# 1. CLASSIFICATION OF WASTES AND THEIR DISPOSAL

In our department there is a significant amount of waste formation. This is a signature of the extend of the research that is carried out in our department. This is certainly a good thing. However, disposal of these chemical wastes by applying appropriate procedures for each class of waste produced is equally important for both personal and working place safety. In addition, we have to do our responsibility toward the environment.

The waste produced in our department is divided into two classes:

- Recycled waste (must not contain any chemical or chemical waste)
- Chemical waste

## 1.1. Recycled waste

Activities carried out in the department (either educational or research base thus in our offices and labs) produces a significant amount of recyclable waste. It is our responsibility to collect these recycled wastes to minimize our impact on nature. The recycled wastes such as papers, bottles, glasses and cans will be collected in Recycle Boxes. The boxes are provided by METU Foundation and placed in various places within the department. We are working to get more boxes so that there will be at least one in every floor. If there is none in your floor place the recycled waste outside of your lab and clearly mark as “RECYCLE” or “GERİ DÖNÜŞÜM”. The housekeepers will transfer those to the proper recycle bins located outside the department next to the garbage bins. Empty batteries are also collected in our department at a recycle bin placed in front of the Chemistry Club room (main entrance).

Please follow the following guidelines to decide on what is considered as recycled wastes:

- No waste that contains chemicals is considered as recycle waste. They should be disposed properly. Please follow the guidelines for chemical disposal below.
- Highly volatile solvent bottles (such as for alcohols etc) could be considered as recycle waste once the chemical is cleaned off the bottle.
- The other solvent bottles should be used for chemical waste disposal if suitable.
- Any paper that was not in contact with chemicals.
- Aluminum cans that was not used for chemical storages.
- Batteries
- Packages of gloves
- Shipping boxes

## 1.2. Chemical waste

Everyone would agree that waste is dangerous and any step toward minimization is a healthy step. Our department produces enormous amount of waste every year; thus, there is a large economic burden of the produced waste to our department’s budget. In fact, we have transferred more than seven tons of waste (not including the common solvents such as acetone, ethylacetate and hexane, collected and disposed by a different company) during the recent disposal program. Waste disposal will require allocation of a significant portion of our department’s budget and human resources. Therefore we should take every step possible to minimize the chemical waste produced. However we should realize that our department is a research and educational facility where no matter what is done there will be a significant amount of waste production. For the proper collection of the waste produced please follow the guidelines given below.

Waste regulation, collection and disposal starts with the planning of the experimental procedure. Before setting up an experiment that will use dangerous chemicals and will produce some waste one should also consider the following questions:

1. What steps or measures should be taken to minimize the waste that will be produced throughout the reaction or any process considered?
2. Is there any chemical that could be used instead of harmful ones?
3. Is there any chemical that could be recycled for reuse in the same process?

One should also make sure not to dispose any chemical to the sink that could be harmful to the nature or to the sewer system. We have separated the waste chemicals into two groups.

- Safe for drain disposal
- Not safe for drain disposal

### 1.2.1. Chemicals safe for drain disposal

Some materials, which do not cause damage to health, the environment and the functioning of the wastewater drains and plants, can be safely let into the sanitary sewer. However, quantities of chemical waste for drain disposal should be generally limited to a ***few hundred grams or milliliters or less per day***. Moreover, disposal should be followed by flushing with ***at least 100-fold excess of water***. Materials that are suitable for drain disposal are listed in Table 1, 2 and 3.

***Table 1.*** *Cations and anions suitable for drain disposal*

| Cations | Anions |
|---|---|
| $Al^{3+}$ | $BO_3^{3-}$ |
| $Ca^{2+}$ | $B_4O_7^{2-}$ |
| $Fe^{2+,3+}$ | $Br^-$ |
| $H^+$ | $CO_3^{2-}$ |
| $K^+$ | $Cl^-$ |
| $Li^+$ | $HSO_3^-$ |
| $Mg^{2+}$ | $OCN^-$ |
| $Na^+$ | $OH^-$ |
| $NH_4^+$ | $I^-$ |
| $Sn^{2+}$ | $NO_3^-$ |
| $Sr^{2+}$ | $PO_4^{3-}$ |
| $Ti^{3+,4+}$ | $SO_4^{2-}$ |
| $Zr^{2+}$ | $SCN^-$ |

• Dilute solutions of inorganic salts that include the ions listed in Table 1 are suitable for drain disposal. Materials listed are considered to be relatively low in toxicity. Compounds of any of these ions that are strongly acidic or basic should be neutralized before drain disposal.

• Mineral acids and bases should be neutralized to pH 5.5 to 9 ranges before disposal. They have to be neutralized in a short time. Without neutralization, waste of acid and base must not be poured into the sink. See the neutralization procedure on page 12.

***Table 2.*** *Types of Alcohols, Aldehydes, Amides and Amines suitable for drain disposal*

| ALCOHOLS | ALDEHYDES | AMIDES | AMINES |
|---|---|---|---|
| Methanol | formaldehyde (10% or less aqueous solution) | Formamide | methylamine |
| Ethanol | propanal | N-methyl formamide | ethylamine |
| Propanol and isomers | isobutyraldehyde | N,N-diethyl formamide | trimethylamine |
| Butanol and isomers | butanal | N,N-dimethyl formamide | N-ethyl methylamine |
| Ethylene glycol | | N-ethyl formamide acetamide | N-methyl propylamine |
| Propylene glycol | | N-methyl acetamide | dimethyl propylamine |
| Butylene glycol | | N,N-dimethyl acetamide | isopropylamine |
| Butanediol + isomers | | N-ethyl acetamide propionamide | 1-ethyl propylamine |
| Pentylene glycol | | N-methyl propionamide | butylamine |
| Pentanediol + isomers | | N, N-dimethyl propionamide | methyl butylamine |
| Hexylene glycol | | butyramide isobutyramide | N-ethyl butylamine |
| hexanediol + isomers | | | isobutylamine |
| heptamethylene glycol | | | amylamine |
| heptanediol + isomers | | | hexylamine |
| Methoxyethanol | | | 1,2- propanediamine |
| ethoxyethanol | | | 1,3-propanediamine |
| butoxyethanol | | | |
| 2-methoxyethoxyethanol | | | |
| 2(2-butoxyethoxy)ethanol | | | |

These materials present low toxicity hazards, are soluble to at least 3 percent and are readily biodegradable.

***Table 3.*** *Types of Carboxylic acids, Sulfonic acids, Esters and Ketones suitable for drain disposal*

| CARBOXYLIC ACIDS | ESTERS | KETONES | SULFONIC ACIDS* |
|---|---|---|---|
| formic acid | methyl formate | Acetone | methane sulfonic acid |
| acetic acid | ethyl formate | methyl ethyl ketone | ethane sulfonic acid |
| propionic acid | isopropyl formate | methyl isopropyl ketone | 1-propane sulfonic acid |
| butyric acid | propyl formate | | 1-butane sulfonic acid |
| isobutyric acid | methyl acetate | | 1-pentane sulfonic acid |
| valeric acid | ethyl acetate | | 1-hexane sulfonic acid |
| isovaleric acid | methyl propionate | | 1-heptane sulfonic acid |
| oxalic acid | Isopropyl acetate | | 1-octane sulfonic acid |
| malonic acid | | | 1-decane sulfonic acid |
| succinic acid | | | 1-dodecane sulfonic acid |
| glutaric acid | | | 1-tetradecane sulfonic acid |
| lactic acid | | | 1-hexadecane sulfonic acid |
| 3-hydroxybutyric acid | | | |
| 2-hydroxy isobutyric acid | | | |

* Sodium and potassium salts of sulfonic acids can be let into drain.

• Apart from the carboxylic acids listed above; aminoalkanoic acids with 6 or fewer carbon atoms and the ammonium, sodium and potassium salts of these acids and also amino acids and the ammonium, sodium and potassium salts of these acids are suitable for drain disposal.
• Amines and organic acids with a disagreeable odor, such as dimethylamine, 1,4-butanediamine and butyric acids and valeric acids should be neutralized and the resulting salt solutions could be flushed down the drain, diluted with at least 100 volumes of water.

• Enzymes, starch, sugars and sugar alcohols are not considered as hazardous. Therefore, up to about 100 g or 100 ml at a time per day are suitable for disposal of materials listed above.

### 1.2.2. Chemicals not safe for drain disposal

When a new project is realized a researcher thinks and analyses every part of the process before carrying out the experiment. Unfortunately most of us do not consider the waste that will be produced during this period. We should change our habits and include the waste management into our initial thinking and design our experiments accordingly. During these designs and carrying out the experiment the goal should include the waste minimization besides reaching to the final product. We do not suggest on sacrificing the research for the sake of waste minimization but rather to consider minimization of waste without affecting the outcome of your experiment.

Chemicals including the waste can be dangerous and should be handled accordingly. Therefore storage and collection of the waste is very important. Except the chemicals listed above as safe for drain nothing should be let into the sinks. The chemicals that may cause the following hazards if disposed to the drain should not be let into the drainage system:

- Fire and explosion hazards within the drain system
- Mixing of incompatible chemicals from different laboratories
- Corrosion of drainpipes
- Chemicals exposure hazards to plumbers
- Escape of volatile, toxic and malodorous substances
- Biocidal action on microorganisms those are necessary for the normal and effective operation of our waste water treatment plant.

Some chemicals that are not appropriate for drain disposal include:

- Halogenated hydrocarbons
- Nitro compounds
- Mercaptans
- Flammables (immiscible in water)
- Explosives such as azides and peroxides
- Water soluble polymers that could form gels in the sewer system
- Water reactive materials
- Malodorous chemicals
- Toxic chemicals such as carcinogens, mutagens, teratogens
- Substances that boil below 50° C.
- Mixtures that have a component not found on the safe list.
- Any material not found on the safe list.

List can be extended further. Special chemicals that are not listed here require special handling.
Please contact the department safety personnel for further assistance.

For the efficient disposal of the chemical wastes, each chemical must be collected in appropriate way as listed below. Although some of the chemicals given below are safe for drain disposal in small amounts, it is better to collect them.
Some of the following wastes can be reused as a raw material. Therefore we should consider recycling those wastes whenever possible.

The following chemical waste should be collected separately.

**ACETONE:** It should be collected in plastic bottles. Acetone wastes will be collected and reused by a private company.

**HEXANE:** Hexane wastes will be collected and reused by a private company.

**ETHYL ACETATE:** Ethylacetate waste will be collected and reused by a private company

**SILICA:** Silica will not be collected. After complete solvent evaporation in suitable conditions (such as in a fume hood), solid silica must be disposed in plastic bags with a maximum weight of 2 kg to the regular waste bins. Plastic bags used should be durable.

**BROKEN GLASS**: Broken glassware must be collected in durable carton boxes that has a durable plastic bag inside if possible. When the box gets full, close tightly, label clearly and place the box next to the regular trush bin to be picked up by the cleaning personnel of the department for disposal.

**SHARP METAL MATERIALS** (Includes syringe tips)**:** They will be collected in durable and hard plastic boxes. The full boxes will be closed tightly, labeled and discarded -like the broken glass waste.

While selecting a container for the broken glassware and sharp metal waste please consider the safety of cleaning personnel and garbage collectors. Many of them have been injured while handling these wastes. We should do our part and consider the safety of the personals helping us.

**AROMATICS & HALOGENS:** Collection and disposal should be done according to the procedure below.

**RADIOACTIVE & BIOLOGICAL WASTES:** Disposal procedure has not been determined for these kinds of wastes yet. Each kind requires a special handling and has regulations determined by the agency. Please contact the department safety personals for proper handling and disposal.

**OILS** (including vacuum pump oils)**:** Waste oil should be collected in suitable place of the laboratory until the container gets full. Container for waste oil collection must be durable plastic. When the oil containers are full, follow the disposal procedure given below.

## 2. WASTE COLLECTION AND DISPOSAL PROCEDURE

Each research group (and its director, principle investigator) is responsible for proper handling and collection of chemical wastes. The wastes should be collected separately as stated above, and collection bins/bottles must be stored in a safe environment such as fume hoods if possible. The chemical waste containers should not be stored on the floor. One of the most important things is the writing the names of wastes to the waste containers. Waste containers with unknown contents make the disposal of wastes difficult. They are also dangerous in an emergency situation like spilt or breaking of bottles. For example, in an accident recently happened in waste collection area of our department, unlabeled waste bottle has been fallen and broken. Nobody could interfere consciously and it might have been caused a fire or an explosion. Waste collection area has numerous flammable, reactive and poisonous wastes and to not forming a dangerous situation for our department we should care this labeling process.

The collection and disposal procedure is as follows:

- Each type should be collected separately in a suitable container.
- Containers that are used should be cleaned with plenty of water before usage.
- In order not to cause danger, waste containers should be placed into suitable places such as back off the hoods in laboratory. If possible arrange a hood for waste storage only.
- Size of containers should be determined according to the amount of waste. While container with 2.5 L is suitable for less than 1.0 L waste per month, volume of 20 L should be chosen for the waste of more than 10 L.
- Containers must be labeled. Information about content/(s), amount and percent of wastes must be written on the label. Use the label form provided by the department. You may download the form from the web page.
  ***Web address: nernst.chem.metu.edu.tr/waste***
  A copy of the form is given in Appendix A.
- Wastes without properly filled labels will not be collected.
- Once the waste containers are full, follow the following procedure.
  - Fill out the request form for waste removal (Use the form in the web page. A copy of the form is given in Appendix B)
  - Wait for the reply from Halil Memiş about the date for pick-up.
  - Move the full waste container to waste-pick-up area on the arranged date.

- Waste containers without proper label will not be picked-up.

## 3. CHEMICALS THAT SHOULD NOT BE STORED OR MIXED TOGETHER

The following mixtures are some of the chemical combinations which can be dangerous, either at room temperature or when heated. Do not allow to contact between these chemicals except under the specific conditions. The list is not complete but covers most of the common chemicals used.

***Table 4.*** *Chemicals that should not be stored or mixed together*

| Chemicals | Do not mix or do not store together |
|---|---|
| **Acetic acid** | Chromic acid, nitric acid, perchloric acid, perchlorates, peroxides, permanganates |
| **Acetic anhydride** | Compounds which include hydroxyl -(ethylene glycol, perchloric acid) |
| **Acetone** | Mixture of concentrated nitric and sulphuric acids, hydrogen peroxides, oxidizing agents |
| **Acetylene** | Chlorine, Bromine, Iodine, Copper, Silver, Fluorine, Mercury or their compounds |
| **Alkali and alkaline metals; such as powders of Na, K, Li, Mg, Ca, Al** | $CO_2$, $CCl_4$, mercury, chlorinated hydrocarbons (Usage of water, bubbles, dry chemicals and fire extinguisher that includes that metals are forbidden in case of fire. Instead, use dry sand) |
| **Aluminium chloride** | $H_2O$ |
| **Aluminium dust** | Oxides or oxidizing agents, chlorinated hydrocarbons, sulphur, alcohols, silver nitrate. |
| **Ammonium nitrate** | Acids, metal powders, flammable liquids, chlorates, nitrites, sulphur, flammables |
| **Anhydrous ammonia** | Mercury, Chlorine, Calcium hypochlorite, iodine, bromine, Hydrogen fluoride, perchloric acid and silver |
| **Aniline** | Nitric acid, hydrogen peroxide, hydrochloric acid, sulfuric acid. |
| **Bromine** | Ammonia, acetylene, butadiene, butane, other petroleum gases, sodium carbide, terpentine, benzene |
| **Calcium oxide** | Water |
| **Active carbon** | Calcium hypochlorite, other oxidants |
| **Chlorates** | Ammonium salts, acids, salts of metals, sulphur, flammables |
| **Chromic acid and chromium trioxide** | Acetic acid, naphtalein, camphore, glycerol, alcohol, other flammable liquids |

| | |
|---|---|
| **Chlorine** | Ammonia, acetylene, butadiene, butane, other petroleum gases, hydrogen, sodium carbide, benzene. |
| **Chlorine dioxide** | Ammonia, metane, phosgene, hydrogen sulphide |
| **Copper** | Acetylene, hydrogen peroxide |
| **Fluorine** | It must be stored alone. |
| **Hydrazine** | hydrogen peroxide, nitric acid, other oxidants |
| **Hydrocarbons (benzene, butane, propane, gasoline, naphta etc.)** | Fluorine, Chlorine, Bromine, Chromic acid, peroxides |
| **Hydrocyanic acid** | Nitric acid, alkali metals |
| **Hydrofluoric acid (anhydrous), Hydrogen fluoride** | Ammonia (hydrous or anhydrous) |
| **Hydrogen peroxide** | Copper, chromium, Iron, most of the metals or their salts, flammable liquids and matters, aniline, nitrometane |
| **Hydrogen sulphide** | Vaporized nitric acid, oxidant gases |
| **Iodine** | Acetylene, Ammonia (hydrous or anhydrous) |
| **Mercury** | Acetylene, fulminic acid*, ammonia, sodium, oxalic or tartaric acid. |
| **Nitric acid (concentrated)** | Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulphide, flammable liquids and gases, nitrate, etc. |
| **Nitroparafins** | Inorganic bases, amines |
| **Oxalic acid** | Silver, mercury and their salts |
| **Oxides and strong oxidizing agents** | Mg or Al powders, organic substances, flour, sugar, powdered milk |
| **Oxygen** | Oils, grease, hydrogen, flammable liquids, gases. (Grease should be kept away from cylinders of oxygen and their fittings.) |
| **Perchloric acid** | Acetic anhydride, bismuth, alcohol, paper, wood, grease, oils (all organics), ammonia |
| **Peroxides (organic)** | Acids(organic or mineral), (avoid friction and storage in cold) |
| **Phosphorus(white)** | Air, oxygen |

| | |
|---|---|
| **Phosphorus pentaoxide** | Alcohols, strong bases, water |
| **Potassium chlorate** | Acids (see chlorates) |
| **Potassium perchlorate** | Acids (see perchloric acid) |
| **Potassium permanganate** | Glycerol, ethylene glycol, benzaldehyde, sulphuric acid, sulfur, phosphorus, hydrogen peroxide |
| **Silver and salts of silver** | Acetylene, oxalic acid, tartaric acid, fulminic acid*, ammonium compounds (Ammoniacal silver nitrate solutions should not be allowed to stand. The silver should be precipitated with NaCl.) |
| **Sodium** | See alkali metals |
| **Sodium nitrite** | Ammonium nitrate and other ammonium salts |
| **Sodium peroxide** | Any oxidant; like ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulphide, glycerol, ethylene glycol, ethylacetate, methyl acetate, furfural |
| **Sulphuric acid** | Chlorates, perchlorates, permanganates and water. |
| **Zinc dust** | Chlorinated hydrocarbons, oxides or oxidizing agents, sulphur. |

* It is formed by nitric acid and ethanol mixture.

### Proper Storage of Acids & Bases

- Store acids and bases separately
- Store acids in dedicated acid cabinets
- Put oxidizing acids (e.g. nitric acid) away from organic acids (e.g. acetic acid)
- Store hydrofluoric and perchloric acids in secondary containers manufactured from compatible materials

## 4. PRECIPITATION PROCEDURES FOR THE HEAVY METALS IN AQUEOUS WASTE SOLUTIONS

Some of the research groups study with heavy metals in our department. As it is known heavy metals such as Cd, Zn , Cu, Pb, As, Mg and Cr are significantly toxic to human beings and ecological systems. For proper drain disposal of these aqueous solutions, the heavy metals must first be removed from the solutions. Then, neutralization procedure should be applied. Heavy metals can be removed from the solution by different processes such as adsorption by clay or activated carbon, electro-deposition, or chemical precipitation. Among them, precipitation is widely employed since it is a rapid and highly efficient treatment. In literature, more than one coagulants are used for precipitation of heavy metals. Hydrated lime $Ca(OH)_2$, $FeCl_3$, $Na_2S$, calcium polysulfide (CaSx, x $\leftrightharpoons$4) or their combinations are effective for this purpose at a pH above 7. It is important to emphasize that, excess sulphide is toxic and corrosives. Therefore, amount of coagulants have to be controlled for precipitation process, too.

Recommended types, amounts and pH values of coagulants for different heavy metals are listed in Table 5.

***Table 5.*** *Recommended types, amounts* and pH values of coagulants for removal of heavy metals

| Heavy metal | Con. of Heavy Metal, mg/L | Coagulants | Con. of Coagulant, mg/L | pH value | % Removal Efficiency |
|---|---|---|---|---|---|
| ***As*** | 10 | Hydrated lime- $FeCl_3$ | 1000 ($FeCl_3$) | 8-12 | 98 |
| ***As*** | 10 | Hydrated lime- $Na_2S$ | 1000 ($Na_2S$) | 10-12 | 80 |
| **Cd** | 60 | Hydrated lime- $FeCl_3$ | 200 ($FeCl_3$) | 8-11 | 98 |
| **Cd** | 60 | $Na_2S$ | <70 ($Na_2S$) | >6 | 99 |
| ***Zn*** | 60 | Hydrated lime- $FeCl_3$ | 200 ($FeCl_3$) | 8-11 | 98 |
| **Cu** | 60 | Hydrated lime- $FeCl_3$ | 200 ($FeCl_3$) | 8-11 | 98 |
| ***Pb*** | 60 | Hydrated lime- $FeCl_3$ | 200 ($FeCl_3$) | 8-11 | 98 |

You may adjust the concentration of coagulant according to the waste solution. After precipitation process, precipitate must be collected in durable plastic bags that have labels. Then, neutralization procedure will be applied to the filtered solution before its disposal to the drain.

## 5. NEUTRALIZATION PROCEDURES

• Do neutralizations in a fume hood behind a safety shield, as fumes and heat may be generated. Wear lab coat or apron, gloves and goggles.
• Keep containers cool during process.
• Work slowly.
• Once neutralization is complete, flush to sewer with 20 parts water.

### 5.1. Acid Neutralization

**1-** While stirring, add acids to large amounts of ice-water solution of base such as sodium carbonate, calcium hydroxide, or sodium hydroxide for concentrated acids.
**2-** When a pH of at least 5.5 is achieved, dispose the solution into the sewer with at least 20 parts water.

* The unique toxicological properties of HF are due to the action of the fluoride ion. Fluoride ion causes soft tissue necrosis (similar to alkali damage) and bone damage by binding calcium. So, in order to eliminate this risk usage of soda lime (Calcium hydroxide) is more appreciable than others for neutralization of HF.

### 5.2. Base Neutralization

**1-** Add the base to a large vessel containing water. Slowly add a 1.0 M solution of HCl.
**2-** When a pH of 9 or less is achieved, dispose of solution into sewer system followed by 20 parts water.

## 6. REFERENCES


- Safety Manuals from the Universities of Cornell and Pennstate
- National Research Council, *Prudent Practices in the Laboratory, Handling and Disposal of Chemicals*, National Academy Press, 1995.
- www.laboratuvarguvenligi.com
- Aspect of Science Management: A Reference Manual For schools from University of Queenland
- Lab Safety Manual from Newyork University
- http://www.chem.purdue.edu/chemsafety/Equip/hfmsds.pdf

- http://safety.dri.edu/Hazards/HydrofluoricAcidGuidelines.pdf
- T. R. Harper and N. W. Kingham, Removal of Arsenic from Wastewater Using Chemical Precipitation Methods, *Water Environment Research* 64, 3 (1992) 200.
- D. Bhattacharyya, A. B. Jumawan Jr, R. B. Grieves, Separation of Toxic Heavy Metals by Sulfide Precipitation, *Separation Science and Technology* 14, 5 (1979) 441.
- J. E. Etzel et al., Method of Removing Heavy Metals from Industrial Waste Streams, *United States Patent*, 1982.
- Y. Terashima, H. Ozaki and M. Sekine , Removal of dissolved heavy metals by chemical coagulation, magnetic seeding and high gradient magnetic filtration, Water Research 20, 5 (1986) 537.


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*Prepared by Selin BORA*

*v.1.2, 15 August, 2011*

**APPENDIX A**

## CHEMICAL/HAZARDOUS WASTE FOR DISPOSAL

Generator: _____Date: _____

Bldg: _____Room #: _____

Telephone number: _____

Circle the appropriate waste stream for this container.

Acid Aqueous Reagent

Solvent Other: _____

| **CHEMICAL** | **VOLUME/AMOUNT** |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

CHECK ALL THAT APPLY

__Flammable __Corrosive __Poison
__Oxidizer __Reactive __Carcinogen
__Liquid __Solid __Liquid/Solid Mix

I certify that the above information is correct. I understand that there are penalties for false certification of hazardous waste.

_____

Date collected from the lab: _____

Date moved to the accumulation area: _____

## KİMYASAL/ZARARLI ATIK BİLDİRİM FORMU

Formu Dolduran:_____Tarih: _____

Bina: _____Oda #: _____

Telefon no: _____

Uygun atık seçeneğini yuvarlak içine alınız.

Asit Sulu çözelti Reagent

Çözücü Diğer: _____

| **KİMYASAL** | **HACİM/MİKTAR** |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

UYGUN OLANLARI İŞARETLEYİNİZ

__Yanıcı __Çürütücü __Zehir
__Yükseltgen __Tepkisel __Karsinojen
__Sıvı __Katı __Sıvı/Katı Karışımı

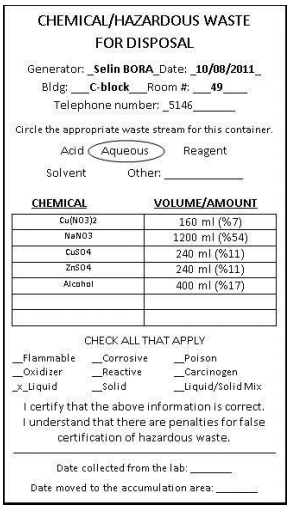
Yukardaki bilgilerin doğruluğunu beyan ederim. Yanlış atık bilgisi beyanının doğuracağı sorumluluğu kabul ederim.

_____

Laboratuvardan alınma tarihi: _____

Toplama alanına getirildiği tarih: _____

**EXAMPLE**



CHEMICAL/HAZARDOUS WASTE FOR DISPOSAL

Generator: _Selin BORA_Date: _10/08/2011_

Bldg: __C-block__Room #: __49___

Telephone number: _5146_____

Circle the appropriate waste stream for this container.

Acid (Aqueous) Reagent

Solvent Other: _____

| CHEMICAL | VOLUME/AMOUNT |
|---|---|
| Cu(NO3)2 | 160 ml (%7) |
| NaNO3 | 1200 ml (%54) |
| CuSO4 | 240 ml (%11) |
| ZnSO4 | 240 ml (%11) |
| Alcohol | 400 ml (%17) |
| | |
| | |

CHECK ALL THAT APPLY

__Flammable __Corrosive __Poison
__Oxidizer __Reactive __Carcinogen
_X_Liquid __Solid __Liquid/Solid Mix

I certify that the above information is correct. I understand that there are penalties for false certification of hazardous waste.

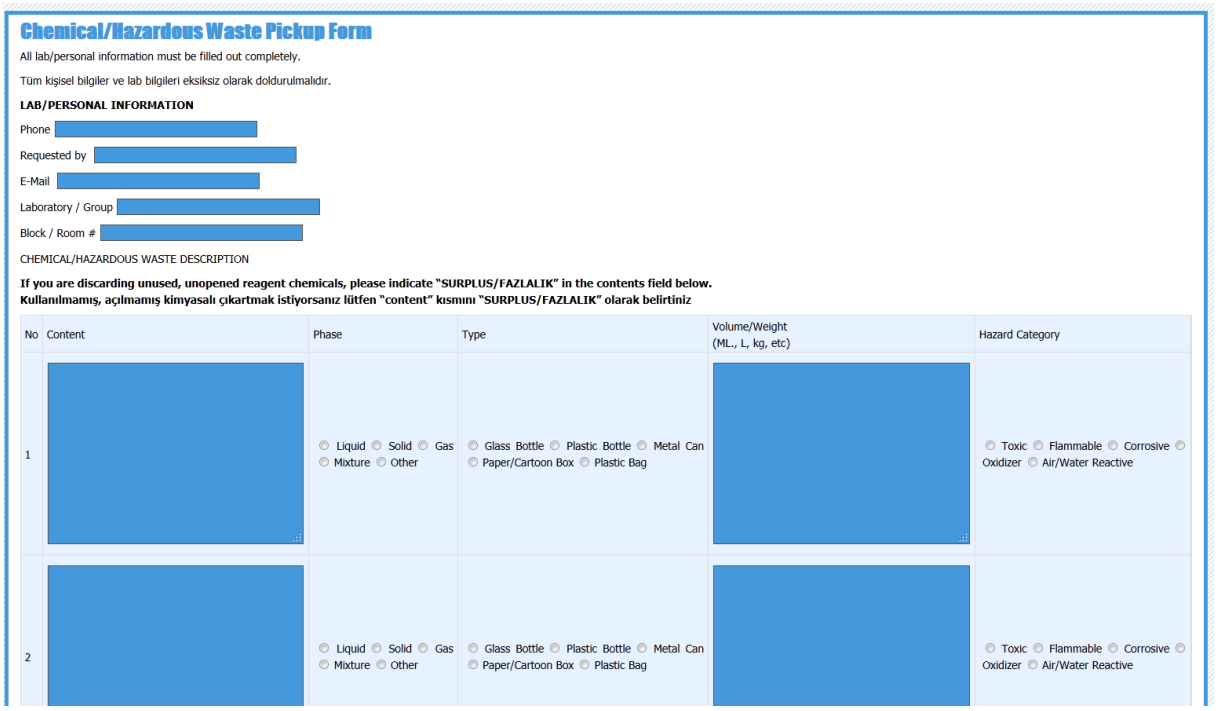
Date collected from the lab: _____

Date moved to the accumulation area: _____

## APPENDIX B

**This is a copy of the request form that you may find and fill at the web site.**

**http://nernst.chem.metu.edu.tr/waste/?page_id=14**



### Chemical/Hazardous Waste Pickup Form

All lab/personal information must be filled out completely.

Tüm kişisel bilgiler ve lab bilgileri eksiksiz olarak doldurulmalıdır.

**LAB/PERSONAL INFORMATION**

Phone

Requested by

E-Mail

Laboratory / Group

Block / Room #

CHEMICAL/HAZARDOUS WASTE DESCRIPTION

**If you are discarding unused, unopened reagent chemicals, please indicate "SURPLUS/FAZLALIK" in the contents field below.**
**Kullanılmamış, açılmamış kimyasalı çıkartmak istiyorsanız lütfen "content" kısmını "SURPLUS/FAZLALIK" olarak belirtiniz**

| No | Content | Phase | Type | Volume/Weight (ML., L, kg, etc) | Hazard Category |
|---|---|---|---|---|---|
| 1 | | Liquid Solid Gas Mixture Other | Glass Bottle Plastic Bottle Metal Can Paper/Cartoon Box Plastic Bag | | Toxic Flammable Corrosive Oxidizer Air/Water Reactive |
| 2 | | Liquid Solid Gas Mixture Other | Glass Bottle Plastic Bottle Metal Can Paper/Cartoon Box Plastic Bag | | Toxic Flammable Corrosive Oxidizer Air/Water Reactive |