

Section B - 8

UNO NON-WASTE CHEMICAL STORAGE

A. Overview

Due to the diverse individual properties of chemicals that may be located in a chemical use area, proper storage requirements may be complicated. Some general procedures for chemical storage are listed below. These procedures are not intended to be all-inclusive, but should form the basis for more specific procedures in the workplace. Specific instructions on chemical storage may be obtained from the MSDS, container label, or by contacting EHS.

B. General Storage

The following general procedures apply to the safe storage of chemicals:

1. Ensure that all containers are in good condition, properly capped, and properly labeled. There should be no unlabeled containers.
2. Store incompatible chemicals separately. (Chemicals should not simply be stored in alphabetical order without regard to compatibility.) Segregate chemicals according to compatibility class to avoid reactions if the containers leak or break. See "Compatibility" Subsection.
3. Ensure that storage areas are dry and adequately ventilated. Do not store chemicals above eye level.
4. Secure gas cylinders away from heat sources.
5. Store highly reactive or corrosive liquids in spill trays.

C. Compatibility

Heat generation, fire, container corrosion, poison gas evolution, explosions and violent reactions can occur when incompatible chemicals come into contact with each other. Knowledge of general incompatibilities and of the specific incompatibilities for a chemical are crucial for avoiding these reactions. General compatibility classes are listed below. Specific incompatibilities for a chemical are usually provided in the Material Safety Data Sheet.

A comprehensive means of classifying chemicals is given in "A Method for Determining the Compatibility of Hazardous Waste", EPA document number 600/2-80-076. This publication lists forty one classes of chemicals by compatibility. A table, extracted from this reference, listing the classes and compatibilities is provided in Table 6 of this Manual.

Based on the information given in the EPA document mentioned above, eight general compatibility categories have been developed for use at UNO. Incompatibilities within those categories are broken down into classes. These compatibility classes are described below.

The compatibility classes are prioritized based on the potential for reaction and severity of the hazard posed. (For example, explosive chemicals will generally pose a more serious threat to human health than acids, and therefore have a higher priority.) Chemicals that meet the definition of more than one compatibility class should be placed in the class having the highest priority.

Each compatibility class includes a shorthand code that can be used as a quick method for marking containers or storage areas. A summary of the compatibility classes, with associated codes, is also provided in Table 6 of this Manual. (If codes are used, the summary or a key to the full name of the compatibility class, must be posted in the area.)

1. Explosives (EX) and Shock-sensitive (SS) Materials

Example: dry picric acid

2. Flammable/Combustible Liquids

Flammable and combustible liquids are chemicals that have a flashpoint of 200EF or below. Five general groups of flammable/combustible liquids are listed below.

a. Organic Group One (FL)

Alcohols, glycols, aldehydes, amides, esters, ethers, aromatic hydrocarbons, halogenated organics, ketones and aliphatic saturated hydrocarbons.

Examples: isopropanol, acetaldehyde, ethyl acetate, xylene, acetone, hexane, mineral spirits, paint thinners

b. Organic Group Two (FL-2)

Aliphatic and aromatic amides, death-carbamates, carbamates, mercaptans and other organic sulfides, nitriles, organic nitro compounds, and unsaturated aliphatic hydrocarbons.

Examples: ethanolamine, ethyl mercaptan, acetonitrile, ethyl nitrate and butadiene

c. Hydrazines (FL-HYZ)

Example: methyl hydrazine

d. Flammable Organic Acids (FL-A)

Examples: glacial acetic acid, propionic acid

e. Flammable Bases (FL-B)

Example: Base-bath solution (isopropyl alcohol and sodium hydroxide)

3. Flammable Solids (FS)

Powdered metals, water reactive metals, metal hydrides, and some organics.

Examples: powdered zinc, sodium metal, sodium hydride, calcium carbide, sodium hydrosulfite, sodium methacrylate

4. Oxidizers

Chemicals that can supply oxygen or an analog to either initiate or enhance the combustion of other material.

a. Inorganic Acid Oxidizers (OX-A)

Examples: nitric acid, sulfuric acid, perchloric acid, potassium dichromate, chlorine gas

b. Basic and Other Inorganic Oxidizers (OX-B)

Some chemicals that are stabilized with sodium hydroxide, nitrates, bromates, iodates, permanganates, and chlorates

Examples: sodium hypochlorite (strong bleach), ammonium nitrate, silver nitrate, potassium permanganate

c. Organic Oxidizers (OX-O)

Examples: benzoyl peroxide, tetranitromethane

5. Acids

Liquids having a pH less than 4, and solids, which if dissolved, would be acidic.

a. Inorganic Acids (AC-I)

Examples: hydrochloric acid, hydrofluoric acid, phosphoric acid

b. Organic Acids (AC-O)

Examples: acetic acid (non-glacial), formic acid, benzoic acid

6. Bases

Liquid having a pH greater than 9.5, and solids, which if dissolved, would be basic.

a. Inorganic Bases (BS-I)

Examples: sodium hydroxide, potassium hydroxide

b. Organic Bases (BS-O)

Example: amides

7. Cyanides (CN) and Sulfides (S)

Chemicals that can release toxic cyanide or sulfide gases if exposed to acidic conditions (i.e., pH below 7).

Examples: potassium cyanide, ferric sulfide

8. Poisons

Poison is the default class for chemicals not defined by another compatibility class.

a. Organic Group One Poisons (PO-O)

Alcohols, glycols, aldehydes, amides, esters, ethers, aromatic hydrocarbons, halogenated organics, ketones, and aliphatic hydrocarbons.

Examples: ethylene glycol, glutaraldehyde, formamide, dichlorobenzene, quinone, petroleum oils, carbon tetrachloride

b. Organic Group Two Poisons (PO-2)

Aliphatic and aromatic amides, death-carbamates, carbamates, mercaptans and other organic sulfides, nitriles, organic nitro groups, unsaturated aliphatic hydrocarbons, and all other miscellaneous organic and inorganic compounds.

Examples: amino acids, aniline, aldicarb, chloropicrin, linseed oil

c. Inorganic Poisons (PO-I)

Inorganic poisons generally can be placed with either Group One or Group Two poisons.

The above listed classes constitute areas that must be physically separated. Some chemicals are incompatible with almost everything, and should be stored alone.

D. Flammable Liquids

Within a given room;

Flammable liquid storage on an open shelf is acceptable up to 4 liters. Quantities between 4 and 40 liters should be stored in an approved safety can or an approved flammable liquid storage cabinet. Flammable liquids in quantities exceeding a total of 40 liters should be stored within an approved flammable liquid storage cabinet. Large quantities of chemicals should be stored in specifically designed rooms that meet health, safety, and fire regulations. Refrigerators or freezers used to store flammable chemicals must be designed for flammable materials.

E. Peroxides

Since peroxide-forming chemicals become more unstable with time, indicate the date of receipt on each container of peroxide-forming chemical that is in storage. Check storage areas routinely to determine if any of these chemicals must be tested or disposed. (The time frames for testing common peroxide-forming chemicals are provided in Section B-5.

Table 8

CHEMICAL COMPATIBILITY CLASSES

COMPATIBILITY CLASS	CODE	GROUPS
EXPLOSIVES/ SHOCK-SENSITIVES	EX SS	EXPLOSIVE SHOCK-SENSITIVE
FLAMMABLE/ COMBUSTIBLE LIQUIDS	FL FL-2 FL-HYZ FL-A FL-B	ORGANIC GROUP-ONE ¹ ORGANIC GROUP-TWO ² HYDRAZINE FLAMMABLE ACID FLAMMABLE BASE
FLAMMABLE SOLIDS	FS	FLAMMABLE SOLID
OXIDIZERS	OX-A OX-B OX-O	INORGANIC ACID BASIC AND OTHER ORGANIC OXIDIZER
ACIDS	AC-I AC-O	INORGANIC ACID ORGANIC ACID
BASES	BS-I BS-O	INORGANIC BASE ORGANIC BASE
CYANIDES AND SULFIDES	CN SU	CYANIDE SULFIDE

POISONS	PO PO-2 PO-I	ORGANIC GROUP-ONE ¹ ORGANIC GROUP-TWO ² INORGANIC POISON ³
OTHER	SA	STORE ALONE!!
¹ Group-One: Alcohols, glycols, aldehydes, amides, esters, ethers, aromatic hydrocarbons, halogenated organics, ketones and aliphatic saturated hydrocarbons ² Group-Two: Aliphatic and aromatic amides, death-carbamates, carbamates, mercaptans and other organic sulfides, nitriles, organic nitro compounds, and unsaturated aliphatic hydrocarbons ³ Inorganic poisons generally can be placed with either Group-One or Group-Two poisons.		