Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

ANNAI COLLEGE OF ARTS AND SCIENCE

BHARATHIDASAN UNIVERSITY

Supporting Document

Criterion 7.1.3

1. MOU for E-Waste Management.
2. Chemical wastage Disposal Manual.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

E-waste Management MOU


भारतीय गैर न्यायिक

बीस रुपये Rs.20

रु.20 TWENTY RUPEES

INDIA

INDIA NON JUDICIAL

TAMIL NADU 30.12.2021 03AC 163195

Annai College of Arts and Science - Kovilacheri

No. 94436 65640

MEMORANDUM OF UNDERSTANDING

(E-Waste Management System)

This agreement is entered into between **ANNAI COLLEGE OF ARTS AND SCIENCE, KOVILACHERI** and **VB SYSTEMS, THANJAVUR** registered with the management dismantling/disposal of all our e-waste in order to protect **ACAS CAMPUS** and to conserve our natural and human resources.

As part of the agreement **VB SYSTEMS, THANJAVUR** will collect all our E-Waste generated from **ACAS CAMPUS** and dispose the same at their Campus.

This agreement is for 3 years period after the expiry of three years the agreement shall either be renewed or enter into a new agreement with **VB SYSTEM, THANJAVUR** or any other third party service provider.

1.

2.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

Defined the term in this agreement

In this contract the term "e-waste" is defined as 'electronics and electrical equipment, whole or inpart discarded as waste that have become unwanted, not working or obsolete and have essentially reached the useful life.

1) **Agreement:-** This agreement, its appendices, as well as any documentation expressly incorporated by references therein and amendments to the same.
2) **Effective date: 30-12-2021**
3) **End Date : 30-12-2024**
4) **E-Scrap / E-Waste:**
5) - E-Waste is all type of electronic, electrical waste which includes
   a. IT & Telecommunications, Mobile, Pager, Etc.,
   b. Photocopier, Printer, fax, landline phones, smart & features Phones etc.,
   c. UPS, Inverter, battery, stabilizer etc.,
   d. TV, LCD, LED, AC, Refrigerator etc.,
   e. Toner / Cartridge / Dry Cell etc.

The Proprietor

VB SYSTEMS
Thanjavur
VB SYSTEMS
THANJAVUR-613 (0)

The Principal

Annai College of Arts and Science
Anakudi Road, Kovilacheri,
Kumbakonam - 612503

Principal
Annai College of Arts & Science
Kovilacheri, Kumbakonam-612 503

IN WITNESS whereof, this agreement has been signed by the duly authorized representatives of each party hereto

Approved for and on behalf of

1

Approved for and on behalf of

2.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

CHEMICAL WASTE DISPOSAL MANUAL

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

TABLE OF CONTENTS

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

1.0 INTRODUCTION

Annai College of arts and Science is one of Tamilnadu's leading colleges, and as such houses a number of research and teaching laboratories that generate chemical waste. Improper disposal of chemical waste can le0ad to serious risks to people and the environment. Annai College of arts and Science committed to the proper and safe management of these wastes in order to protect employees, students and the public and to comply with all applicable legislation.

This manual and the procedures herein apply to chemistry laboratory operations within the college generate hazardous chemical wastes. The objective of the manual is to provide information and instructions to handle safely, and in an environmentally responsible manner all the hazardous wastes produced in College laboratory. Please note that this manual does not describe the processes for disposing of biohazardous or radioactive waste materials.

The basic elements of the Hazardous Waste Management program are:

- Waste minimization
- Packaging requirements
- Labeling requirements
- Storage requirements

Waste generators are responsible for proper identification, segregation, packaging and labeling of all hazardous wastes which originate from their operations. The procedures in this manual are mandatory when preparing waste for disposal.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Waste not prepared according to these procedures will not be accepted for disposal by the College.

2.0 GENERAL REQUIREMENTS

2.1 Legislation

The proper handling, transport and disposal of hazardous wastes are governed by a variety of provincial and federal legislation and local by-laws.

2.2 Responsibilities

As per the internal responsibility system, chemical waste management is everyone's responsibility. The following outlines the primary responsibilities that various parties on Annai College of arts and Science campus bear.

2.3 Deans, Directors, Department Chairs, and Administrators

The above mentioned are responsible for ensuring that all members of the Department are informed regarding the procedures described herein and for ensuring that they are adhered to. They are also responsible for ensuring that all chemical materials have clear ownership and that non-routine chemicals do not accumulate.

2.4 Supervisors, Researchers, and Principal Investigators

Supervisors, researchers, and principal investigators (henceforth referred to as "supervisors") are responsible for complying with the procedures described in this manual.

Supervisors are responsible for:

- Prearranging waste handling and disposal methods for laboratory experiments.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

- Segregating incompatible waste streams, and ensuring that they are stored correctly.
- Ensuring that routine waste is transported in a secondary means of containment.
- Reducing the volume of chemical waste produced by routine operations.
- Ensuring that non-routine chemical wastes do not accumulate.

Supervisors are responsible for ensuring that all personnel being supervised (both staff and students) are aware of and adhere to the proper handling, safety procedures, and disposal methods.

2.5 Employee

Employees are responsible for adhering to the procedures described within this manual. Employees are responsible for ensuring that their supervisor has provided and/or directed them with the correct training in accordance with the work that they will be carrying out. They are responsible for segregating incompatible waste streams as described.

2.6 Student

Students are responsible for adhering to the procedures described within this manual. Students are responsible for ensuring that their supervisor has provided and/or directed them with the correct training in accordance with the work that they will be carrying out.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

3.0 Waste Minimization

Disposing of hazardous wastes is very costly. It is therefore very important the waste generators take all reasonable steps to minimize the generation of hazardous wastes.

The following steps should be actively considered at all times.

3.1 Purchasing

- Purchase hazardous materials in the smallest quantities needed. Stockpiling hazardous materials creates additional problems with respect to security and usually results in excessive disposal costs for unused material.
- Donations in bulk of hazardous materials should be avoided. This can result in the receipt of unwanted hazardous materials with the resultant liability for costly disposal. Accept only those donations which will be used within one year.
- Before purchasing chemicals, prepare a written procedure detailing the method of disposal of the chemical and any reaction products.

3.2 Process Modification

- Examine experimental protocols to, if possible, eliminate materials that would result in the generation of hazardous wastes, or would generate the least hazardous product.
- Review experimental protocols to determine whether quantities of hazardous materials can be reduced by, for example, use of microscale methods.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

3.3 Product Substitution

• Evaluate experimental protocols to determine if a less hazardous material may be used.e.g.

- Toluene substituted for benzene.
- A thermocouple thermometer instead of a mercury thermometer.
- Alcohol thermometers instead of mercury thermometers.

3.4 Good Laboratory Practices

- Plan for hazardous waste disposal as part of all experimental protocols.
- Record the date on all containers when they are received so that older ones can be used first.
- Avoid storing excessive quantities of hazardous materials.
- Ensure that all containers are properly labeled with the proper scientific name of the material. They must be labeled according the requirements in this manual.
- Do not mix hazardous with non-hazardous products. Such mixed materials must be disposed of as hazardous waste thereby increasing costs
- Do not mix solid and liquid waste; the disposal methods for the two are different and mixing them may increase costs.
- On termination of a research project ensure all hazardous materials and containers are labeled and those no longer required are disposed of.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

4.0 Waste Segregation

Clearly defining hazardous and non-hazardous waste streams in a laboratory and the proper storage of hazardous materials are techniques that aid in maintaining the safety of the college community.

Accidental mixing of chemicals can result in fire, explosion, and/or the release of other chemical and physical hazards. Documents that list incompatible chemicals, such as Safety Data Sheets, can aid in determining which waste stream a material can be categorized in, and how it should be stored.

4.1 Waste Streams

Solvent wastes and solid wastes are to be segregated from one another. Waste solvent are to be segregated into the following waste streams:

- Aqueous; pH < 6
- Aqueous; pH = 6-9
- Aqueous; pH > 9
- Non-halogenated (i.e. acetone, ethyl acetate, hexanes, etc.)
- Halogenated (i.e. chloroform, dichloromethane, etc.)
- Waste oil (i.e. vacuum pump oil, motor oil, etc.)

The hazardous waste streams listed above are the ones most common at the college, however there are others that may be generated at the college as well. Always use professional judgement when segregating waste streams.

Waste solvents may not contain undissolved solids or solid non-hazardous materials (i.e. disposable pipettes, gloves, glassware, etc.). Immiscible solvents may

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

not be combined in a single container.

It is important to segregate halogenated solvents from those that are non-halogenated. The disposal of one drum halogenated waste solvents costs approximately twice as much as disposing of one drum of non-halogenated waste solvents.

Disposing of hazardous materials via the sewer is not an appropriate disposal method. Examples of dilute solutions for which drain disposal may be appropriate include saline, fructose, and yeast extract.

Solid waste should also be segregated according to their chemical properties.

Sample vials containing small volumes of solid chemical waste must be segregated according to their properties (i.e. keep organic and inorganic materials separate).Samples vials should not be mixed with other materials, such as chemically contaminated lab ware.

Refer to Appendix A: Specific Use and Disposal Considerations for more information in regards to hazardous solvent and solid waste streams.

5.0 Packaging

Waste materials must be packaged in a manner that will allow them to be stored or transported without the danger of spillage, explosion of hazardous vapours escaping. The detailed requirements for the different categories of waste materials are given in the appropriate sections of this manual. The waste generator bears the primary responsibility for proper packaging.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Any hazardous waste that is improperly packaged will not be accepted for disposal.

6.0 Labeling

Waste materials must be labeled in a manner that will allow the hazards to be clearly and accurately identified.

Appropriate waste labels must be attached to each waste container. An accurate inventory must be maintained of the material being added to each waste container using the appropriate label.

7.0 Storage

It is important to store chemicals based on their chemical properties to avoid unintended reactions. Materials should never be stored based on alphabetical order. Materials should be stored in cabinets designed for the chemical hazards that they present. For example, flammable materials should be stored in flammable cabinet, acids in an acid cabinet, and so on.

- Containers must be in good condition and should remain closed unless waste is being added.
- Hazardous waste must be stored in a safe location outside of the normal work area of the laboratory;
- Hazardous waste should be removed from the laboratory on a regular basis and not allowed to accumulate.
- Liquid hazardous waste containers stored in laboratories should be periodically inspected for leaks.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

8.0 Disposal

Hazardous materials must never be disposed of in the regular garbage. Such practice is dangerous and illegal. Hazardous materials must not be flushed down drains as a method of disposal. This practice is illegal according to provincial legislation and the by-laws of the Regional Municipality of Tamilnadu. It may also lead to dangerous reactions, damage to the drainage system, and dissemination of odours to other areas of the building and create a potential hazard to personnel working on the system.

9.0 Releases to Sanitary Sewer

The following are specifically prohibited from discharge to the sanitary sewer system:

- pH less than 6.0 or greater than 10.5
- Two or more separate liquid layers
- A temperature greater than 60 degrees Celsius
- Total mercury greater than 0.01 mg/L
- Acute hazardous waste chemicals
- Combustible liquids
- Reactive wastes.

10.0 Chemistry Department Collection

The Chemistry Department follows an altered procedure to dispose of their routine chemical waste. Chemical wastes are collected for disposal by a licensed chemical waste contractor as required. At that time the waste will be inspected and,

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

if appropriately packaged and labeled, accepted for disposal. Any waste not appropriately packaged and labeled will not be accepted for disposal and the generator will be required to return it to their laboratory. Chemical wastes must be kept in the generating laboratory or other designated storage area in a safe location between scheduled pickups. If material is generated which requires special handling or immediate disposal contact the local Waste Coordinator.

10.1 Definition

Generally, waste is defined as any surplus, unneeded or unwanted material. It is usually the laboratory worker or supervisor who decides whether to declare a given laboratory material a waste.

Once the material has been declared a waste, then the waste labeling and storage requirements outlined in this manual apply.

Chemical waste includes solids, liquids or gases containing or contaminated with any of the following:

- Flammable or combustible liquids (organic solvents)
- Corrosives (strong acids and bases)
- Reactives (oxidizers, cyanides, sulphides, explosives, unstable materials, water reactive materials)
- Toxic materials (mutagens, carcinogens, acutely toxic materials)
- Polychlorinated biphenyls (>50 ppm concentration)
- Non returnable gas cylinders

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

10.2 Non-routine Materials

Materials that are not generated as a result of routine operations must be disposed of in accordance with the following procedure. Materials that fall into the category of nonroutine chemical waste include:

- Partially used chemicals (i.e. a container that was opened, and only some of the contents were used in an experiment);
- Surplus materials (i.e. too much of a material was ordered)
- Unknown materials, and
- Expired materials.

10.3 Packaging

- Wastes must be stored in containers which are compatible with the material stored. For example corrosive materials should be stored in glass or plastic containers, not metal ones. Hydrofluoric acid must not be stored in glass containers.
- Do not completely fill containers of liquid waste. Leave between 20-25 % of air space to allow for vapour expansion and to reduce the potential for spills when moving containers.
- Compatible wastes can be accumulated within a common container; however care must be taken to ensure that the chemicals are compatible.
- Never mix incompatible chemicals together in a single container. This has the potential to cause heat generation, gas evolution or other reaction and a subsequent explosion.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

- Flammable and combustible solvents shall be segregated and packaged separately into two categories:
  - Halogenated solvents
  - Non-halogenated solvents

The two should not be mixed as there is a premium cost for disposal of halogenated solvents.

- Solvent safety cans should be used to collect and temporarily store large volumes (>10-20 L) of flammable organic waste solvents. The generating laboratory is responsible for providing these containers and they will be returned to the laboratory when the material is bulked at the time of waste collection.

10.4 Labeling

Attach a Chemical Waste Label directly to each waste container. All information requested on the label must be provided. Chemical generic names of the chemicals must be listed. No abbreviations, acronyms or trade mark names are to be used. Vague categories such as "solvent waste" are not acceptable.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Annai College of Arts and Science
CHEMICAL WASTE
Name of Generator
ID
Building and Room Number
Major Chemical Constituents (Approximate %)
Click the appropriate chemicals
Halogenated Solvents
Non-Halogenated Solvents
Unstable/Explosive
Air/Water Reactive
Acid
Alkali
Aqueous Inorganic
Organic Peroxide(Specify)

10.5 Storage

In addition to the general storage requirements, these specific requirements for chemicals must be followed:

- Chemical waste is to be stored in a safe, out-of-the-way location in the generator's laboratory or other designated area between scheduled collection days.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

- Flammable solvents should be stored in a flammable storage cabinet. If circumstances require that they be stored in fumehood, they should be limited to small amounts and be kept in a location such that they do not interfere with work in the fumehood or obstruct the airflow and decrease the fumehood efficiency.
- Waste should be segregated according to compatibility groups such as acids, bases, flammables, oxidizers and water reactives.
- Dispose of aging containers promptly. Some chemicals are time sensitive and may degrade into very hazardous by-products. e.g. ethers may degrade to form explosive organic peroxides. Where safety considerations would indicate not waiting until the scheduled collection day, contact the local Waste Coordinator.

11.0 Chemical Compatibility

When preparing chemical waste for disposal it is the generator's responsibility to ensure that incompatible chemicals are not mixed in the same container. The first step in determining chemical incompatibilities is to review the Material Safety Data Sheet where incompatibilities will be listed in the section on reactivity

Some general examples are:

- Acid-reactive compounds (e.g. cyanides, sulphides) which liberate gaseous products when acidified should not be mixed with any inorganic acid (e.g. sulphuric or hydrochloric acid).

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

• Organic acids (e.g. glacial acetic acid) should be segregated from inorganic acids. Generally inorganic acids are oxidizing agents while some organic acids may be either reducing agents or combustible.

• Water reactive materials (e.g. sodium, potassium) should be kept well away from any water sources.

• Oxidizers (i.e. any inorganic compound that assists fire such as hydrogen peroxide, lead nitrate) should never be mixed with organic materials (e.g. organic base ssuch as pyridine, aniline, amines, flammable solvents such as toluene, acetone) or reducing agents (e.g. water-reactive chemicals such as sodium).

• Perchloric acid, although an inorganic acid, is a powerful oxidizing agent and should be considered a powerful oxidizer in its concentrated form.

Appendix 1 of this manual provides a table giving general classes of incompatible chemicals. For specific chemicals, consult the material safety data sheet.

12.0 Special Cases

The preceding procedure deals with most common teaching and research chemical wastes. On occasion some wastes may be generated which require special handling.

Some of these are:

12.1 Asbestos

Asbestos containing materials such as gloves, heating pads etc. should be placed in a plastic bag, sealed, and marked "asbestos containing waste".

Contact the local Waste Coordinator to arrange disposal.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

12.2 Explosives

Do not handle explosive materials. Examples of explosive materials include trinitrated compounds, dry picric acid (<29% by weight water content), fulminated mercury, heavy metal azides. These materials require special handling for disposal. These materials must be checked frequently for signs of deterioration and aging. Such signs include "sweating" of a container, bulging, crystal formation around the cap. Deteriorating explosive materials are potentially more dangerous to handle than new explosives.

Contact the local Waste Coordinator to arrange disposal.

12.3 Gas Cylinders

Gas cylinders should be treated as high energy sources. Use the smallest size necessary to do the work. Prior to purchasing, check if empty cylinders can be returned to the supplier. Disposing of gas cylinders is extremely expensive and difficult.

12.4 Mercury

All free liquid mercury should be collected in a leak-proof container. Mercury contaminated solids such as glassware, gloves and cleanup materials should be packaged separately.

12.5 Peroxidizable Compounds

Peroxidizable compounds should be ordered in small quantities (less than 6 months' supply) and dated when the container has been opened. Even if a commercial inhibitor has been added by the manufacturer, organic peroxide

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

formation can begin within 6 months following exposure to air. Organic peroxides are explosive. The ordering of smaller quantities and the reduction of the volume of these materials in storage encourages the quick turnover of inventory and reduces the likelihood of peroxide formation.
The following materials have the potential to form organic peroxides:

- Ethers such as Isopropyl ether, dimethyl ether, diethyl ether
- Acetal
- Decahydronapthalene
- Dicyclopentadiene
- Diethylene glycol
- Dioxane

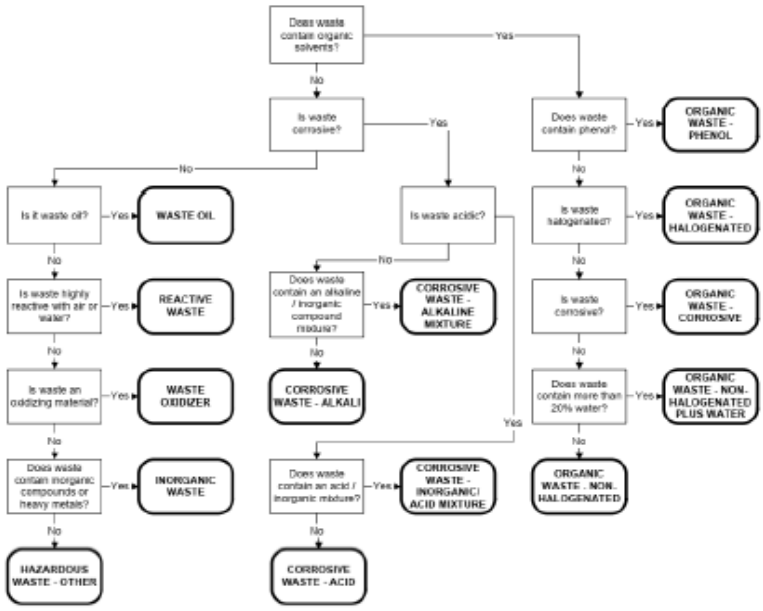
13.0 Collection Schedules

Collection and disposal will be arranged by the Waste Coordinators as required. There will normally be at least two scheduled collections per year, at the end of the fall term in December and the end of the spring term in May. Special pickups may be arranged by contacting the local Waste Coordinator.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Annai College of arts and Science Waste Storing Process



Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

14.0 Specific Use and Disposal Considerations

14.1 Aqua regia

Aqua regia is an oxidizer, and will oxidize over time; this will form toxic gases, such as nitrogen dioxide and chlorine. The use of aqua regia at the college is strongly discouraged, and as such solutions will not be accepted through the Chemical Waste Collection.

14.2 Chemical containers

Chemical containers which have been emptied by all practicable means (i.e. pouring, pumping, scraping, etc.), are considered trash. Labels on containers should be defaced, or removed before disposal. It is preferable that glass containers placed in a lined, sturdy box labeled as "Broken Glass". To reduce any uncertainty, laboratory staff should place the box in the dumpster since custodians do not handle chemicals, including non-hazardous laboratory chemicals.

14.3 Chromic acid

Chromic acid is a powerful oxidizing agent. It is both toxic and corrosive, and it can also explode on contact with organic materials. Moreover, chromium (VI) is also classified as a carcinogen. Burns to both the skin and clothing may arise from accidents involving chromic acid cleaning solutions. Do not attempt to neutralize chromic acid: dispose of chromic acid waste through the Chemical Waste Collection.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

14.4 Ethidium bromide

Ethidium bromide is a mutagenic chemical that can present a risk due to its ability to modify an organism's genetic material. Deactivation of ethidium bromide waste materials must be incorporated as a last step in the research protocol.

14.5 Gas Cylinders

Compressed gases are among the most problematic wastes to handle and dispose. Rent gas cylinders if at all possible so cylinders can be returned to the gas vendors if emptyor not routinely used.

Lecture bottles can be a serious disposal problem. If at all possible, return these to the manufacturer or supplier for reuse. Ensure that the label on each cylinder is legible. Keep the valve protection cap on the cylinder when not in use. When the cylinder is in use, keep this valve cap near the cylinder so that it does not get misplaced. Never dispose of hazardous gases by releasing outdoors or in a fume hood.

14.6 Hydrofluoric acid

Hydrofluoric acid is a strong corrosive and highly toxic chemical that causes severe burns from dilute solutions, and exposure to concentrated solutions can be fatal. Hydrofluoric acid must only be used in a fume hood. Personnel using hydrofluoric acid must purchase a tube of calcium gluconate gel, which is used as an initial response to skin exposure of hydrofluoric acid.

The quantities of hydrofluoric acid that are used and stored should be kept to an absolute minimum. Hydrofluoric acid and its waste must be stored in plastic containers due to its ability to etch glass.

Calcium hydroxide be added to any mixtures or dilute solutions of hydrofluoric acid waste to help bind the fluoride ions.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

14.7 Labware

Generally, chemically contaminated labware can only be placed into the regular trash if they are non-hazardous, non-ignitable, non-reactive, non-carcinogenic, non-mutagenic, non-infectious, non-radioactive, and the contaminant is not highly toxic. Examples include disposable items such as gloves, bench top coverings, pipettes, and test tubes. If the normal trash is not an appropriate disposal route for your chemically contaminated labware, then package them in a thick clear plastic bag or leak-proof container and label with a hazardous waste tag as "Chemically Contaminated Labware" with the name and approximate percentage of chemical contaminants. These can then be disposed of through the routine Chemical Waste Collection.

14.8 Lithium metal

Lithium metal reacts violently with water, strong oxidants, acids, and other compounds. It may also spontaneously ignite upon contact with air (as there is moisture in air). Any activity involving lithium metal must take place in a glove box. To safely dispose of lithium metal via the Chemical Waste Collection, it must be placed in a sealable container with mineral oil. The mineral oil must cover all of the lithium metal, plus take up a minimum of an inch of additional headspace.

14.9 Mercury

Metallic mercury is collected and sent out for retort and recycling. Packaged mercury in a tightly sealed and leak free container (for instance a vial or bottle with a screw top lid). Broken mercury thermometers should be also placed in a leak proof container or a secured thick plastic bag. Avoid mixing metallic mercury with other chemicals or waste if possible.

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

CHEMICAL WASTE DISPOSAL MANUAL

Although the practice of adding sulfur in attempt to contain mercury vapors was at one time acceptable, it often results in more hazardous waste being generated. Often times, it may also render the metallic mercury as non-recyclable. Commercially available absorbents such as "Hg Absorb" powder are acceptable.

Mercury is a highly toxic chemical. Any mercury spills, including broken thermometers, have to be cleaned up immediately. The spill debris can then be disposed of through the Chemical Waste Collection. Never use a regular vacuum cleaner to clean up a mercury spill, this will only cause the mercury to vaporize and disperse into the air.

14.10 Mixed wastes

In some instances, waste generated from research activities may contain a combination of biological, chemical, and radioactive materials. Waste of this nature present a conundrum for disposal. As such, these types of waste must be treated on a case-by-case basis, and may involve inactivation and disposal.

14.11 Nitric Acid

Many reported waste container ruptures and explosions in laboratories involve the accidental mixing of nitric acid with reducing agents (i.e. organic compounds). Avoid creating nitric acid waste mixtures with acetone, acetic acid, acetic anhydride, alkali metals, cyanides, aldehydes, powdered metals organic materials, ammonia, acetonitrile, alcohols, acrylonitrile and other organic matter. Nitric acid is a powerful oxidant and reacts violently, sometimes explosively with liberation of toxic nitrogen oxides. Oxidation is invariably accompanied by more or less gas evolution, usually capable of rupturing closed vessels.

14.12 Perchloricacid

Perchloric acid is a corrosive acid, as well as a strong oxidizer. Perchloric acid can react with metal to form shock sensitive metal perchlorates, and can occur when it is used in a regular (non-perchloric acid) fume hood. Due to the reactive nature, do not attempt to

Annai College of Arts & Science
Quality Education for Today & Tomorrow
Kovilacheri, Kumbakonam. 612 503. Ph: 0435 2453007
Accredited by NAAC with "B" Grade & Recognized by UGC under Section 2(f) & 12(B)
Affiliated to Bharathidasan University, Tiruchirappalli. E-Mail:acasdmn@gmail.com

neutralize perchloric acid. Dispose of perchloric acid waste through the Chemical Waste Collection.

14.13 Piranha solution

When making the solution, the reaction is extremely exothermic. The use of piranha etch solution at the college is strongly discouraged, and as such solutions will not be accepted through the Chemical Waste Collection.

14.14 Silica gel

Used silica gel that is contaminated with solvents or other hazardous chemicals must be disposed as hazardous waste. Please ensure that the silica is dry of any solvent prior to disposal. Used silica gel that appears free flowing and dry still may have chemical contamination significant enough to classify it as hazardous waste according to regulations. Only unused silica gel, molecular sieves or desiccants that have not been in contact with hazardous chemicals may be disposed of in the regular trash within a sealed container.

15.0 Unknown material

Chemicals that cannot be identified are considered unknown hazardous waste. Do not bring wastes that are not properly identified to the pickup site. It is the generator's responsibility to identify and properly label all chemical wastes.

PG & RESEARCH DEPT. OF CHEMISTRY
Date: 23/11/2020
GAC, CHIDAMBARAM.

M. SEKAR, M.Sc.,M.Phil.,B.Ed.,PhD
ASSOCIATE PROFESSOR
PG & Research Department of Chemistry
GOVERNMENT ARTS COLLEGE
CHIDAMBARAM - 608 102

IQAC CHAIR PERSON

Principal
Annai College of Arts & Science
Kovilacheri, Kumbakonam-612 503