

That is, poisonous and deleterious substances must be stored in a securely lockable storage location with clear distinction from other items, and such storage location must be locked at all times. A management book must be kept for the keys for storage locations. The form can be downloaded from “Manuals/Materials” on the top bar of the YAKUMO screen.

At the University, the sign below must be displayed at storage locations for poisonous and deleterious substances. Poisonous and deleterious substances must be stored in these storage locations. Contact the Environmental Safety Center to obtain the sign.



Fig. 4-1 A sign that is displayed at storage locations for poisonous and deleterious substances

[What happens if poisonous and deleterious substances are not stored properly?]

- In September 2019, a chemical that contained carbon tetrachloride and carbon disulfide (deleterious substances) was lost at a university. The police investigated the case on suspicion of theft. The chemical was found to have been disposed of properly. Improper management of poisonous and deleterious substances lead to a police investigation and an on-site inspection and verification by a health center.

3. Storage of hazardous materials

Hazardous materials are chemical substances that may cause a fire or explosion as defined in the Fire Service Act. Hazardous materials pose difficulties in extinguishing fire and hazards of spreading fire. A fire-prevention area is designated to handle hazardous materials. The quantity that can be handled is also designated (designated quantity). In the event of an earthquake, etc., hazardous materials may leak and cause a secondary accident, such as a fire. Article 4 of the Guidelines stipulates the storage of hazardous materials as follows.

Article 4 of the Guidelines (Storage of Hazardous Materials, etc.)

1. A laboratory, etc. shall be regarded as a unit of management area for storage and use of hazardous materials. The quantity of any hazardous material stored and used in each said area shall be less than one fifth of the designated quantity.
2. When multiple Chemical Substance Handling Groups (hereinafter referred to as “Groups”) store and use hazardous materials in a single management area, the quantity stored and used by each Group (hereinafter referred to as the “Standard Allocation Quantity”) shall be less than the quantity obtained by dividing one fifth of the designated quantity by the number of such Groups in principle. In this case, each Group shall be able to add or subtract a certain quantity to or from the Standard Allocation Quantity within the scope that the total of the Standard Allocation Quantity of all the Groups within such management area does not reach one fifth of the designated quantity for mutual adjustments.
3. Any hazardous material whose quantity is one fifth or more of the designated quantity shall be stored in the Hazardous Material Indoor Storage Facility. If the quantity of such hazardous material is one fifth of the designated quantity or more but not exceeding the specified quantity, it may be stored in the Small Quantity Hazardous Material Handling Area.

4. The Chemical Substance Managers shall classify and store hazardous materials in laboratories, etc. based on the categories indicated in the Table for Consolidated Storage of Hazardous Materials (Appended Table 1).
5. For storage specified in the preceding paragraph, it shall be required to comply with the following matters.
- (1) When containers at the time of purchase are not used as containers to store hazardous materials, containers made from materials that are not easily damaged when containers are dropped, overturned, etc. shall be used (e.g., polyethylene containers) whenever possible.
 - (2) Containers that contain hazardous materials shall be stored in storage locations that meet the following conditions, and the doors shall be closed in principle.
 - A. Storage locations that are made from incombustible materials, have depth (front to rear), and are robust
 - B. Storage locations equipped with double sliding doors (In the case of storage locations equipped with gate-fold doors, they shall be provided with a latch to prevent the doors from opening due to vibration. In the case of storage locations equipped with double sliding doors, necessary measures shall be implemented to prevent containers from overturning due to vibration when the doors are opened and closed.)
 - C. Storage locations that are secured to the wall, pillar, etc. of the building and for which measures are implemented to prevent containers from overturning and dropping
 - (3) The following items shall be checked when storing containers in storage locations.
 - A. Containers shall be sealed hermetically.
 - B. Containers shall not be stacked up.
 - C. Containers that contain hazardous materials which may cause a hazardous reaction when mixed (e.g., ignition) shall be kept away from each other, or measures shall be implemented to prevent leaked hazardous materials due to overturning, etc. from being mixed.
 - D. For hazardous materials that are likely to cause spontaneous ignition, the container shall be filled with a sufficient quantity of protective liquid.
 - E. For hazardous materials that are highly hazardous, storage in upper shelves of storage locations shall be avoided, and measures such as storage in a sandbox shall be implemented as necessary.

There are six types of hazardous materials (Type 1 to Type 6), and their properties are different. Mixing of hazardous materials may cause ignition. It is necessary to take care in storage and usage. For storage of hazardous materials, refer to the table below.

Table 4-1 Hazards of mixing hazardous materials based on the Fire Service Act

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Type 1 (oxidizing solids)		x	x	x	x	o a
Type 2 (combustible solids)	x		x	o	o a	x
Type 3 (Spontaneously combustible substances and water-reactive substances)	x	x		o b	x	x
Type 4 (flammable liquids)	x	o	o b		o b	x
Type 5 (self-reactive substances)	x	o a	x	o b		x
Type 6 (oxidizing liquids)	o a	x	x	x	x	

- x: consolidated storage prohibited (hazardous when mixed)
 o: consolidated storage allowed (not hazardous when mixed)
 o: unlikely to pose hazards of mixing
 a: likely to pose hazards of mixing
 b: likely to pose hazards of mixing in some cases

The quantity of hazardous materials stored per laboratory must be one fifth of the designated quantity (0.2, which is the multiple of the designated quantity) or less. The designated quantity is specified in the Fire Service Act depending on the type of hazardous material (refer to Reference Material 3 at the end of this document). In YAKUMO, the multiple of the designated quantity is automatically calculated for each storage area (designated quantity ratio). In the case of a laboratory that is used by multiple Groups, the sum of the Groups is the multiple of the designated quantity for the laboratory. Thus, each Group must ensure management using a number calculated by dividing 0.2 by the number of Groups (Table 4-2) as a standard. The Standard Allocation Quantity can be adjusted between the Groups as long as the total of the Groups is within 0.2.

To store more than one fifth of the designated quantity, it is necessary to store the chemical substance in special equipment and notify a competent fire department. A large quantity of hazardous materials must be stored in a Small Quantity Hazardous Material Handling Area or a Hazardous Material Indoor Storage Facility .

Table 4-2 Restriction on the storage quantity for shared laboratories based on the number of Groups

Number of Groups	Initial value of the Standard Allocation Quantity of each Group
1	0.200
2	0.100
3	0.066
4	0.050
5	0.040

[What happens if hazardous materials are not stored properly?]

- In December 2018, a fire broke out at a university due to chemical reaction of hazardous materials. Experiment waste liquids including hazardous materials caught fire, etc., causing one laboratory to be completely burned down. A fire causes significant damage to the source of fire and the surrounding areas. Thus, hazardous materials that are likely to cause a fire must be stored properly.

4. Storage of mercury, etc.

Mercury is discharged from various sources into the environment through anthropogenic activities, such as combustion of fossil fuels and disposal of waste. It circulates and builds up in the global environment. The mercury concentration in marine organisms has been rapidly increasing due to the increased discharge from anthropogenic activities since the Industrial Revolution. There is concern about the impact on people in the Arctic Region, who consume a large amount of fish and seafood, etc. Against this backdrop, the Minamata Convention on Mercury was adopted at a diplomatic conference held in Kumamoto Prefecture in October 2013 to prevent global environmental pollution from mercury. In Japan, the Act on Prevention of Pollution by Mercury of Environment (Mercury Pollution Prevention Act) came into force on August 16, 2017. The University Guidelines stipulate the storage of mercury, etc. as follows.

Article 11 of the Guidelines (Storage of Mercury, etc.)

When storing mercury, etc., the Chemical Substance Managers shall carry out the following matters.

- (1) The containers or packages that are used to store mercury, etc. shall be made from carbon steel or stainless steel that does not react with mercury, etc. at normal temperature.
- (2) The name of mercury, etc. (for mixtures of mercury, etc. (excluding cinnabar), the name and content of mercury, etc.) shall be indicated on containers or packages.
- (3) Mercury, etc. shall be stored in a securely lockable storage location that indicates the name of mercury, etc. stored.