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OVERVIEW

The National Institutes of Health (NIH) is made up of 27 Institutes and Centers, each with a specific research agenda, focusing on diseases or body system. The NIH has over 3000 labs on the Bethesda campus, including local off-campus and regional facilities, where biomedical research is conducted including animal facilities, clinical and patient care areas and industrial activities. These activities produce an array of waste both hazardous and nonhazardous which must be managed appropriately. This document provides guidance based on policy, permits, and regulations, for materials which must be collected for proper disposal and a select group of chemicals which can be discharged under specific conditions. The NIH objective is to dispose of chemicals via the waste management service and limit discharges to the sanitary sewer. Current NIH waste management practices include collection of chemicals through waste disposal services. Only chemicals pre-approved for drain disposal may be disposed of down the drain (see page 3). All other chemical waste should be managed and disposed of as chemical waste according to the instructions on page 3 of this guide. The NIH will review policies, regulations and procedures, and update this guide on a periodic basis.

WASTE POLICY

The NIH waste policy requires that all wastes be reduced to the greatest extent feasible to limit any negative environmental impact. Proper management of all wastes, including their characterization, collection, labeling, packaging, storage, recycling, transportation, treatment and final disposal, is also required. Disposal of chemical wastes, including pharmaceutical wastes, via the sanitary sewer is regulated by federal, state and local laws and regulations. Violation of these regulations may result in citations for non-compliance from local, state or federal authorities. Per EPA regulations, wastes are considered hazardous if they exhibit any of the following characteristics: ignitability, corrosivity, reactivity, and toxicity; or if they are specifically named on one of four lists of hazardous wastes in the Code of Federal Regulations (40 CFR). Additional state and local laws and regulations also apply respectively to waste generated in NIH facilities. These regulations and restrictions must be adhered to by all NIH personnel, contractors and/or anyone involved with the generation of wastes or waste management and support services at all NIH facilities, including but not limited to the Bethesda main campus, local off-campus facilities (Baltimore, Frederick, Poolesville and Rockville) and regional facilities (Montana and North Carolina).
CHEMICALS APPROVED FOR DRAIN DISPOSAL

It is the responsibility of each NIH laboratory worker to ensure that chemical waste generated from their activities is disposed of properly. Chemicals put down the drain may interfere with the process of removing contaminants from Publicly Owned Treatment Works (POTW). After treated waste water leaves the POTW, it flows to major recreational and drinking water resources in our areas. The stewardship of these important natural resources is our collective responsibility.

Laboratory workers should consult this guide before undertaking drain disposal of any lab chemicals. Only chemical approved for drain disposal by the NIH Division of Environmental Protection (NIH/DEP) may be disposed of down the drain. Surplus solid chemicals must be disposed of through the NIH chemical waste services and not discharged down the sanitary sewer. Below is the approved chemicals list. Click A – Z to expand the list for approved chemicals or see the Expanded List at the end of this Guide (see Appendix B). Chemicals that are not listed below must be managed as chemical waste and collected by your IC's chemical waste service for disposal (see Appendix A). Dilution to achieve compliance is prohibited per EPA CFR Dilution Prohibition.

When disposing of approved chemical via the drain use the following procedure:

1. Ensure the sink to be used for drain disposal of chemicals is clear of all items.
2. The worker shall wear appropriate PPE (lab coat, nitrile gloves, and protective eye wear).
3. Turn on cold water and let run for about one (1) minute to ensure there is adequate flow of water down drain, no back up into the sink. Do not use the sink for disposal of chemicals if water does not freely flow down the drain.
4. Slowly pour material down the sink drain minimizing splashing.
5. Rinse out the material container if to dispose of, recycle, or reuse.
6. Clean sink to ensure sink basin is free of material.
7. Let tap water run for about two (2) minutes after pour to allow the material to flush through p-traps.
8. Shut off water taps to sink.
CHEMICAL DETERMINATION FOR HAZARDOUS WASTE

If the chemical in question is not already on the “Chemicals Approved for Drain Disposal” list (see Appendix B), the NIH will need to determine if it is acceptable for disposal. Generally, if the chemical waste is Ignitable, an Oxidizer, Corrosive, Reactive or Toxic, it is a hazardous waste that needs to be collected for disposal. Additionally, chemicals on EPA waste lists F, K, P, and U are identified as hazardous waste and subject to disposal regulations. EPA periodically updates the CFR Title 40 – Protection of Environment, Volume 27, Part 261 – Identification and Listing of Hazardous Waste.

Chemical wastes that are already listed on the “Chemicals Approved for Drain Disposal” list (see Appendix B) are approved for disposal down the drain when not mixed with unapproved materials. If a chemical waste that is generated in your lab, does not appear on the list, you can request standing approval for drain disposal at DEP’s Application for Disposal of Specific Chemical Reagents to the Sanitary Sewer. System wastes, disinfection wastes, or chemicals associated with disapproved mixtures will be approved on a case-by-case basis. If approved, the chemical will be added by DEP to the list of Chemicals Approved for Drain Disposal. If disapproved, collect as chemical waste and request pickup through waste disposal authority (see Appendix A).

---

**Chemical Waste Disposal**

- **The waste is listed as Approved for Drain Disposal**
  - Yes ➔ Waste can be poured down the drain

- **Disapproved**
  - Request pick up through your IC’s designated waste authority

---

The waste is listed as Approved for Drain Disposal
deleted later
WASTE CONTAINING ANTIBIOTICS

NIH is committed to avoiding the release of antibiotics that can reach the ecosystem. Autoclaving is the best practice and reliable means to inactivate antibiotics. Antibiotic waste must be treated differently depending on its stability. Request discharge to drain, with inactivation by other methods, requires an approval at DEP’s Application for Disposal of Specific Chemical Reagents to the Sanitary Sewer.

<table>
<thead>
<tr>
<th>Inactivate by heat (autoclave or boil) before pouring down the drain</th>
<th>Must be submitted for combustion (treated as hazardous waste)</th>
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<tbody>
<tr>
<td>Ampicillin</td>
<td>Blasticidin-S</td>
</tr>
<tr>
<td>Amphotericin B (Fungizone)</td>
<td>Choramphenicol</td>
</tr>
<tr>
<td>Carbenicillin</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Enrofloxacin</td>
</tr>
<tr>
<td>Geneticin (G418)</td>
<td>Kanamycin</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Nalidixic acid</td>
</tr>
<tr>
<td>Neomycin</td>
<td>Vancomycin</td>
</tr>
<tr>
<td>Penicillin</td>
<td>Zeocin</td>
</tr>
<tr>
<td>Puromycin</td>
<td>Zeomycin</td>
</tr>
<tr>
<td>Streptomycin</td>
<td></td>
</tr>
<tr>
<td>Sulfadoxine</td>
<td></td>
</tr>
<tr>
<td>Tetracycline</td>
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</table>

Antibiotics not listed above should be collected as chemical waste. See waste services disposal guide for additional information.

LIQUID BIOHAZARDOUS WASTE DISPOSAL

Proper biohazardous waste treatment is important to ensure sterilization or deactivation prior to disposal. Biohazardous wastes consist of microbial cultures, viruses or recombinant DNA. Biosafety Risk Groups are designated 1 (agents with little risk to an individual or community) to 4 (agents with the highest risk to an individual or community). In this guide, only Risk Groups 1 and 2, with approval, will be considered for drain disposal. Risk Group 1 agents represent little to no risk to an individual or community. Risk Group 2 represents moderate risk to an individual but no risk to a community. Risk Groups 3 and 4 should be collected as Medical Pathological Waste (MPW). Risk Group 3 agents are serious or lethal human disease for which preventive or therapeutic interventions may be available. Risk Group 4 agents cause serious or lethal human disease without preventive or therapeutic interventions available. For more information, see DHHS’s Biosafety Risk Groups. Biohazardous waste containing chemicals or radioactive waste should be collected for disposal through the appropriate waste management service.
Below are the steps necessary for drain disposal of Risk Group 1 and 2 biohazardous wastes:

1. Wear appropriate PPE such as gloves, lab coat and eye protection when working with biohazardous waste
2. A bleach mixture (final concentration of 1:10 or 10%) for a contact time of a minimum of 20 minutes should be used to decontaminate biohazardous liquids. Once the liquid has been decontaminated, it can be poured down the drain. If using another disinfectant such as alcohol-based or Wescodyne® for decontamination, direct to the waste disposal guide for the appropriate disposal method.

NANOMATERIAL-CONTAINING WASTE

Chemical wastes containing nanoparticles shall not be disposed of as regular waste or poured down the drain (refer to the NIH Nanotechnology Safety and Health Program, 9.0 Waste, pages 7-8). Contact the waste management service for additional assistance with disposal recommendations for all nanomaterial related waste.

PHARMACEUTICAL WASTE

Hazardous pharmaceutical wastes governed by regulations under the Resource Conservation and Recovery Act (RCRA). Pharmaceuticals entering the environment via drain disposal have the potential to negatively impact aquatic ecosystems, including fish and animal populations, and can lead to water contamination and other public safety concerns. Any pharmaceutical waste must be handled as chemical waste.

Pharmaceutical wastes are drugs, vaccines, and anti-neoplastic drugs; including contaminated pharmaceutical products and equipment. The acquisition, use and disposal of controlled substances at NIH is subject to strict Federal Drug Enforcement Administration (DEA) and State Department of Justice regulations. These regulations and directives set specific requirements and restrictions on registration, acquisition, usage, record keeping, transfer, storage and disposal.

Individuals who manufacture, distribute, dispense, import, export, conduct research or perform chemical analysis with any controlled substances including precursor chemicals are subject to a DEA registration.
REFERENCE LIST

Waste Policy


Chemicals Approved for Drain Disposal
EPA CFR Dilution Prohibition

Chemical Determination for Hazardous Waste


APPENDIX A – NIH ICS CHEMICAL WASTE DISPOSAL CONTACTS LIST

NIH

NIH/ORF/Waste Management Services
https://www.orf.od.nih.gov/EnvironmentalProtection/WasteDisposal/Pages/default.aspx

For questions and help, contact your Safety and Health Specialist, NIH/OM/SOSB/DOHS,
https://www.ors.od.nih.gov/sr/dohs/safety/laboratory/Pages/safety_health_specialists.aspx

NIH at Baltimore

Montana
Hamilton
https://nems.nih.gov/NEMS-locations/Pages/NIAID_at_Rocky_Mountain_Laboratories_Montana.aspx

North Carolina
Research Triangle Park
https://apps.niehs.nih.gov/hsb/pickups/

NCI at Frederick
Fort Detrick
https://nciffrederick.cancer.gov/Ehs/WasteManagement/
APPENDIX B – EXPANDED LIST OF CHEMICAL SOLUTIONS APPROVED FOR DRAIN DISPOSAL

Note: (*) = allowable concentration limit   (●) = antibiotic

A
A-Glucosidase, Type I
*Acetic Acid (≤10% with pH > 6)
Albumin, Bovine (without Sodium azide)
Albumin, Serum (Human) (without Sodium azide)
Alconox (≤1%) (10 g/L)
Alpha-D (+) Melibiose
●Amphotericin B (Fungizone) (Autoclave, pg. 5)
●Ampicillin (Autoclave, pg. 5)
*Animal Drinking Water (≤4% Deuterated Water)
Artificial Cerebrospinal Fluid (aCSF) (NaCl, MgSO₄, KCl, KH₂PO₄, Dextrose, NaHCO₃, CaCl₂, Kynureic Acid)

B
B-D (+) Glucose, and all Isomers – Beta D Glucose
Bacto Tryptic Soy Broth
Basal Medium Eagle
BD™ FACSFlow™ Sheath Fluid
Beta-Glucuronidase, Type VIII
Bicine [N, N-bis (2-hydroxyethyl) glycine]
Bile Salts
*Bleach (≤10% Clorox Bleach)
Blood Bank Saline
Bovine Serum Albumin (BSA)
Brain Slicing Perfusion Solution

C
Calcium Bicarbonate
Calcium Carbonate
Calcium Chloride
Calcium Citrate
Calcium Phosphate, Monobasic
Calcium Sulfate
●Carbenicillin (Autoclave, pg. 5)
Carboxypeptidase B
Carboxypeptidase Y
Carrageenan, Type II
Casein
Cellulase, all types
Chitin
Chondroitin
Chymotrypsinogen
Click’s Medium
CM Cellulose Powder
Cocarboxylase
Coenzyme A, Sodium Salt
Collagen & Collagenase
Complete Dulbecco’s Modified Eagle’s Media (DMEM-C)
Cytidine 2’ & 3’ - Monophosphates
Cytidine 2’ & 3’ – Triphosphates
Cytosin

D
2’ DeoxyAdenosine 5’ Triphosphate
2-Deoxy-D-Ribose
D-Broth (Dehydraged Broth) (≤1% Sodium chloride)
D-Cellobiose
D-Erythrose
D-Fructose and other Isomers & Enzymes
D-Glycogen
D- (+) Maltose, Monohydrate
D-Ribose 5-Phosphate, Disodium Salt
D-Sorbitol
D-Xylose
Deoxyribonucleic Acid, Type XV
Dextran
Dextrose

*Dialysis Buffer for Protein Purification [(20mM Tris-HCl, 100mM Urea) with removal of DDT, BME, or preservatives]
*Diethylene Triamine Penta Acetic Acid (DTPA) (<10 mM with pH≤6)
Disodium Phosphate
*Dithiothreitol (DTT) (≤1 M)
DL-Cystine
DL-Histidine
DL-Homoserine
DL-Isoleucine
DL-Leucine
DL-Serine
DL-Threonine
DNA Polymerase I
*Donkey Serum, Normal (≤5%) without Sodium Azide]
Dulbecco's Modified Eagle's Medium (DMEM)
Dulbecco's Modified Eagle Medium (DMEM), without Phenol Red
Dulbecco's Modified Eagle Medium (DMEM), with Phenol Red
Dulbecco's Modified Eagle's Medium (DMEM)/Ham's Nutrient Mixture F-12
Dulbecco's Modified Eagle Medium (DMEM), High Glucose, Pyruvate without Phenol Red
Dulbecco's Modified Eagle Medium (DMEM) High Glucose
Dulbecco's Modified Eagle Medium/Nutrient Mixture F-12 (DMEM/F12), without Phenol Red
Dulbecco's Modified Eagle Medium/Nutrient Mixture F-12 (DMEM/F12), with Phenol Red

E
Eagle's Minimum Essential Medium (EMEM)
Earl's Balanced Salt Solution (EBSS)
Elastase Type III
EmbryoMax® Advanced KSOM Medium
Enolase
Epidermal Growth Factor, Human (hEGF)
• Erythromycin (Autoclave, pg. 5)
Essential 6 Medium
*Ethanol (≤10% with a Flash Point >140°F)
*Ethylenediaminetetraacetic Acid (EDTA) (≤10 mM)
*Ethylene Glycol Tetraacetic Acid (EGTA) (≤10 mM)

F
F-12 Coon's Modification Formulation
Fetal Bovine Serum (FBS)
Fetal Bovine Serum Charcoal Stripped
Fetal Calf Serum (FCS) (FCS)
Fibrinogen
Fibronectin
Fischer's Medium
Flavin Adenine Dinucleotide
Folic Acid
Fructose

G
Galactose
Gelatin
- Geneticin (G418) (G418) (Autoclave, pg. 5)
- Gentamicin (Autoclave, pg. 5)
- Gibberellic Acid (GA)
- Glasgow Minimum Essential Media
- Glucose
- Glucose Enzymes & Phosphates (All)
- Glutamax
- Glutamic Acid (including D, L, DL Isomers)
  *Glutamine Autoclave Prior to Disposal
- Glycine
- GlycylGlycine
- Grace’s Insect Medium
- Guanosine 3’, 5’ Cyclic Monophosphate

H
- Ham’s F-12 Medium (F-12)
- Hank’s Balanced Salt Solution (HBSS)
- Hemoglobin
- HEPES (N-2-hydroxyethylpiperazine-N-2-ethane sulfonic acid) Buffer
- HEPES-Buffered Saline
- Hexokinase
- Histone
- Human Basic Fibroblast Growth Factor (hFGF basic/hFGF-B)
- Hyaluronidase Type I-S
  *Hydrogen Peroxide (≤8%)

I
- Immunoglobulins, IgG
- Immunoglobulins, IgM
- Immunoglobulins, IgE
- Insect Medium Supplement
- Instant Ocean® Sea Salt
- Insulin
- Invertase, Grade V
- IPL-41 Insect Medium
- Iscove’s Modified Dulbecco’s Medium (IMDM)
- IsoFlow™ Sheath Fluid (Beckman Coulter)
  *Isopropanol (2-propanol) (<2% with Flash Point >140°F)

J
- Joklik’s Minimum Essential Medium Eagle
K
Krebs-Henseleit Buffer

L
L-Citrulline
L-Glutamine
L-15 Media
L-Proline
L-Serine
L-Sorbose
L-Threonine
L-Valine
Lactic Dehydrogenase (including D-isomer)
Lactoferrin, Globulin, alpha-Lactose
Lactose
Lectin
Lectin from Glycine Max
Leibovitz’s L-15 Medium
Lithium Acetate
Litmus Milk Medium
Lithium Carbonate
*Lithium Chloride (≤1%)
*Lithium Sulfate (≤1%)
Luria Broth (LB)
Lysozyme, Grade I

M
M2 Medium
M9 Minimal Medium
M9 Minimal Salts
M16 Medium
Magnesium Chloride (≤1%)
Magnesium Sulfate (≤1%)
Maltose
McCoy’s 5A Modified Medium
MCDB Medium
Medium 199
*MEM Amino Acids (1X) (pH >6 and <9)
*MEM Vitamin Solution (1X)
Methylcellulose (Paraben)
*Methylene Blue Embryo Water (Zebrafish only, 2ml of 0.1% methylene blue)
Milk (Non-fat dry)

Minimum Essential Medium Eagle (MEM)
Modified Ringer's "Artificial Cerebrospinal Fluid" Solution
Monopotassium Phosphate

N
Nicotinamide Adenosine Diphosphate (NADP)
NCTC Medium
Nematode Medium (Axenic)
• Neomycin (Autoclave, pg. 5)
NERL™ Blood Bank Saline
Nerve Growth Factor
Neuraminidase, Type X and Type VIII
Nutrient Mixtures (HAM) F-10
Nutrient Mixtures (HAM) F-12
NZY Broth

O
Opti-MEM/Reduced Serum Medium

P
Pectin
Pectinase
• Penicillin (pg. 5)
Penicillinase Type 1
*pH 4 Calibration Buffer (without Phenylmercuric Acetate)
*pH 7 Calibration Buffer (without Phenylmercuric Acetate)
*pH 10 Calibration Buffer (without Phenylmercuric Acetate)
Phosphatase Alkaline, Type VII-NT,Bovine (without Glycerol)
*Phosphate Buffer Saline (PBS) (Unused only)
Phosphodiesterase
Phosphodiesterase 3’, 5’ Cyclic Nucleotide (Without Glycerol)
Plasmin
Polyoxyethylenesorbitan Monolaurate (Tween-20) (<5%)
Potassium Acetate
Potassium Bicarbonate
Potassium Bitartrate
*Potassium Chloride (≤1%)(stock solution must be submitted as chemical waste)
Potassium Phosphate (dibasic)
Potassium Phosphate (mono)
Potassium Thiosulfate
Proline & Isomer DL
• Puromycin (Autoclave, pg. 5)
Pyridoxal Phosphate

Q

Raffinose Pentahydrate
Riboflavin
Ribonuclease A
Ribonuclease S
Ribonuclease T1
Roswell Park Memorial Institute (RPMI) 1640 Medium
RPMI 1640 Medium Auto-Mod™ for Autoclaving
RPMI 1640 Medium Dutch Modification

S
Sarcosine
Schneider's Insect Media
Shields and Sang M3 Insect Medium
SmBM® Smooth Muscle Cell Growth Basal Medium
Sodium Acetate
Sodium Ascorbate
Sodium Bicarbonate (Sodium Hydrogen Carbonate also known as Baking Soda)
Sodium Carbonate
Sodium Chloride (NaCl) (≤1%)
*Sodium Chloride Sodium Citrate (SSC) (1x)
Sodium Citrate
*Sodium Dodecyl Sulfate (Sodium Luaryl Sulfate) (SDS) (≤10% concentration)
Sodium Hydrogen Phosphate
*Sodium Hypochlorite Solution (Bleach) (≤10%)
Sodium Phosphate Buffer
Sodium Phosphate Dibasic
Sodium Phosphate Monobasic
Sodium Pyruvate
Sodium Sulfate
Sodium Thiosulfate
Starch
StemFlex Medium
Streptokinase
• Streptomycin (Autoclave, pg. 5)
Succinamide
Sucrose (and Isomers)
• Sulfadoxine (Autoclave, pg. 5)
Super Optimal Broth with Catabolite Repression (SOC) Medium

**T**
- **TAPS** (3-[(tris(hydroxymethyl)methyl]amino)propanesulfonic acid)
- **TC-100 Insect Medium**
- **Terrific Broth**
- **Tetracycline** (Autoclave, pg. 5)
- **TMB Substrate Solution A**
- **TNM-FH Insect Medium**
- **Transferrin, Human**
- **Tricaine Methanesulfonate (MS-222) Buffered Solution (≤300mg/L)**
- **Tricine [N-tris(hydroxymethyl)methyl]glycine]**
- **TrypLE Select Enzyme**
- **Tris**
- **Tris, Acetic Acid and EDTA (TAE) Buffer (1x)**
- **Tris Buffered Saline (TBS) (1x)**
- **Tris-EDTA (20mM Tris, 1mM EDTA)**
- **Tris-Glycine Buffer (1x)**
- **Tris Hydrochloride (Tris-HCl)**
- **Triton X-100 Lysis Buffer (1x)**
- **Triton X-100 (≤1%)**
- **Trypsin Inhibitor (Undiluted stock must be submitted as chemical waste)**
- **Trypsin-EDTA (≤0.25%)**
- **Tryptic Soy Broth Medium**
- **Tryptone Peptone**
- **Tween-20 (Polyoxyethylenesorbitan Monolaurate) (≤5%)**
- **Tyrode’s buffer (10mm HEPES, 137mM NaCl, 4.5mM Potassium Chloride, 0.5mM Magnesium Sulfate, 0.5mM Potassium Phosphate, 10mM Glucose, 1.8mM Calcium Chloride)**

**U**
- **Urea**

**V**
- **Vinegar** (pH≤6)

**W**
- **Waymouth Medium MB**
- **Whittens’s Medium**
- **William’s Medium E**
Yeast Extract
Yeast Extract with Supplements (YES) Medium
Yeast extract, Peptone and Dextrose (YPD) Medium
YP-GAL Broth
*YT Culture Medium (2x)