive Toxin |
| 8-Methoxypsoralen with ultraviolet A therapy | 298-81-7 | Carcinogen |
| 5-Methoxypsoralen with ultraviolet A therapy | 484-20-8 | Carcinogen |
| Methyl acrylonitrile | 126-98-7 | High Acute Toxicity |
| 2-Methylaziridine (Propyleneimine) | 75-55-8 | Carcinogen |
| Methylazoxymethanol | 590-96-5 | Carcinogen |
| Methylazoxymethanol acetate | 592-62-1 | Carcinogen |
| Methyl cellosolve | 109-86-4 | Reproductive Toxin |
| 3-Methylcholanthrene | 56-49-5 | Carcinogen |
| 5-Methylchrysene | 369-72-43 | Carcinogen |
| Methyl chloride | 74-87-3 | Reproductive Toxin |
| Methyl chloroformate | 79-22-1 | High Acute Toxicity |
| 4,4--Methylene bis(2-chloroaniline) | 101-14-4 | Carcinogen |
| 4,4--Methylene bis(N,N-dimethyl)benzenamine | 101-61-1 | Carcinogen |
| 4,4--Methylene bis(2-methylaniline) | 838-88-0 | Carcinogen |
| Methylene biphenyl isocyanate | 101-68-9 | High Acute Toxicity |
| 4,4--Methylenedianiline | 01-77-9 | Carcinogen |
| 4,4--Methylenedianiline dihydrochloride | 13552-44-8 | Carcinogen |
| Methyl fluoroacetate | 453-18-9 | High Acute Toxicity |
| Methyl fluorosulfate | 421-20-5 | High Acute Toxicity |
| Methylhydrazine and its salts | 13552-44-8 | Carcinogen, High Acute Toxicity |
| Methyl mercury and other organic forms | --- | High Acute Toxicity |
| Methyl methanesulfonate | 66-27-3 | Carcinogen |
| 2-Methyl-1-nitroanthraquinone | 129-15-7 | Carcinogen |
| N-Methyl-N=-nitro-N-nitrosoguanidine | 70-25-7 | Carcinogen |
| N-Methylolacrylamide | 924-42-5 | Carcinogen |
| N-Methyl-2-pyrrolidone | 872-50-4 | Reproductive Toxin |
| Methylthiouracil | 560-4-2 | Carcinogen |

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| Methyl trichlorosilane | 75-79-6 | High Acute Toxicity |
| Methyl vinyl ketone | 78-94-4 | High Acute Toxicity |
| Metiram | 9005-42-2 | Carcinogen |
| Metronidazole | 443-48-1 | Carcinogen |
| Michler=s ketone | 90-94-8 | Carcinogen |
| Mirex | 2385-85-5 | Carcinogen |
| Mitomycin C | 50-07-7 | Carcinogen |
| Monocrotaline | 315-22-0 | Carcinogen |
| 5-(Morpholinomethyl)-3-[(5-nitro-furfurylidene)-amino]-2 oxalolidinone | 139-91-3 | Carcinogen |
| Mustard Gas | 505-60-2 | Carcinogen |

N

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| Nafenopin | 3771-19-5 | Carcinogen |
| 1-Naphthylamine | 124-32-7 | Carcinogen |
| 2-Naphthylamine | 91-59-8 | Carcinogen |
| Nickel and certain nickel compounds | --- | Carcinogen |
| Nickel carbonyl | 13463-39-3 | Carcinogen, High Acute Toxicity |
| Nickel subsulfide | 12035-72-2 | Carcinogen |
| Niridazole | 61-47-4 | Carcinogen |
| Nitrilotriacetic acid | 139-13-9 | Carcinogen |
| Nitrilotriacetic acid, trisodium salt monohydrate | 18662-53-8 | Carcinogen |
| 5-Nitroacenaphthene | 602-87-9 | Carcinogen |
| 5-Nitro-o-anisidine | 99-59-2 | Carcinogen |
| 4-Nitrobiphenyl | 93-93-3 | Carcinogen |
| 6-Nitrochrysene | 7496-02-8 | Carcinogen |
| Nitrofen (technical grade) | 1836-75-5 | Carcinogen |
| 2-Nitrofluorene | 607-57-8 | Carcinogen |
| Nitrofurazone | 59-87-0 | Carcinogen |
| 1-[5-Nitrofurfurylidene)-amino]-2-imidazolidinone | 555-84-0 | Carcinogen |
| N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide | 531-82-8 | Carcinogen |

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| Nitrogen dioxide | 10102-44-0 | High Acute Toxicity |
| Nitrogen mustard (Mechlorethamine) | 51-75-2 | Carcinogen |
| Nitrogen mustard hydrochloride (Mechlorethamine hydrochloride) | 55-86-7 | Carcinogen |
| Nitrogen mustard N-oxide | 126-85-2 | Carcinogen |
| Nitrogen mustard N-oxide hydrochloride | 302-70-5 | Carcinogen |
| Nitrogen tetroxide | 10544-72-6 | High Acute Toxicity |
| Nitrogen trioxide | 10544-73-7 | High Acute Toxicity |
| 2-Nitropropane | 79-46-9 | Carcinogen |
| 1-Nitropyrene | 5522-43-0 | Carcinogen |
| 4-Nitropyrene | 57835-92-4 | Carcinogen |
| N-Nitrosodi-n-butylamine | 924-16-3 | Carcinogen |
| N-Nitrosodiethanolamine | 1116-54-7 | Carcinogen |
| N-Nitrosodiethylamine | 55-18-5 | Carcinogen |
| N-Nitrosodimethylamine | 62-75-9 | Carcinogen |
| p-Nitrosodiphenylamine | 156-10-5 | Carcinogen |
| N-Nitrosodiphenylamine | 86-30-6 | Carcinogen |
| N-Nitrosodi-n-propylamine | 621-64-7 | Carcinogen |
| N-Nitroso-N-ethylurea | 759-73-9 | Carcinogen |
| 3-(N-Nitrosomethylamino)propionitrile | 60153-49-3 | Carcinogen |
| 4-(N-Nitrosomethylamino)-1-(3-pyridyl)1-butanone | 64091-91-4 | Carcinogen |
| N-Nitrosomethylethylamine | 10595-95-6 | Carcinogen |
| N-Nitroso-N-methylurea | 684-93-5 | Carcinogen |
| N-Nitroso-N-methylurethane | 615-53-2 | Carcinogen |
| N-Nitrosomethylvinylamine | 4549-40-0 | Carcinogen |
| N-Nitrosomorpholine | 59-89-2 | Carcinogen |
| N-Nitrosonornicotine | 16543-55-8 | Carcinogen |
| N-Nitrosopiperidine | 100-75-4 | Carcinogen |
| N-Nitrosopyrrolidine | 930-55-2 | Carcinogen |
| N-Nitrososarcosine | 13256-22-9 | Carcinogen |
| Nitrous Oxide | 10024-97-2 | High Acute Toxicity |
| Norethisterone (Norethindrone) | 68-22-4 | Carcinogen |

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O

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| Ochratoxin A | 303-47-9 | Carcinogen |
| Osmium tetroxide | 20816-12-0 | High Acute Toxicity |
| Oxadiazon | 19666-30-9 | Carcinogen |
| Oxygen difluoride gas | 7783-41-7 | High Acute Toxicity |
| Oxymetholone | 434-07-1 | Carcinogen |
| Ozone | 10028-15-6 | High Acute Toxicity |

P

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| Panfuran S | --- | Carcinogen |
| Pentachlorophenol | 87-86-5 | Carcinogen |
| Phenacetin | 62-44-2 | Carcinogen |
| Phenazopyridine | 94-78-0 | Carcinogen |
| Phenazopyridine hydrochloride | 136-40-3 | Carcinogen |
| Phenesterin | 3546-10-9 | Carcinogen |
| Phenobarbital | 50-06-6 | Carcinogen |
| Phenoxybenzamine | 59-96-1 | Carcinogen |
| Phenoxybenzamine hydrochloride | 63-92-3 | Carcinogen |
| Phenyl glycidyl ether | 22-60-1 | Carcinogen |
| Phenylhydrazine and its salts | --- | Carcinogen |
| o-Phenylphenate, sodium | 132-27-4 | Carcinogen |
| Phosgene | 75-44-5 | High Acute Toxicity |
| Phosphine gas | 1498-40-4 | High Acute Toxicity |
| Phosphorus oxychloride | 10025-87-3 | High Acute Toxicity |
| Phosphorus pentafluoride gas | 7641-19-0 | High Acute Toxicity |
| Phosphorus trichloride | 7719-12-2 | High Acute Toxicity |
| Polybrominated biphenyls | --- | Carcinogen |
| Polychlorinated biphenyls | --- | Carcinogen |
| Polygeenan | 53973-98-1 | Carcinogen |
| Ponceau MX | 3761-53-3 | Carcinogen |
| Ponceau 3R | 3564-09-8 | Carcinogen |

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| Potassium bromate | 7758-01-2 | Carcinogen |
| Procarbazine | 671-16-9 | Carcinogen |
| Procarbazine hydrochloride | 366-70-1 | Carcinogen |
| Progesterone | 57-83-0 | Carcinogen |
| 1,3-Propane sultone | 1120-71-4 | Carcinogen |
| beta-Propiolactone | 57-57-8 | Carcinogen |
| Propylene glycol monomethyl ether | 107-98-2 | Reproductive Toxin |
| Propylene oxide | 75-56-9 | Carcinogen |
| Propylthiouracil | 51-52-5 | Carcinogen |

R

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| Reserpine | 50-55-5 | Carcinogen |
| RH-7592 | --- | Reproductive Toxin |

S

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| Saccharin | 81-07-2 | Carcinogen |
| Saccharin, sodium | 128-44-9 | Carcinogen |
| Safrole | 94-59-7 | Carcinogen |
| Selenium sulfide | 7446-34-6 | Carcinogen |
| Silica, crystalline | --- | Carcinogen |
| Sodium azide | 26628-22-8 | High Acute Toxicity |
| Sodium cyanide (and other cyanide salts) | 143-33-9 | High Acute Toxicity |
| Streptozotocin | 18883-66-4 | Carcinogen |
| Styrene oxide | 96-09-3 | Carcinogen |
| Sulfallate | 95-06-7 | Carcinogen |
| Systhane/RH-3866 | 8867-89-0 | Reproductive Toxin |

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T

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| Talc' containing asbestiform fibers | --- | Carcinogen |
| Testosterone and its esters | 58-22-0 | Carcinogen |
| 2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD) | 1746-01-6 | Carcinogen |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | Carcinogen |
| Tetrachloroethylene (Perchloroethylene) | 127-18-4 | Carcinogen |
| p-a, a, a-Tetrachlorotoluene | 5216-25-1 | Carcinogen |
| Tetranitromethane | 509-14-8 | Carcinogen |
| Thioacetamide | 62-55-5 | Carcinogen |
| 4,4' - Thiodianiline | 139-65-1 | Carcinogen |
| Thiourea | 62-56-6 | Carcinogen |
| Thorium dioxide | 1314-20-1 | Carcinogen |
| TOK (herbicide) | 1836-75-5 | Reproductive Toxin |
| Toluene diisocyanate | 26471-62-5 | Carcinogen |
| ortho-Toluidine | 95-53-4 | Carcinogen |
| ortho-Toluidine hydrochloride | 636-21-5 | Carcinogen |
| para-Toluidine | 106-49-0 | Carcinogen |
| Toxaphene (Polychlorinated camphenes) | 8001-35-2 | Carcinogen |
| Trasulfan | 299-75-2 | Carcinogen |
| Trichlormethine (Trimustine hydrochloride) | 817-09-4 | Carcinogen |
| 2,4,6-Trichlorophenol | 88-06-2 | Carcinogen |
| Trimethyltin chloride | 1066-45-1 | High Acute Toxicity |
| Triphenyltin hydroxide | 76-87-9 | Carcinogen |
| Trichloroethylene | 79-01-6 | Carcinogen |
| Tris (aziridiny)-para-benzoquinone (Triaziquone) | 68-76-8 | Carcinogen |
| Tris (1-aziridiny) phosphine sulfide (Thiotepa) | 52-24-4 | Carcinogen |
| Tris (2-chloroethyl) phosphate | 115-96-8 | Carcinogen |
| Tris (2,3-dibromopropyl) phosphate | 126-72-7 | Carcinogen |
| Trp-P-1 (Tryptophan-P-1) | 62450-06-0 | Carcinogen |
| Trp-P-2 (Tryptophan-P-2) | 62450-07-1 | Carcinogen |
| Trypan blue (commercial grade) | 72-57-1 | Carcinogen |

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U

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| Uracil mustard | 66-75-1 | Carcinogen |
| Urethane (Ethyl carbamate) | 51-79-6 | Carcinogen |

V

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| Vinyl bromide | 593-60-2 | Carcinogen |
| Vinyl chloride | 75-01-4 | Carcinogen, Reproductive Toxin |
| 4-Vinyl-1-cyclohexene diepoxide (Vinyl cyclohexene dioxide) | 106-87-6 | Carcinogen |
| Vinyl trichloride (1,1,2-Trichloroethane) | 79-00-5 | Carcinogen |

X

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| 2,6-Xylidine (2,6-Dimethylaniline) | 87-62-7 | Carcinogen |
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Z

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| Zineb | 12122-67-7 | Carcinogen |
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