

Chemical Waste Management Guide



The Chemical Waste Disposal Unit

Chemical waste in the Technion is handled by the Chemical Waste Disposal warehouse personnel, which administratively belongs to the Safety Unit.

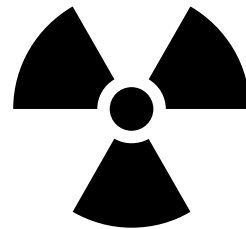
Chemical waste does not include:



Explosives



Gas
cylinders



Radioactive waste



Biological
waste



Chemical disposal instructions at the Technion reflect the State laws

Licensing of Business Regulations (Disposal of Hazardous Substances Waste) - 1990

2.

- a) A plant owner shall dispose of all waste that originates in a plant or is found therein, as soon as possible and not later than six month from the time of its generation, to the plant for the neutralization and treatment of industrial wastes and hazardous substances wastes in Ramat Hovav (hereinafter – “the Hazardous Waste Site”), and it shall be packed and transported in accordance with the provisions of any law and subject to the guidelines of the Director.
- b) A plant owner shall not dispose of and shall not allow another to dispose of waste from his plant, in a manner, or to a place, that is not stipulated in these regulations, unless the disposal is for the purpose of waste recycling or reuse, or for another reason, subject to the prior approval of the Director.



Personal Protective Equipment for handling chemical waste



Personal Protective Equipment (PPE) shall be used while handling chemical waste in accordance with the safety data sheet (SDS) or the operating procedures for handling chemicals of the same type.

Minimal PPE requirements to work in a chemical lab include



Fully enclosed shoes



Gloves

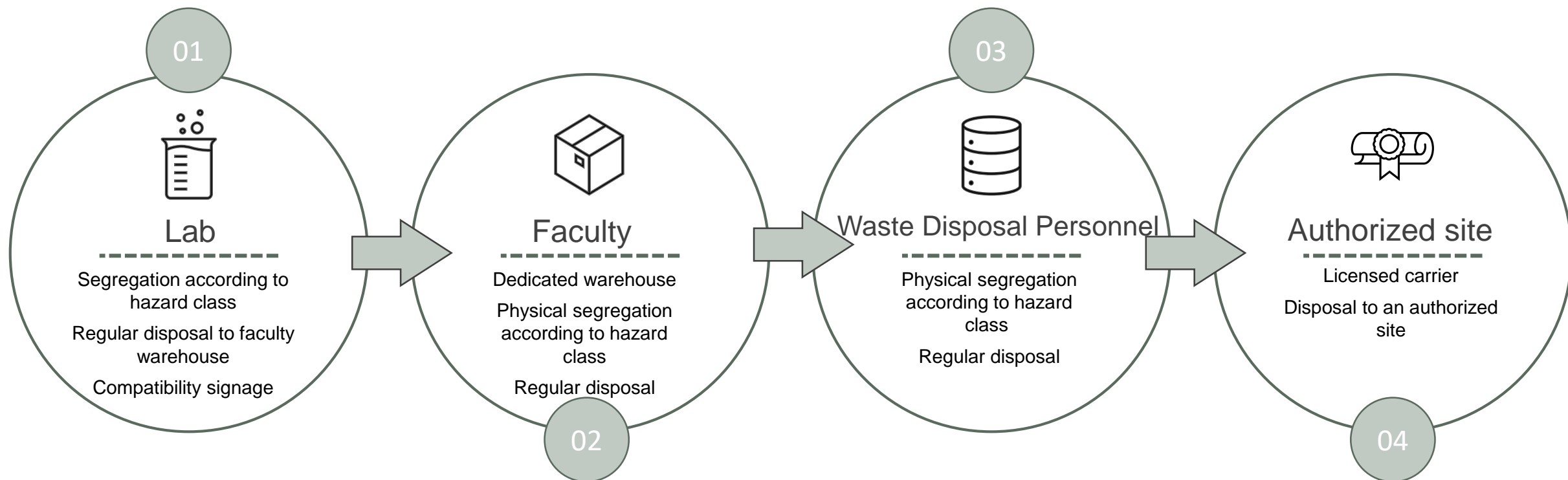


Safety goggles



Lab coat

Logistics of chemical waste disposal



Hazardous Waste Labeling and Signage

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת ציטוטוקסית

מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

CYTOTOXIC WASTE

הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. במקרה של תערובת רשום את שם הממס העיקרי.
1. Write the name of the Chemical in clear letters.
2. In case of mixtures state the main dangerous chemical.

פרטי: _____

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת חומצית

מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

ACIDIC WASTE

הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. במקרה של תערובת רשום את שם הממס העיקרי.
1. Write the name of the Chemical in clear letters.
2. In case of mixtures state the main dangerous chemical.

פרטי: _____

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת בסיסית

מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

ALKALINE WASTE

הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. במקרה של תערובת רשום את שם הממס העיקרי.
1. Write the name of the Chemical in clear letters.
2. In case of mixtures state the main dangerous chemical.

פרטי: _____

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת מתכלים

מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

Disposable Waste

הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. אין לערבב נוזלים ומוצקים עם המוצקים.
1. Write the name of the material in clear letters.
2. Don't add chemicals (liquids or solids).

פרטי: _____

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת מוצקה

מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

SOLID WASTE

הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. במקרה של תערובת רשום את שם הממס העיקרי.
1. Write the name of the Chemical in clear letters.
2. In case of mixtures state the main dangerous chemical.

פרטי: _____

הטכניון
מכון טכניון לרפואה

יחידת בטיחות ופיקוח קרינה
Safety and Radiation Unit

פסולת ממסים אורגניים

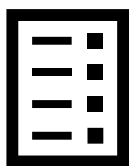
מנהל המעבדה _____
Lab. Man. _____
יחידה _____
Unit _____
תאריך _____
Date _____

ORGANIC SOLVENT WASTE

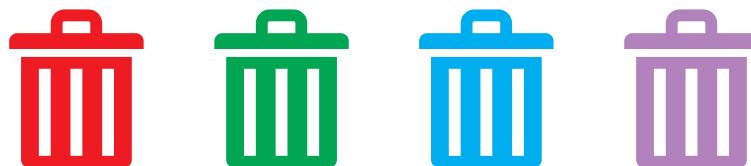
הערות:
1. רשום את שם החומר באנגלית ובכתב ברור, קרא ושמד.
2. במקרה של תערובת רשום את שם הממס העיקרי.
1. Write the name of the Chemical in clear letters.
2. In case of mixtures state the main dangerous chemical.

פרטי: _____

It is required to label the types of materials being disposed of as chemical waste with the appropriate sticker



The chemical waste personnel handle the waste according to the waste labels



Separate waste containers according to chemical reactivity/incompatibility (cross-reaction) or according to the final treatment technology at the waste treatment plant



If the label becomes faded or destroyed, it should be replaced

Hazardous Waste Labeling and Signage

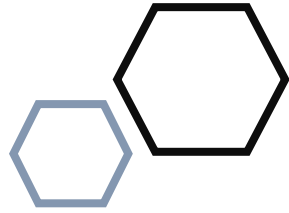
Unique waste

Pay attention to
a special waste
that must be
disposed of
separately
according to its
SDS (e.g.
concentrated
nitric acid)

Unknown waste



- Unknown waste requires analysis by an external company chemist, leading to substantial extra costs.
- If the unknown chemical is found in the lab, “unknown chemical waste” white colored label should be placed on the container along with faculty member’s name.
- Never mix unknown waste with other chemicals.



Chemical incompatibility

When handling chemical waste, make sure that the chemicals being disposed of to the same waste container are **compatible**.

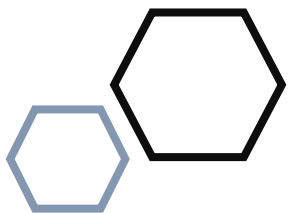
Follow the link below to the Chemical Incompatibility Chart on the Safety Unit's web site:

CTRL Click:



Chemical Incompatibility Chart of common chemicals, for example:

Chemical	Incompatible with
Acetic Acid	Chromic Acid, nitric acid, hydroxyl-containing compounds, ethylene glycol, perchloric acid, peroxides, and permanganates.
Acetone	Bromine, chlorine, nitric acid, sulfuric acid, and hydrogen peroxide.
Acetylene	Bromine, chlorine, copper, mercury, fluorine, iodine, and silver.
Alkaline and Alkaline Earth Metals such as calcium, lithium, magnesium, sodium, potassium, powdered aluminum	Carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons, water, Bromine, chlorine, fluorine, and iodine. Do not use CO2, water or dry chemical extinguishers. Use Class D extinguisher (e.g., Met-L-X) or dry sand.
Aluminum and its Alloys (especially powders)	Acid or alkaline solutions, ammonium persulfate and water, chlorates, chlorinated compounds, nitrates, and organic compounds in nitrate/nitrate salt baths.
Ammonia (anhydrous)	Bromine, chlorine, calcium hypochlorite, hydrofluoric acid, iodine, mercury, and silver.
Ammonium Nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulfur and finely divided organics or other combustibles.
Aniline	Hydrogen peroxide or nitric acid.
Bromine	Acetone, acetylene, ammonia, benzene, butadiene, butane and other petroleum gases, hydrogen, finely divided metals, sodium carbide, turpentine.



Chemical incompatibility

Rules of thumb for the **incompatibility** of different chemicals:

SUBSTANCE CATEGORY	INCOMPATIBLE SUBSTANCES
Alkali metals, e.g., sodium, potassium, cesium and lithium	Carbon dioxide, chlorinated hydrocarbons, water
Halogens	Ammonia, acetylene, hydrocarbons
Acetic acid, hydrogen sulfide, aniline, hydrocarbons, sulfuric acid	Oxidizing agents, , e.g., chromic acid, nitric acid, peroxides, permanganates

Section 10 – **Stability and Reactivity** of Safety Data Sheet (SDS) must be advised to determine incompatibility with other materials, for example for acetone:

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

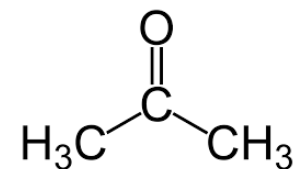
Heat, flames and sparks.

10.5 Incompatible materials

Bases, Oxidizing agents, Reducing agents, Acetone reacts violently with phosphorous oxychloride.

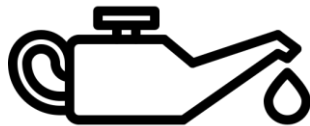
10.6 Hazardous decomposition products

In the event of fire: see section 5

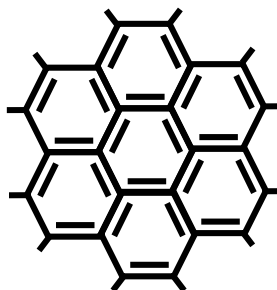


Acetone

Solutions to **never** pour down the sink



Oil and fats,
Mineral **oil**



Organic solvents $C > 25\%$ or
 $V > 4L$

e.g. ethanol, methanol,
isopropanol, acetone

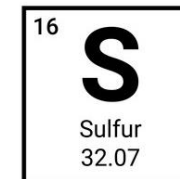
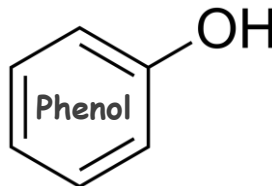
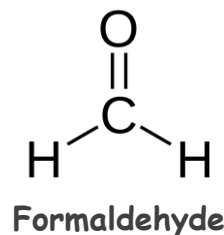


Solutions with
pH < 6 or **pH** > 10



Highly concentrated solutions ($C > 0.1 \frac{mg}{L}$)
of **metals**, especially silver, silver stain, zinc,
arsenic, mercury, chrome, lead

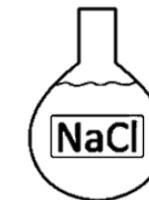
Solutions to **never** pour down the sink



Sulfur, phenol, cyanide or formaldehyde containing solutions



Substances in their original container (expired or unwanted)



Solutions' volume per day $V > 4L$
Including **chlorides**, such as sodium hypochlorite,
sodium (including NaCl)

Solutions shall be disposed as chemical waste in accordance with the "Handling Chemical Waste at the Technion Safety Procedure".

In any case of doubt, the solution should be treated as chemical waste.

Chemical Waste



Liquids



Solids



Consumables

* Special waste is detailed on the next slide

Chemical waste

Liquid

Organic Waste

Silanes

Aqueous Liquid Waste

Acidic



E.g:

1. HCl + EtOH
2. H_2SO_4 + EtOH
3. Acetic acid
4. Formic acid
5. Phenol solution
6. TCA *****

Basic



E.g.:

1. KOH+ EtOH
2. KOH+ IPA
3. Amines
4. Amines solutions

A mixture of both



E.g.:

1. Chloroform
2. Ethanol
3. Methanol
4. Acetone
5. Hexane

Oxidizing solutions with acidic pH



E.g.:

1. H_2O_2
2. Permanganate solutions
3. Silver Nitrate solutions

Acidic/Salt Solutions with acidic pH



E.g.:

1. HF *
2. HNO_3 **
3. Piranha ***
4. H_2SO_4
5. H_2PO_4
6. HCl

Basic/Salt Solutions with basic pH



E.g.:

1. KOH
2. NaOH
3. NH_4OH ****
4. Sodium hypochloride

Oxidizing solution with basic pH



E.g.:

1. Silver Nitrate Solutions

Unique Waste to be disposed separately

Aqueous Liquid Waste

Nitric acid **

Corrosive (below 70% concentration)
Oxidizing (above 70% concentration).
Reacts with many substances

Ammonium Hydroxide ****



Clean/original

HF (Hydrofluoric acid) *

HF can cause serious health effects.
Safety Officer shall be consulted before starting to handle the acid. Be sure you are familiar with operating and evacuation procedures.

Piranha Solutions ***

Piranha solutions must be allowed to cool and off-gas in an open polyethylene container left inside of the chemical fume hood for at least one night after use. Dispose as aqueous liquid acidic waste.

Organic Waste

(Trichloroacetic acid) TCA*****

Clean/original

Silanes *****

React with water. Mark and separate accordingly.

Chemical Waste



Liquids



Solids



Consumables

Chemical waste

Solids

Organic

Inorganic

Unique organic compounds to be disposed of separately (react with water etc.)

E.g.:

1. Chlorides of organic acids
2. Silanes

Common organic compounds

E.g.:

1. Phenol
2. Polymers like Polyethylene, Polystyrene, PVA.
3. Paints
4. Adhesives

Unique inorganic compounds to be disposed separately (react with water etc.)

E.g.:

1. Cyanides
2. Borohydride solutions
3. Metals like Na, Li, K
4. Silicon powder
5. Sodium hydro sulfite

Common inorganic compounds

E.g.:

1. NaCl
2. Magnesium sulfate



פסולת מוצקה
Lab. Name: _____
Date: _____
SOLID WASTE
1. Write the name of the Chemical in blue letters.
2. In case of reaction with the waste dangerous chemical.



פסולת מוצקה
Lab. Name: _____
Date: _____
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Chemical Waste



Liquids



Solids



Consumables

Chemical waste

Consumables

Contaminated equipment**

E.g.:

1. Gloves
2. Paper wipes (Kimwipes)
3. Plastic test tubes
4. Roll paper soaked in substances/solutions
5. Pipettes



Sharp waste*

E.g.:

1. Syringes
2. Pipettes tips
3. Pasteur pipette
4. Needles



****Contaminated equipment (consumables) must be stored in a dedicated sealed bag.**

Make sure there is no "biohazard" sign on the container. If there is, cover the sign with a "consumable" sticker with the details of its contents.

*** Sharp waste –any item that could puncture a waste bag.**

*** Sharp waste shall be stored in a dedicated sharps container (red bucket with an opening in the lid).**

*** Make sure there is no "biohazard" sign on the container. If there is, cover the sign with "consumable" sticker with the details of its contents.**

Chemical Waste Treatment Guidelines

Waste classification according to groups:
organic, acidic, basic, solids, consumables

Disposal to a new
container

Labeling the
container: reagent's
name + PI + faculty

Disposal to an existing
container in the lab

Adding the new
reagent's specs onto
label

Disposal
from lab
when:



80% full

or/and



6 m. after
opening

Shuttle waste to the faculty's collection point. In parallel, submit the Appendix B form of the "Handling Chemical Waste at the Technion Safety Procedure" to the Chemical Waste Disposal representative.

Chemical waste mixed with radioactive or biological waste

The Chemical Waste Disposal Warehouse **does not treat** radioactive or biological waste



Radioactive waste mixed with chemical waste shall be disposed as radioactive waste and labelled accordingly



Biological waste mixed with chemical waste shall be treated or disposed of in accordance with the "Treatment of Biological Waste in the Technion Laboratories Safety Procedure "

Grade definition of the materials is as follows:

Chemical
Waste



Biological
Waste



Radioactive
Waste

Empty Chemical Bottles



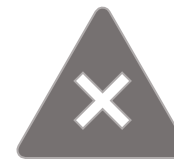
The empty chemical containers shall be disposed as chemical waste (according to the Ministry of Environmental Protection regulations)



The chemical containers' rinses shall be carried out in accordance with the "Handling Chemical Waste at the Technion Safety Procedure "



In the chemical waste removal request form, fill out: "Empty bottles"



Labeling of empty containers is not required (already labeled with manufacturer's original sticker)

Chemical Cytotoxic waste



The bag/container shall be labeled with a dedicated sticker



The reagent must be specified in the chemical waste disposal application form



Shall be disposed as chemical waste

Chemical Waste Container Types



COEX

Made of two (2) layers: the inner - polyamide and the outer - polyethylene.

The polyamide layer protects against unique organic solvents but reacts with acids/bases and their aqueous solutions.



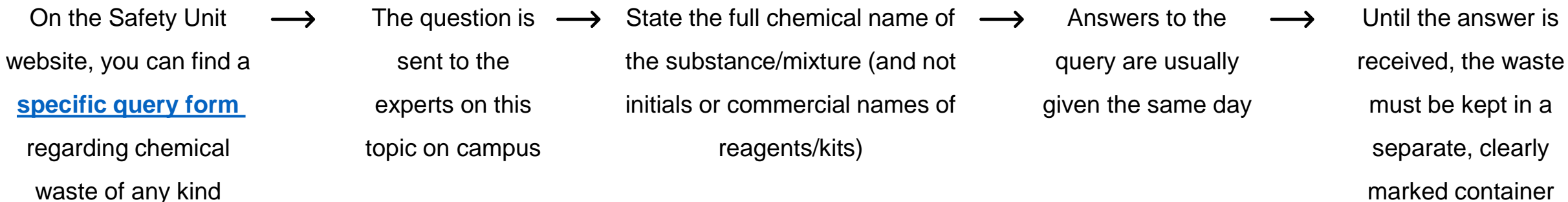
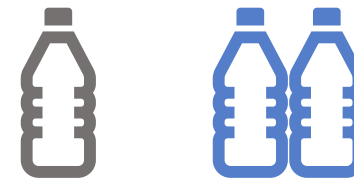
HDPE

High Density Polyethylene

Common **solvents** waste, **acidic** or **basic** waste, acidic or basic aqueous solutions shall be disposed of in **HDPE** containers.

Unique organic solvents, such as > 50% **toluene** and **xylene**, shall be disposed of in **COEX** containers.

Chemical Waste Queries



Queries examples with answers:

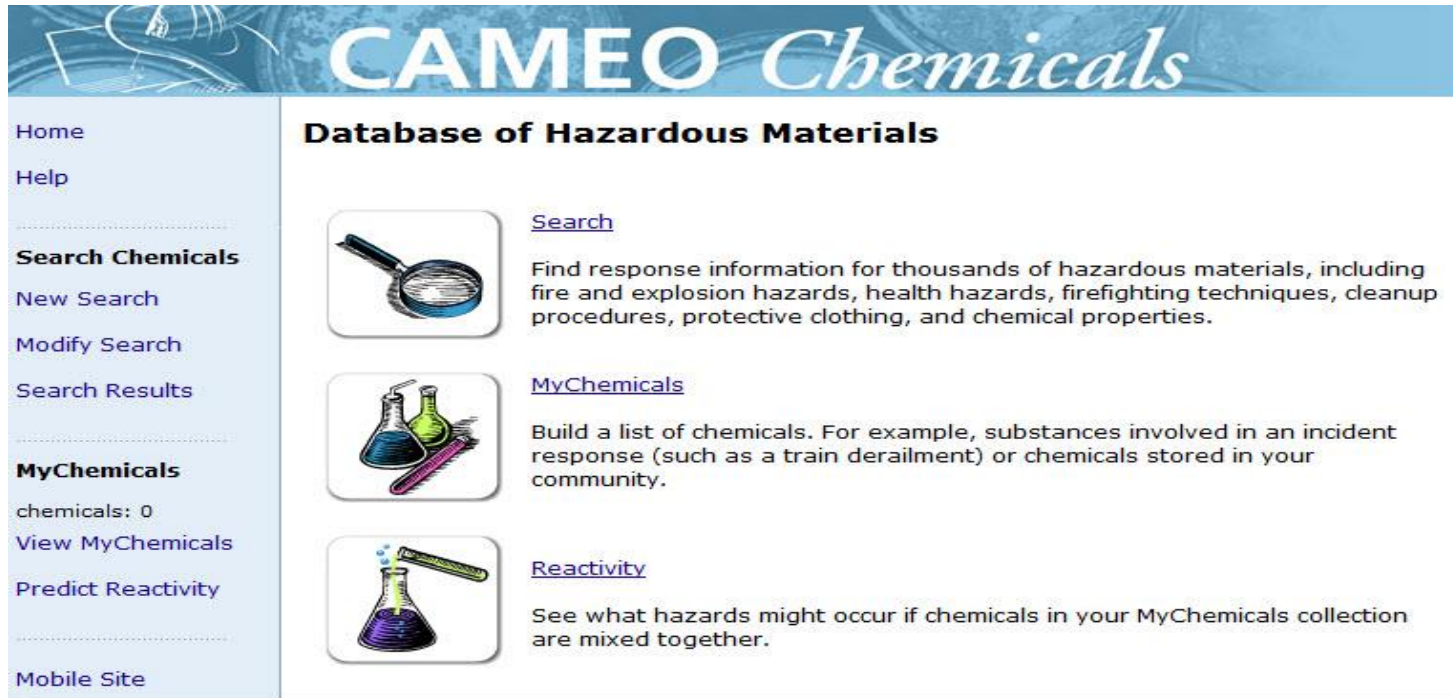
How to dispose of chloroform, tri-reagent and isopropanol waste: can they be mixed?

They can be disposed of together as an organic solvent.

Do nitric acid and acetic acid need to be disposed of separately or can they be mixed in one waste container?

Do not mix nitric acid with acetic acid! Acetic acid is organic, so the heat generated by the oxidation process is enough to cause a fire. Nitric acid must be separated from any other hazardous materials

Cameo Chemicals



CAMEO Chemicals

CAMEO Chemicals is the hazardous chemical database prepared by **NOAA** that contains thousands of safety datasheets with critical response information, including physical properties, health hazards, information about air and water hazards, and recommendations for firefighting, first aid, and spill response.



(<https://cameochemicals.noaa.gov/>)

NOAA

National Oceanic and
Atmospheric Administration



CAMEO Chemicals

Phone app icon

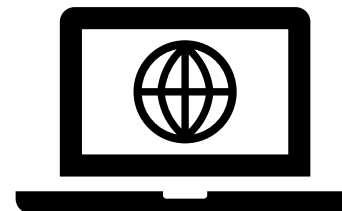
CAMEO

Computer Aided Management
of Emergency Operations

**For any additional information, please
contact the Safety Unit**



04-8292147



<https://safety.net.technion.ac.il/>