

SRM University Delhi-NCR

Policy for the Management and Disposal of Hazardous Chemicals



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DELHI-NCR, SONEPAT

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Introduction

SRM University Delhi-NCR, Sonapat, Haryana (SRM Education and Research Institute) has been established under Haryana Private University Act, 2006 as amended by Act No. 8 of 2013. SRM University Delhi-NCR, Sonapat, Haryana aims to emerge as a leading world-class university that creates and disseminates knowledge upholding the highest standards of instruction in Engineering & Technology, Science, Management, Law, Science & Humanities. Along with academic excellence and skills, university curriculum imparts integrity and social sensitivity to mould university graduates who may be best suited to serve the nation and the world.

SRM University realizes sustainable and holistic management and disposal of hazardous chemical essential in reducing its environmental footprint and providing a safe and healthy work environment for teaching and non-teaching employees, students, and visitors. The University has a duty to ensure that all the hazardous chemicals from concerned laboratories in the university are disposed of responsibly by using proper mechanism at the source and if possible, converting it into value added environment friendly product.

Policy Objectives

- ✓ To ensure the safe handling, storage and disposal of hazardous chemicals from concerned laboratories of University.
- ✓ To provide appropriate training for teacher, resident, staff, students and other stakeholders on waste management issues.

3. Organization and Management

The responsibilities and organizational arrangements for this hazardous chemical Management and disposal Policy lie with variety of personnel within the University.

▪ Advisory Board

- a. Vice-Chancellor- Chairman
- b. Dean Academic Affairs
- c. Dean (S & H)
- d. Project Manager
- e. One outside experts (to be nominated by the Vice-Chancellor):
Prof. R. K. Sharma, Dept. of Chemistry, University of Delhi
- f. Head of the concerned Departments

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▪ **Function of Advisory Board**

- ❖ Monitoring the concerned laboratories regarding management and disposal of hazardous chemicals.
- ❖ Provision of appropriate training for all personnel who have responsibilities for management and disposal of hazardous chemicals.

Definitions

Acid - any of various typically water-soluble and sour compounds that in solution are capable of reacting with an alkali to form a salt, redden litmus, and have a pH less than 7.

Alkali - a chemical compound that neutralizes or effervesces with acids and turns litmus blue; typically, a caustic or corrosive substance of this kind such as lime or soda.

Air reactive - liquids and solids spontaneously ignite within 5 minutes after coming into contact with air.

Authorized individual – person within a department or other administrative unit who had received necessary training and is authorized to review and approve chemical and hazardous material requests.

Carcinogen – refers to any substance that is an agent directly involved in the development of cancer or increases the potential of developing cancer over a period of time (acute or chronic exposures).

Combustible - chemicals able to catch fire and burn easily.

EHS&RM – Environmental Health, Safety and Risk Management Department

EPCRA - Emergency Planning and Community Right-To-Know Act

Flammable - ability of a substance to burn or ignite, causing fire or combustion. The degree of difficulty required to cause the combustion of a substance is quantified through fire testing. Internationally, a variety of test protocols exist to quantify flammability.

Mixtures - a combination of two or more pure substances in which each pure substance retains its.

Organic - relating to, being, or dealt with by a branch of chemistry concerned with the carbon compounds of living beings and most other carbon compounds

OSHA (Occupation Safety and Health Administration) - This agency develops, issues and enforces employee safety regulation.

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Oxidizers - chemicals that transfer electronegative atoms, usually oxygen, to a substrate.

Reagents - substances used in detecting or measuring a component, in preparing a product, or in developing photographs because of its chemical or biological activity

RQ – (Reportable Quantity) Amount of chemical that if released to the environment, requires notification to emergency response agencies.

SDS – (Safety Data Sheets) (formerly referred to as MSDS – Material Safety Data Sheets). Product safety and handling information supplied by the product manufacturer.

Water reactive – chemicals which become spontaneously flammable or emit flammable gases in potentially dangerous quantities upon contact with water, steam or moisture.

Solution - solid, liquid, or gaseous substances homogeneously mixed with a liquid or sometimes a gas or solid

TPQ – (Threshold Planning Quantity) is the amount of chemical that if possessed by University requires the development and implementation of a chemical specific risk analysis and risk management plan.

Stakeholders

Personnel procuring, handling, storing, using and disposal of chemicals on the SRMUH campus for cleaning, educational instruction and laboratory research procedures.

Policy contents

- **Purchase** – Chemicals used on the SRMUH campus must be purchased through the Purchase Department. SDS for samples, gifts or chemicals from outside sources must first be approved by authorized personnel prior to being brought on campus. The University has an obligation to make SDS for all chemicals on-campus available. EHS&RM cannot provide data sheets for chemicals that appear surreptitiously. SDS must be obtained for chemicals purchased “over-the counter”.
- **Training**

Authorized individuals will be provided with Hazard Communication, Laboratory Safety, and/or Hazardous Waste training as required by their job function. Training will cover relevant safety and environmental issues that must be considered when reviewing a request for chemicals.

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- **Responsibilities**

- Material Requestor – Responsible for ensuring all provisions of this policy are followed when requesting and procuring chemicals.
- Authorized Individuals: Responsible for reviewing all chemical requisitions to ensure applicable compliance issues are addressed prior to purchase. If an authorized individual has concerns about a request, the concern must be resolved with the requestor as soon as possible. The Authorized individual will indicate in the text field on the requisition if an SDS is required from the material supplier.
- Faculty and Staff: Responsible for ensuring policy is followed by staff, graduate and under graduate students.
- Procurement Services: Monitors chemical requisitions and ensures the approval of authorized individuals is obtained prior to purchase.

- **Preventing the generation of Hazardous Waste**

- Hazardous waste reduction begins at the source of generation. Purchases should be reviewed by authorized individuals to determine if it is possible to alter the process or materials used in order to reduce the quantity or hazard of the waste generated. Determine if a less hazardous material (or recyclable or reusable) can be substituted for the same job. Suppliers often have suggestions for safer or more environmentally friendly products.
- Purchase only the required/necessary quantity of material for the job at hand. Excess materials that age past shelf life become hazardous waste.
- Conduct chemical inventories periodically to ensure materials are used prior to expiration.

- **Chemical Storage**

Appropriate cabinets or rooms for storage of corrosive, flammable, reactive or toxic materials must be obtained prior to materials purchase. Cabinets or rooms must be labeled to indicate the type of materials stored within. Typical storage considerations may include temperature, ignition control, ventilation, segregation and identification.

- **Requirements for Safe Chemical Storage**

- Ensure all containers of hazardous chemicals are properly labeled with the identity of the hazardous chemical(s) and appropriate hazard warnings.

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- All chemicals should be labeled and dated upon receipt in the lab and on opening. This is especially important for peroxide-forming chemicals such as ethers, dioxane, isopropanol, and tetrahydrofuran.
- Segregate all incompatible chemicals for proper storage by hazard class. In other words, store like chemicals together and away from other groups of chemicals that might cause reactions if mixed. Refer to **Appendix B** for examples of incompatible chemicals.
- Do not store chemicals alphabetically except within a grouping of compatible chemicals. Refer to **Appendix C** for Basic Chemical Segregation
- Flammable materials should be stored in an approved, dedicated flammable materials storage cabinets or storage rooms if the volume exceeds ten gallons.
- Keep cabinet doors closed except when transferring chemicals to smaller containers for use in experiments and research. All chemicals should be labeled and dated upon receipt and on opening. This is especially important for peroxide forming chemicals such as ethers, dioxane, isopropanol and tetrahydrofuran etc.
- Do not store chemicals on the floor (even temporarily) or extending into traffic aisles.
- Liquids should be stored in unbreakable or double-contained packaging, or the storage cabinet should have the capacity to hold the contents if the container breaks.
- Store acids in a dedicated acid cabinet. Nitric acid may be stored there, but only if it is kept isolated from all other acids.
- Store highly toxic or controlled materials in a locked, dedicated poison cabinet. Volatile or highly odorous chemicals block proper air flow in hoods and reduce available work space.
- Solutions should be labeled and dated. Chemicals shall be stored in ventilated cabinets. Chemical fume hoods shall not be used for storage.

Look for unusual conditions in chemical storage areas, such as:

- ✓ Improper storage of chemicals
- ✓ Leaking or deteriorating containers
- ✓ Spilled chemicals
- ✓ Temperature extremes (too hot or cold in storage area)
- ✓ Lack of or low lighting levels
- ✓ Blocked exits or aisles
- ✓ Lack of security
- ✓ Trash accumulation
- ✓ Open lights or matches
- ✓ Fire equipment blocked, broken or missing
- ✓ Lack of information or warning signs ("Flammable liquids", "Acids", "Corrosives", "Poisons", etc.)

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- First aid supplies, emergency phone numbers, eyewash and emergency shower equipment, fire extinguishers, spill cleanup supplies, and personal protective equipment should be readily available and personnel trained in their use.
- Chemicals stored in explosion-proof refrigerators or cold rooms shall be sealed and labeled with the name of the person who stored the material in addition to all other required hazard warnings.
- Only compressed gas cylinders that are in use and secured in place shall be kept in the laboratory. All others, including empties, shall be sent to the compressed gas cylinder storage area for the particular facility.
- Keep all stored chemicals, especially flammable liquids, away from heat and direct sunlight.
- Proper storage information can usually be obtained from the Safety Data Sheet (SDS), label, or other chemical reference material.

Disposal

- Hazardous Chemicals (waste) (liquid, solid) should be accumulated in drums or containers separately.
- Waste storage areas should be checked weekly for leaks or spills.
- Waste containers should be labeled with contents, hazards (flammable, combustible, acid, non-halogenate, halogenated etc.), and accumulation dates.
- Before disposal, pH must be checked, if acidic, before disposal it should be neutralized.
- Solvent should be recycled with the help of fractional distillation process.

APPENDIX A

Storage Time Limits for Common Peroxidizable Compounds

Under proper conditions, these chemicals will form explosive peroxides which can be detonated by shock or heat.

<u>MOST DANGEROUS:</u> Discard after <u>3 months</u> .	
Peroxide formation hazard during storage.	
Diisopropyl ether	Potassium metal
Divinyl acetylene	Sodium amide
Isopropyl ether	Vinylidene chloride

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DANGEROUS: Discard after one year.

Peroxide formation hazard during storage and on concentration (i.e., distillation) of compound.

Acetal	Dicyclopentadiene	Methyl cyclopentane
Acetaldehyde	Diethyl ether	Methyl isobutyl ketone
Cumene	1,4-Dioxane	Tetrahydrofuran
Cyclohexene	Ethylene glycol dimethyl ether	Tetrahydronaphthalene
Diacetylene	Methyl acetylene	Vinyl ethers

Peroxide formation causes initiation of hazardous polymerization.

Acrylic acid	Chloroprene	Tetrafluoroethylene
Acrylonitrile	Chlorotrifluoroethylene	Vinyl acetate
1,3-Butadiene	Methyl methacrylate	Vinyl acetylene
2-Butanol	2-Propanol	Vinyl chloride
	Styrene	Vinyl pyridine

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APPENDIX B

Examples of Incompatible Chemicals

The following list is not a complete listing of incompatible materials. It contains some of the most common incompatible materials. Before starting your work always research materials you work with order to work safely in the lab. Contact the Environmental Health Safety and Risk Management Office (EHS&RM) with any questions.

Chemicals listed in Column A should not be stored with or used near items in Column B.

Column A	Column B
Acetic acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetic anhydride	Hydroxyl-containing compounds such as ethylene glycol, perchloric acid
Acetone	Concentrated nitric and sulfuric acid mixtures, hydrogen peroxide
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali and alkaline earth metals such as powdered magnesium, sodium, potassium	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury, halogens, calcium hypochlorite, hydrofluoric acid
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids, heavy metals and their salts, oxidizing agents
Calcium oxide	Water
Carbon, activated	All oxidizing agents, calcium hypochlorite
Carbon tetrachloride	Sodium
Chlorates	Ammonium salts, acids, metal powders, sulfur, finely divided organic or combustible material
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide

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Chromic acid and chromium trioxide	Acetic acid, alcohol, camphor, glycerol, naphthalene, flammable liquids in general
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens, other oxidizing agents
Fluorine	All other chemicals
Hydrides	Water
Hydrocarbons (e.g., butane, propane, benzene)	Fluorine, chlorine, bromine, chromic acid, peroxides
Hydrocyanic acid	Nitric acid, alkalis
Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, any flammable liquid (i.e., alcohols, acetone), combustible materials, aniline, nitromethane
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Metal hydrides	Acids, water
Nitrates	Acids
Nitric acid (concentrated)	Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Mercury and silver and their salts
Oxygen	Oils, grease, hydrogen; flammable liquids, solids, or gases
Perchloric acid	Acetic anhydride, alcohol, bismuth, paper, wood, grease, oils
Permanganates	Concentrated sulfuric acid, glycerol, ethylene glycol, benzaldehyde
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold

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Phosphorus, white	Air, oxygen, alkalis, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids, ammonium salts, metal powders, sulfur, finely divided organics, combustibles
Potassium perchlorate (see also chlorates)	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Silver and silver salts	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, other chlorinated hydrocarbons, water
Sodium nitrate	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Chlorates, perchlorates, permanganates

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APPENDIX C
Basic Chemical Segregation

Hazard Class of Chemical	Recommended Storage Method	Examples	Incompatibilities
Compressed gases - Flammable	Store in a cool, dry area, away from oxidizing gases. Securely strap or chain cylinders to a wall or bench.	Methane Hydrogen Acetylene Propane	Oxidizing and toxic compressed gases, oxidizing solids.
Compressed gases - Oxidizing	Store in a cool, dry area, away from flammable gases and liquids. Securely strap or chain cylinders to a wall or bench.	Oxygen Chlorine Bromine	Flammable gases
Compressed gases - Poisonous	Store in a cool, dry area, away from flammable gases and liquids. Securely strap or chain cylinders to a wall or bench.	Carbon monoxide Hydrogen sulfide Nitrogen dioxide	Flammable and/or oxidizing gases.
Corrosives - Acids	Store separately in acid storage cabinet. Segregate oxidizing acids (i.e., Chromic, nitric, sulfuric, and perchloric acids) from organic acids	Acetic acid Phenol Sulfuric acid Chromerge Nitric acid Perchloric acid Chromic acid Hydrochloric acid	Flammable liquids, flammable solids, bases, oxidizers
Corrosives - Bases	Store in separate corrosive storage cabinet. Store solutions of inorganic hydroxides in labeled polyethylene containers.	Ammonium hydroxide Sodium hydroxide Calcium hydroxide	Flammable liquids, oxidizers, poisons, and acids
Flammable Liquids	Store in flammable storage cabinet and away from sources of ignition. Store highly volatile	Acetone Benzene Diethyl ether Methanol	Acids, bases, oxidizers, and poisons

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	flammable liquids in an explosion-proof refrigerator.	Ethanol Toluene Glacial acetic acid	
Flammable Solids	Store in a separate dry, cool area away from oxidizers, corrosives, flammable liquids	Phosphorus, yellow Calcium carbide Picric acid Benzoyl peroxide	Acids, bases, oxidizers, and poisons
General Chemicals - Non-reactive	Store on general laboratory benches or shelving preferably behind glass doors and below eye level.	Agar Sodium chloride Sodium bicarbonate Most non-reactive salts	See specific SDS.
Oxidizers	Store in a spill tray inside a chemical storage cabinet. Separate from flammable and combustible materials.	Ammonium persulfate Ferric chloride Iodine Sodium hypochlorite Benzoyl peroxide Potassium permanganate Potassium dichromate The following are generally considered oxidizing substances: Peroxides, perchlorates, chlorates, nitrates, bromates, and superoxides.	Separate from reducing agents, flammables, and combustibles.
Poisons/Toxic Compounds	Store separately in vented, cool, dry area, in unbreakable chemically-resistant secondary containers and in accordance with the hazardous	Aniline Carbon tetrachloride Chloroform	Flammable liquids, acids, bases, and oxidizers.

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	nature of the chemical.	<p>Cyanides</p> <p>Heavy metals compounds, i.e., cadmium, mercury, osmium</p> <p>Oxalic acid</p> <p>Phenol</p> <p>Formic acid</p>	See specific SDS.
Water-Reactive Chemicals	Store in dry, cool location, protect from water fire sprinkler.	<p>Sodium metal</p> <p>Potassium metal</p> <p>Lithium metal</p> <p>Lithium aluminum hydride</p>	Separate from all aqueous solutions and oxidizers.
Carcinogens	Label all containers as "Cancer Suspect Agents". Store according to the hazardous nature of the chemical, using appropriate security when necessary.	<p>Benzidine</p> <p>Beta-naphthylamine</p> <p>Benzene</p> <p>Methylene chloride</p> <p>Beta-propiolactone</p>	See specific SDS.
Teratogens	Label all containers as "Suspect Reproductive Hazard". Store according to the hazardous nature of the chemical, using appropriate security when necessary.	<p>Lead and mercury compounds</p> <p>Benzene</p> <p>Aniline</p>	See specific SDS.
Peroxide-Forming Chemicals	Store in air-tight containers in a dark, cool, dry area. See Table 3 for recommended storage time limits.	<p>Diethyl ether</p> <p>Acetaldehyde</p> <p>Acrylonitrile</p>	See specific SDS.
Strong Reducing Agents	Store in cool, dry, well-ventilated location. Water reactive. Segregate	<p>Acetyl chloride</p> <p>Thionyl chloride</p>	See specific SDS.

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	from all other chemicals.	Maleic anhydride Ferrous sulfide	
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