

## Chapter 6 Disposal of Chemical Substances

Regarding the disposal of chemical substances, Article 14 of the University Rules stipulates as follows.

### Article 14 of the Rules (Disposal of Chemical Substances)

1. Chemical Substances shall be disposed of in accordance with the relevant Laws and Regulations, etc. and any instruction that may be provided by the Environmental Safety Center.
2. When storing Chemical Substances to be disposed of in a laboratory, the Chemical Substance Manager shall implement necessary measures to prevent theft, loss, proliferation, leakage, exudation, effluence, etc. of the Chemical Substance.
3. If a Chemical Substance Manager finds it impossible to hand over Chemical Substances to a successor (as specified in Article 6, Item 6), the Chemical Substance Manager shall dispose of the Chemical Substances on his or her responsibility.


The Environmental Safety Center undertakes disposal of the toxic and hazardous waste below. However, it does not handle radioactive waste, infectious waste, waste related to animal experiments, explosives, narcotics, stimulants, and stimulants' raw materials.

#### [Waste handled by the Environmental Safety Center]

Experiment waste liquids, unnecessary chemicals, toxic sludge, mercury-containing apparatuses, used fluorescent lamps, used batteries, used lead storage batteries, domestic hazardous materials, and experiment waste

Waste discharged by the University may be toxic and hazardous. Toxicity and hazards cannot be confirmed for some types of waste. If you have problems with the waste disposal method, inquire with academic advisers or the Environmental Safety Center. The website of the Environmental Safety Center also offers information.

Website of the Environmental Safety Center: <http://www.esc.kumamoto-u.ac.jp/en/>

Or enter  in the search box 

Refer to “3R/Waste” → “Activities (Experiments).”

### 1. Disposal of used chemical substances

Wastewater generated by Kumamoto University is disposed of in accordance with the Sewerage Act (the Water Pollution Control Act for part of wastewater) and the Kumamoto Prefectural Ordinance on Conservation of Groundwater. Chemical substances adhering to apparatuses used in experiments cannot be drained directly into a laboratory sink. Classify wastewater based on the storage scheme for experiment waste liquids (Reference Material 6 at the end of this document) and store wastewater in the waste liquid tanks. Clean apparatuses based on the cleaning manual (Reference Material 5 at the end of this document).

#### [Examples of accidents]

- Oil in an oil bath was mistaken for water and discharged into an effluent outlet. Water supply to the building was suspended for five days until safety was confirmed.

### 2. Cleaning of apparatuses contaminated with chemical substances

Fouling of apparatuses and devices becomes more difficult to remove over time. The cause of the fouling becomes unknown. Thus, apparatuses and devices must be cleaned immediately.

Use a brush, sponge, detergent, etc., depending on the shape for cleaning. When using a brush, hold the handle close to the head to avoid breakage through the bottom of an apparatus. Regarding apparatuses for measuring the volume, the capacity changes when they are scrubbed by a brush, sponge, etc. They must be rinsed using a solvent or cleaned using an ultrasonic cleaner, etc.

Only apparatuses to which chemical substances do not adhere can be cleaned in a sink. Chemical substances must be removed before cleaning in a sink. Clean apparatuses by the following procedure depending on the fouling properties.

(1) Water-soluble substances (liquids)

- [1] Rinse an apparatus at least three times using water. Put all the rinsing liquid in an appropriate waste liquid tank.
- [2] Clean an apparatus in a sink using detergent, etc., rinse the apparatus using ion exchanged water for finish, and dry the apparatus. (It is not necessary to put the wastewater in the waste liquid tank.)
- [3] If an organic solvent is used for rinsing for finish, put the solution in a waste liquid tank.

(2) Water-soluble substances (solids)

- [1] Rinse an apparatus using water until the fouling adhering to the apparatus is dissolved. Or dissolve fouling using a glass rod, medicine spoon, ultrasonic cleaner, etc. Put all the rinsing liquid in an appropriate waste liquid tank.
- [2] Rinse an apparatus at least three times using water. Put all the rinsing liquid in an appropriate waste liquid tank.
- [3] Clean an apparatus in a sink using detergent, etc., rinse the apparatus using ion exchanged water for finish, and dry the apparatus. (It is not necessary to put the wastewater in the waste liquid tank.)
- [4] If an organic solvent is used for rinsing for finish, put the solution in a waste liquid tank.

(3) Water-insoluble substances (liquids)

- [1] Rinse an apparatus at least three times using a solvent that dissolves the fouling. Put all the rinsing liquid in an appropriate waste liquid tank.
- [2] Rinse the apparatus at least twice using a water-soluble solvent (e.g., methanol, acetone). Put all the rinsing liquid in an appropriate waste liquid tank.
- [3] Rinse the apparatus at least twice using water. Put all the rinsing liquid in an appropriate waste liquid tank.
- [4] Clean an apparatus in a sink using detergent, etc., rinse the apparatus using ion exchanged water for finish, and dry the apparatus. (It is not necessary to put the wastewater in the waste liquid tank.)
- [5] If an organic solvent is used for rinsing for finish, put the solution in a waste liquid tank.

(4) Water-insoluble substances (solids)

[e.g., metals, organic compounds, low-molecular polymers]

- [1] Dissolve the fouling using a chemical substance, organic solvent, etc. (e.g., acid).
- [2] Rinse the apparatus about three times using the solvent used for dissolution. Put all the rinsing liquid in an appropriate waste liquid tank.
- [3] Rinse the apparatus about three times using water. Put all the rinsing liquid in an appropriate waste liquid tank.
- [4] Clean an apparatus in a sink using detergent, etc., rinse the apparatus using ion exchanged water for finish, and dry the apparatus. (It is not necessary to put the wastewater in the waste liquid tank.)
- [5] If an organic solvent is used for rinsing for finish, put the solution in a waste liquid tank.

[Chemical substances that cannot be dissolved]

- [1] Set a funnel, on which gauze, etc. is placed to prevent solids from entering a tank, at the inlet of a waste liquid tank.
- [2] Allow such chemical substances to swell using a solvent if possible.
- [3] Put a solvent or liquid detergent in an apparatus and physically remove the fouling using a brush, sponge, etc. Put all the rinsing liquid in an appropriate waste liquid tank. (Filter insoluble solids using gauze.)
- [4] Rinse the apparatus about three times using water. Put all the rinsing liquid in an appropriate

waste liquid tank.

- [5] Clean an apparatus in a sink using detergent, etc., rinse the apparatus using ion exchanged water for finish, and dry the apparatus. (It is not necessary to put the wastewater in the waste liquid tank.)
- [6] If an organic solvent is used for rinsing for finish, put the solution in a waste liquid tank.
- [7] Dispose of gauze and other materials which are used to collect removed solids as experiment-related waste.

Note that chemical substances adhere to the brush and sponge used in this process. Do not use such brush and sponge for cleaning in a sink.

Fouling can be removed by using a small quantity of rinsing liquid repeatedly. Regarding fouling caused by a chemical substance that cannot be dissolved, if it can be dispersed in a solvent, the fouling can be removed by repeating the process of dispersing the chemical substance and putting the solvent into a waste liquid tank to which gauze, etc. is set. Clean the apparatus if necessary.

### 3. Classification of experiment waste liquids

Experiment waste liquids are liquid waste that contains toxic chemical substances. Experiment waste liquids may flow into wastewater, onto the floor, or into soil. Prevent leakage, exudation, effluence, etc.

When storing experiment waste liquids, do not leave a funnel, etc. attached. Close the lid after use. Vapors of chemical substances are generated from the opening of a tank. The concentration of toxic substances in the surrounding environment may increase.

Experiment waste liquids are transported by a specialized contractor on public roads. Heavy metals, etc. are concentrated by reduction, neutralization, and coagulation sedimentation. Liquids are incinerated, and solid ingredients are subject to concrete solidification before landfill disposal. Experiment waste liquids are incinerated eventually.

Experiment waste liquids must be separated based on the storage scheme in Reference Material 6 at the end of this document. They must be separately stored in special polyethylene containers. Note that the capacity of polyethylene containers may be 10 L or 20 L depending on the storage classification. When collecting experiment waste liquids in polyethylene containers, fill the containers up to about 80% of their capacity to prevent leakage. Set an inner cap or packing and close the cap securely.

Indicate "experiment waste liquids" on containers so that they can be distinguished from other containers.

[Examples of accidents]

- The cap opened during collection. A worker was exposed to the waste liquid.
- The waste liquid in an analyzer was mistaken for water and discharged into an effluent outlet.

### 4. Collection of experiment waste liquids

Experiment waste liquids are collected regularly (twice or three times a month). Regarding the collection schedule, refer to the "Chemical Substance Management and Waste Calendar" on the website of the Environmental Safety Center. Before discharging experiment waste liquids, apply for discharge from YAKUMO by the application deadline. Print a storage record book sheet, and paste the sheet on a pertinent waste liquid container to be discharged. For details of the operation method, refer to the YAKUMO operation manual.