1 Laboratory Liquid Waste Disposal Flow Chart

※ Also check the notes on pp.71-72 of Environmental Safety Guidebook.

This classification is applicable to all three campuses.

Laboratory liquid waste

Contains ≧ 5% organic solvents ? (including organic acids such as acetic acid)

Contact the Environmental Safety Center (ESC) when you wish to dispose liquid waste containing cyanide or mercury even if organic levels are ≧ 5%.

Yes / No

*LIST
Specified organochlorine compounds are as follows.
Trichloroethylene
Tetrachloroethylene
Dichloromethane
Carbon tetrachloride
1,2-Dichloroethane
1,1-Dichloroethylene
1,2-Dichloroethylene
1,1,1-Trichloroethane
1,2,2-Trichloroethane
1,3-Dichloropropene

If waste is composed of two layers, separate and dispose each layer properly.
Separated water layer goes this way.

Contains specified organochlorine compounds ? (see list*)
- Yes → **Organic liquid waste containing dichloromethane, carbon tetrachloride, etc.** — Yellow-2 **Dichloro**
  Rinsed water that may contain dichloromethane etc. should go to **Blue 1**.
- No → Contains benzene ?
  - Yes → **Organic liquid waste containing benzene** — Red-3 **Benzene**
  - No → Contains offensive odor substances ?
    - Yes → **Organic liquid waste containing malodorous substances** — Orange-1 **Offensive odor** (organic)
    - No → Contains non-flammable substances such as Organohalogens ?
      - Yes → **Flame-retardant organic liquid waste** — Yellow-1 **Non-flammable**
      - No → **Includes organic liquid waste containing any of the following elements, i.e., F, Cl, Br, I, S, P**
        Machine oil ?
        - Yes → **Waste Oil** Silicone oil should be collected separately and labeled explicitly. — Red-2 **Waste oil**
        - No → Contains ≧ 5% water ?
          - Yes → **Organic liquids containing ≧ 5% water** 1,4-Dioxane should be disposed here. — Blue-1 **Organic-water mix**
            Water layers in liquid-liquid extraction and 1st or 2nd rinse water are also included in this classification.
          - No → Red-1 **Organic** Combustible organic liquid waste

Contains cyanides ?
- Yes → White-1 **Cyanide** — **Liquid waste containing cyanides** Keep pH at 11 or over.
- No → Contains mercury compounds ?
  - Yes → Green-1 **Mercury** — **Liquid waste containing mercury compounds** (Indicate organic content(%)) (metallic mercury should not be included)
  - No → Contains chromium compounds ?
    - Yes → Black-1 **Cr** — **Liquid waste containing chromium compounds**
    - No → Contains As / Se ?
      - Yes → Black-2 **As,Se** — **Liquid waste containing arsenic / selenium compounds** (Indicate organic content (%))
      - No → Contains Cd / Pb ?
        - Yes → Black-3 **Cd,Pb** — **Liquid waste containing cadmium / lead compounds** (Indicate organic content (%))
        - No → Contains Os / Tl / Be ?
          - Yes → Purple-1 **Os,Tl,Be** — **Liquid waste containing osmium / thallium / beryllium compounds**(Indicate organic content(%))
          - No → Contains Cu / Zn / Fe / Mn / B ?
            - Yes → Purple-2 **Legally regulated** — **Liquid waste containing legally regulated toxic heavy metals** (Indicate organic content (%))
            - No → Contains other heavy metals ?
              - Yes → Purple-3 **Heavy metals** — **Liquid waste containing other heavy metals** (Indicate organic content (%))
              - No → Contains offensive odor substances ?
                - Yes → Orange-2 **Offensive odor** (inorganic) — **Inorganic liquid waste containing offensive odor substances.**
                - No → Contains F ?
                  - Yes → Brown-1 **Fluorine** — **Fluorine-containing liquid waste**
                  - No → Photography waste liquids ?
                    - Yes → Gray-1 **Develop** Gray-2 **Fix** — **・Photographic developer** **・Photographic fixer**
                    - No → Contains inorganic acids or alkalis ?
                      - Yes → Lime Green-1 **Acid** Brown-2 **Alkali** — **・Acidic liquid waste** **・Alkaline liquid waste** Concentrated solutions should be carefully and moderately diluted. Phosphoric acid should be separately collected from other acids.
                      - No → Inorganic liquid waste excluding hazardous substances in the above chart
                        - Yes → Gray-3 **Inorganic** — **Other inorganic liquid waste** Containing inorganic substances not included in the above lists but in the effluent standard items.(phosphates, nitrogen-containing compounds, etc.)
                        - No → Contains specified organochlorine compounds in the list* ?
                          - Yes → Consult with the Procurement and Campus Management Section for greases and solid fats.
                          - No → Discharge to laboratory wastewater

Chemicals that are not normally used (iodine, pesticides, solutions or precipitates containing specific elements in more than a few percent, etc.) should be basically collected as obsolete chemicals. In such cases, be sure to separate solutions and solids. When difficult to judge, consult with ESC in advance.

<Caution!>
- Be careful of fire.
- Take special care when storing materials with low boiling points (diethyl ether, etc.).
- Hazardous materials such as self-ignition, explosion (polynitro compounds, methylhydrazine, etc.) and highly reactive substances (acyl chlorides, etc.) should not be mixed.
- Sulfur-containing substances (e.g., mercaptan), amines, styrene, etc., are collected as liquid waste containing malodorous substances (Orange-1).
- Do not mix corrosive substances such as acids.

※ ESC cannot accept liquid waste if the above rules are not observed. Liquid waste collected in tanks other than the designated ones or mixed with solid objects (much precipitate / pen / magnet etc.) cannot be accepted. For details of liquid waste classification, please refer to "Classification of laboratory liquid waste" on p. 68 and "Precautions for collecting laboratory liquid waste" on pp. 71-72.

2 Classification of laboratory liquid waste

【Caution】 Liquid waste should be limited to the eighth fill of the designated polyethylene tank. Make sure the lid is tightly closed before transporting the tank to the specified area.

Type		Typical example	Classification (label color)			Precautions
Acid	Acidic liquid waste (Free of hazardous substances)	Hydrochloric acid, nitric acid, sulfuric acid, etc.	Green yellow-1		酉夋	1. Organic acids such as acetic acid are classified as combustible organic liquid waste (Red-1). 2. Phosphoric acid is separately collected from other acids. 3. Hydrofluoric acid should be treated with care. Make it alkaline with alkali solution and dispose it to fluorine compound liquid waste (Brown-1). 4. Concentrated acids and alkalis should be collected separately. However, concentrated pure product should be diluted appropriately. 5. If the product contains any of the following heavy metals or toxic substances, it should be collected under the specific classification. 6. Small amounts of acid and alkali solutions may be neutralized in a special polyethylene bucket and disposed of in a laboratory sink after neutralization is confirmed with a universal test paper.
Alkali	Alkaline liquid waste (Free of hazardous substances)	Alkali metal hydroxide, etc.	Brown-2		アルカリ	
Organic liquid waste	Combustible organic liquid waste	Ether, ethyl acetate, acetonitrile, etc. *1	Red-1		有機	1. When collecting and storing, be careful of fire. 2. Solvents with low boiling points (ether, petroleum ether, acetaldehyde, ethylene oxide, etc.) should be stored in a sealed 5L waste tank and frequently sent for waste collection. 3. Do not mix in substances that may cause ignition or explosion (e.g., polynitro compounds, methylhydrazine, etc.) or highly reactive substances (e.g., acyl chlorides, etc.).
	Waste oil	Rotary pumps and Oil for oil bath, etc. *1	Red-2		廃油	1. Contact the Procurement and Campus Management Section for greases and solid fats. 2. Silicone oil is difficult to handle after incineration, so be sure to collect it in a separate container and clearly label it as silicone oil.
	Organic liquid waste containing benzene	Containing benzene *1	Red-3		ベンゼン	1. Benzene is a hazardous substance defined by law and must be collected individually.
	Flame-retardant organic liquid waste	Organic substances with halogens as constituent elements, such as chloroform, are in this category. However, substances designated in the following "Yellow-2 dichloro" types are excluded.	Yellow-1		難燃	1. Even small amounts of organochlorine compounds are dissolved in non-chlorinated organic solvents, it is also classified into this category. 2. Organic compounds containing sulfur and phosphorus (e.g., dimethyl sulfoxide, carbon disulfide, etc.) are also classified into this category, because flame retardant liquid waste produces strong acids by incineration.
	Organic liquid waste containing specified organochlorine compounds	Trichloroethylene, tetrachloroethylene, dichloromethane, carbon tetrachloride, 1,2-dichloroethane and substances shown in *2	Yellow-2		ジクロロ	1. This category is defined as hazardous substances by law. Do not mix up with other categories. 2. Also collect the rinse (as many times as necessary depending on the situation).
	Organic liquid waste containing ≧5% water	Aqueous solution in which organic substances is dissolved.	Blue-1		含水有機	1. Waste containing more than 5% water is collected under this classification. 2. 1,4-Dioxane is collected under this classification even if the organic content is less than 5%.
Inorganic liquid waste	Liquid waste containing mercury	Inorganic mercury (e.g., HgCl2) and organo-mercury compounds (e.g., Hgϕ2).	Green-1		水銀	1. If there is even a trace amount of mercury in the product, it should be collected under this classification. 2. Do not include metallic mercury. Collect as "waste chemicals". 3. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing chromium	Chromium compounds, chromates, dichromates, etc.	Black-1		Cr	1. The chromic acid mixture is collected after dilution with water. 2. Hexavalent chromium does not need to be reduced with methanol, etc. 3. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing arsenic and selenium	Arsenic acid, selenium dioxide, etc.	Black-2		As,Se	1. Be sure to collect and store it because it is a legally stipulated extremely hazardous liquid waste. 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing cadmium and lead	Cadmium chloride, lead acetate, etc.	Black-3		Cd,Pb	1. Be sure to collect and store it because it is a legally stipulated extremely hazardous liquid waste. 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing osmium, thallium, and beryllium		Purple-1		Os,Tl,Be	1. Be sure to collect and store it because it is a legally stipulated extremely hazardous liquid waste. 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing regulated elements	Copper, zinc, iron, manganese, or boron-bearing compounds.	Purple-2		法定	1. Collect and store them appropriately. 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing other heavy metals		Purple-3		重金属	1. Collect and store them appropriately. 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Liquid waste containing cyanides*3	Potassium cyanide, sodium cyanide, ferrocyanide, ferricyanide, etc.	White-1		シアン	1. **Always make it alkaline of a pH 11 or more.** 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Photo developer liquid waste	Alkaline	Gray-1		現像	1. Collect and store the developing liquid and fixing liquid separately. Mixing them is dangerous because they react with each other.
	Photo fixing liquid waste	Acidic	Gray-2		定着	
	Fluorine compound liquid waste	Hydrofluoric acid, potassium fluoride, etc.	Brown-1		フッ素	1. Hydrofluoric acid should be kept under alkaline conditions, otherwise bring it solely to the ESC. (**Take care to avoid contact with skin**.)***4** 2. Also collect the rinse (rinse as many times as necessary depending on the situation).
	Other inorganic liquid waste	Liquid waste containing inorganic substances other than the above. Phosphate and nitrogen-containing compounds are also collected in this classification.	Gray-3		無機	1. Solutions of inorganic salts of no harm such as salt, sodium sulfate, alkali carbonate, alkali bicarbonate can be disposed of in the sink. This treatment is not applicable to the solutions containing elements or ions that fall under the discharge standard items.
Other liquid waste	Contains malodorous substances liquid waste	Sulfur-based odorous substances such as mercaptan, trimethylamine, styrene, etc. — Organic	Orange-1		臭(有機)	1. Organic and inorganic waste should be collected separately.
		Inorganic	Orange-2		臭(無機)	2. Keep in an airtight polyethylene container.

Note ※1 When dichloromethane is mixed with combustible organic liquid waste, waste oil, benzene-containing organic liquid waste, etc., it should be classified as dichloromethane liquid waste.

※2 1,1-Dichloroethylene, 1,2-dichloroethylene, 1,1,1-trichloroethane, 1,2,2-trichloroethane and1,3-dichloropropene.

※3 When collecting cyanide-containing liquid waste, make sure that the pH is 11 or higher.

※4 Hydrofluoric acid neutralization should always be done gradually in a draft with a solution of calcium hydroxide solution. Be careful not to scatter the contents. When bringing the hydrofluoric acid itself to the Environmental Safety Center, close the lid tightly to prevent any leakage, and clearly label it as hydrofluoric acid. In all cases, wear protective equipment and take special care because hydrofluoric acid is extremely dangerous if it comes in contact with skin.

5 Precautions for collecting laboratory liquid waste

(Environmental Safety Guidebook, pp.71-72 (2024))

●Organic liquid waste

1. **All laboratory liquid waste containing more than 5% of organic substances is classified into a group of organic liquid waste.**
2. For organic liquid waste containing heavy metals, write the specific element names on the waste label.
3. Since the organic liquid waste is subject to the Fire Service Law, do not store large quantities in laboratories or experimental rooms, etc., and discharge them frequently. To prevent catching fire and spontaneous combustion, be careful about storage location of collection containers to avoid exposure to temperature changes, as well as heat / smoke generation and ignition due to mixing.
4. Strongly oxidizing or explosive substances should be handled separately. Avoid mixing them with other substances.
5. Acid liquid waste means inorganic acids. Do not put organic acids into the acid liquid waste container. Organic acids such as acetic acid should be separated as organic liquid waste.
   If it contains more than 5% water, collect as "Organic-water mix (Blue-1)".

   !! There have been cases of explosions,
   by mixing organic acids into acid liquid waste !!
6. Organic compounds containing sulfur or phosphorus are classified into “Flame-retardant organic liquid waste” because such substances produce strong acids by incineration.
7. All liquid waste containing 1,4-dioxane is classified as “Organic-water mix (Blue-1) " regardless of its concentration. Clearly write the name of the substance on the waste label.
8. Do not mix any substances that may cause ignition or explosion (e.g., poly-nitro compounds, methylhydrazine, etc.), or highly reactive substances (e.g., acyl chlorides, etc.) into organic liquid waste container.
9. Nitro compounds such as nitromethane and picric acid should not be discarded to the waste in alkaline conditions.
10. All organic liquid waste containing specified organochlorine compounds such as dichloromethane (see p.67) is classified as "Dichloro[methane] (Yellow-2)”, regardless of their concentration.
11. Liquid waste containing 1 mg/L or more of benzene is classified as “Benzene (Red-3)”, regardless of organic or inorganic.

●Inorganic liquid waste

1. When you find metallic mercury on the bottom of waste container, be sure to separate and submit it as “waste chemicals”.

   !! Processing the liquid waste mixed with metallic mercury causes
   serious contamination to the entire waste treatment system
   and termination of system operation for a long period !!
2. Phosphoric acid should be separated from other acids, and collected alone as "Acid (Limegreen-1)”.
3. Cyanide-containing waste must have a pH of 11 or higher. Do not store for long periods of time and

send out for collection.

On the acidic side, cyanide ions diffuse into the atmosphere as hydrogen cyanide (HCN) gas (highly poisonous). Therefore, always make it alkaline (pH 11 or higher) with sodium hydroxide or potassium hydroxide.

!! Operation must be performed in a fume hood, wearing a gas mask, chemical protective gloves and safety glasses !!

4. When submitting an inorganic liquid waste containing less than 5% of organic matter, the substance name shall be written in the "Name of substances other than those listed above" column of the waste label with a marker pen. In addition, indicate that “it is less than 5%”.
5. Hydrofluoric acid is extremely dangerous if it contacts your skin or eyes. When handling, wear chemical protective equipment and take special precautions to avoid skin contact.

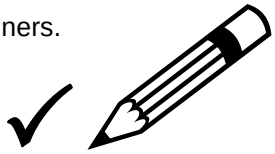
●General rules

1. Never pour the following liquid waste down the sink; Liquid waste containing hazardous substances (see p.12) for which standards are set by laws and regulations such as the Water Pollution Control Law and the Sewerage Law.
2. In addition to the undiluted solution, the rinse solution of the used equipment is also collected as liquid waste. Please refer to the "Guidelines for the frequency of rinse of glassware conforming sewage elimination standards" (p.13).
3. The narrow sticker (A) on the waste label must be affixed to the top of the liquid waste container.
4. Each time the liquid waste is disposed into the container, write the ingredients on the waste label.
5. For highly toxic substances namely “poisonous and deleterious substance”, even in small quantities, you should clearly indicate the substance name and that it is ”有毒” (i.e., toxic) in large letters on the label.

!! In actual, workers have been seriously injured after inhaling leaked vapors due to lack of indication !!

● Check it out before moving waste out from the lab!

ESC confirms those items upon collection!



☐ Is the **lid** tightly closed? An inner lid is also required, except for 20 L containers.

☐ Is every field of the **label** filled out?

☐ Is any **solid object** not remained in the container?

☐ Is the liquid waste **not exceeding 80 %** in content?

☐ Is the liquid waste not less than half of the container? → Use an appropriately sized container.

☐ Is the container **swelling** by gas generation?

→ After the gas is no longer generated, send out for collection.

☐ Is **exothermic reaction** occurring? → Cool completely before sending it to collection.

☐ Is there any **leakage** found on the container? → Wipe it off before sending it to collection.

Wiped-off paper towels and rags will be collected in the following solid waste categories;

Kagurazaka Campus（p.75）, Katsushika Campus（pp.96-97）: hazardous substance attachment.

Noda Campus（p.88）: waste chemicals.