

# Safety Manual

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Kashiwa Campus

The University of Tokyo

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This manual is based on a guide compiled by the University of Tokyo's Division for Environment, Health and Safety, and was modified for use at the Kashiwa Campus. Further helpful information on safety management is posted on the division's website, so please periodically check the following page for details: <http://www.adm.u-tokyo.ac.jp/office/anzeneisei/index.html>.

## About This Manual

### Content

This manual summarizes the minimum safety protocol that must be followed by members of the Kashiwa Campus community. Detailed safety procedures and requirements are set by each division, so be sure to participate in the safety seminars hosted by your division.

### Purpose

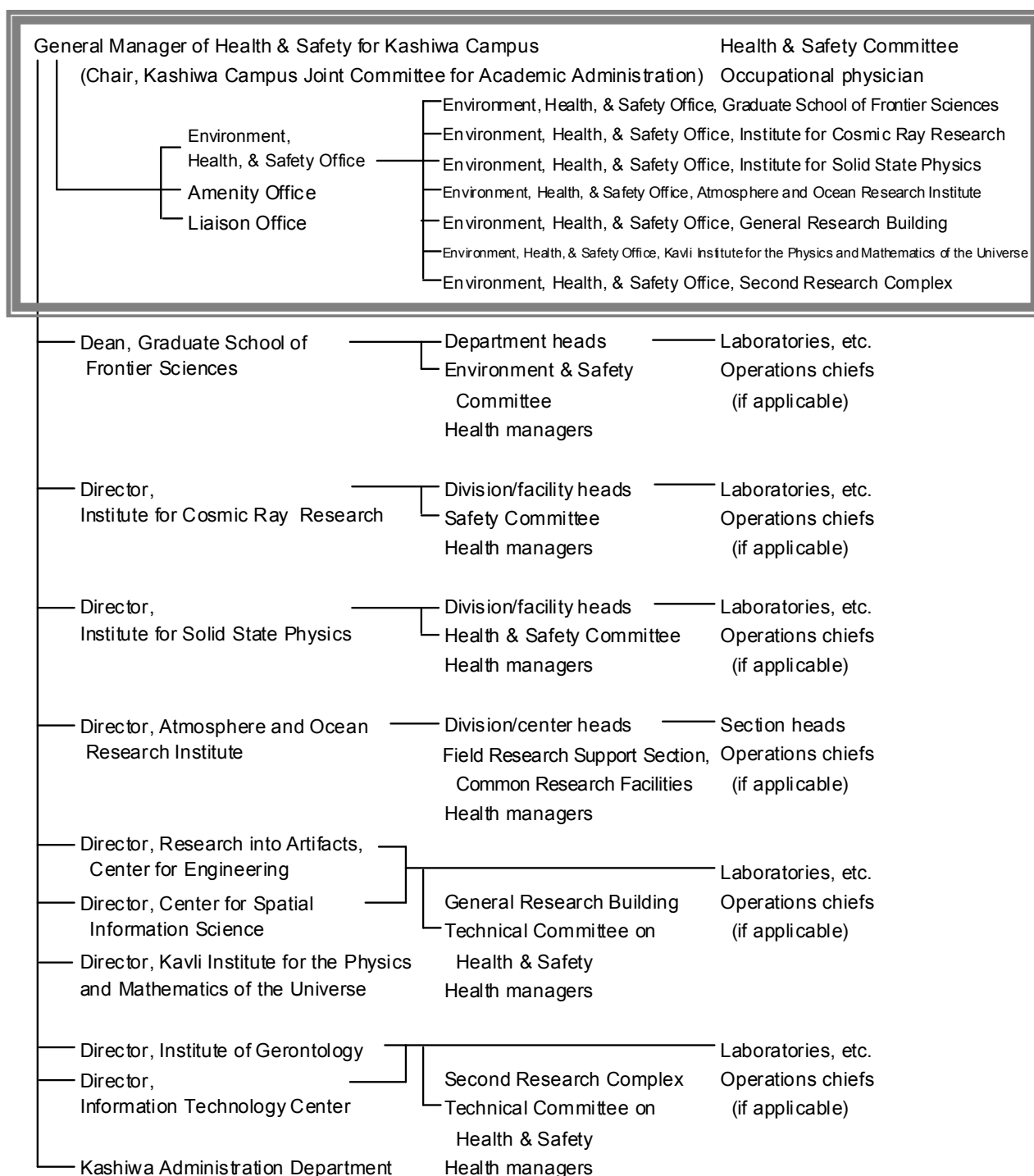
This manual was created to outline the safety practices and responsibilities that need to be discharged by all Kashiwa Campus members—faculty, administrative staff, and students—in order to ensure that all educational and research activities are carried out safely and properly through compliance with the Industrial Safety and Health Act, the Fire Services Act, the Poisonous and Deleterious Substances Control Act, ionizing radiation-related laws, and other pertinent regulations. The aim of this endeavor is to maintain the health and welfare of everyone at the Kashiwa Campus by preventing accidents, fires, and other hazardous situations. Those in supervisory positions are especially urged to familiarize themselves with the information contained herein.

# Safety Management System

## System Overview

The Kashiwa Campus has established a system for ensuring proper safety management through the following chain of responsibility: school/institute head – department/division/facility heads – laboratory heads. All safety officers must be fully aware of their duties for maintaining safety and health.

## **Safety Management Organization**



## Environment, Health & Safety Office

The Kashiwa Campus Environment, Health & Safety Office oversees environment, health and safety management on campus and provides information to support such management. If you have inquiries or desire consultation on matters pertaining to environment, health and safety, contact the office at the extension or e-mail address below.

Extension: 63586 or 63585 (Health & Safety Team, Kashiwa General Administration Office)

E-mail: anzen@kj.u-tokyo.ac.jp

## Safety Patrols and Voluntary Inspections

Safety patrols and voluntary inspections shall be carried out regularly to prevent accidents, disasters, and environmental pollution.

### Patrols

- Patrols by the Kashiwa Campus Environment, Health & Safety Office (health & safety patrols, at least once a month)
- Patrols by health managers (at least once a week)
- Patrols by the occupational physician (at least once a month)

### Voluntary inspections

- Voluntary health and safety inspections by each laboratory
- Voluntary equipment inspections prescribed by law (inspections of local exhaust ventilation systems, pressurized containers, and other applicable equipment, at least once a year)

## Safety Education

- The purpose of safety education is to enlighten campus members on the hazards inherent in their research work and other activities so that they can take steps to protect themselves and prevent accidents.
- Safety education shall be provided to all campus members (including students) when they join the campus community and when they begin new activities or assignments. The Environment, Health & Safety Office shall regularly conduct seminars and other forms of training to serve that need.
- Campus members involved in activities requiring special training (changing grinding stones, arc welding, etc.) are required to acquire the necessary knowledge and skills by participating in special training seminars, etc.
- Fire drills shall be held at every building, in accordance with the fire response plan. All building residents and members of the building's firefighting team must actively participate in the drills and acquire a full understanding of the actions to be taken during a fire.
- Employees and students who use ionizing radiation (X-rays) or radioactive materials (radioisotopes: RI) must comply with the radiation safety rules of their department and participate in the specified training seminars.

# General Safety Practices

## Important Knowledge

Be prepared for emergencies by familiarizing yourself with the following:

- Contact information: Home phone numbers and other contact information for dealing with sudden illnesses, accidents, and other emergencies.
- Evacuation routes: The location of evacuation routes, emergency exits, and refuge areas.
- Emergency equipment: The location of fire extinguishers, fire alarms, fire hydrants, emergency showers, etc.
- AEDs: The location of AEDs (automated external defibrillators) at the security office (ext. 63010), the east entrance of the Frontier Sciences, Transdisciplinary Sciences Building, each department and the Kashiwa Campus Health Service Center. (Refer to p.60)



Know at least two evacuation routes



AED (automated external defibrillator)



Fire extinguishers are located in hallways and some rooms



Fire alarm (top) and hydrant (bottom)



Emergency showers are located in restrooms marked with this sign



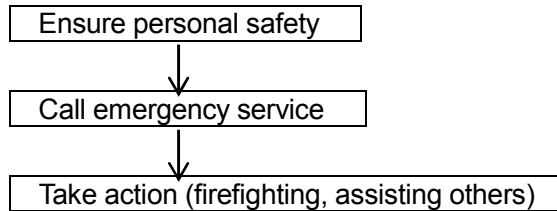
Emergency shower (wall-hanging type) : Pull the chain for a rinse. The shower will stop automatically.

## General Safety Rules

- Maintain two evacuation routes in different directions and keep them free of obstructions.
- When installing electrical wiring, thoroughly consider the amount of power to be used and the capacity of the electrical wires and outlets, so as to prevent overheating and short-circuiting. Refrain from the dangerous habit of plugging too many devices into the same outlet.
- When leaving your workplace, turn off the power to all devices that do not need to run at night.
- Use only heaters that are earthquake-proof, and do not place them near flammable objects.
- Smoke only in designated areas.
- In principle, keep laboratory doors closed at all times.
- When leaving laboratories and other rooms unoccupied, do a safety check and lock the doors.
- Do not lend your keycard to others. When using your keycard to enter/exit a room or building, do not allow strangers to pass through the door with you.
- When working with computers or other visual display terminals, do not continuously work for more than one hour. Take a break of 10 to 15 minutes before resuming work.
- When using a visual display terminal, make sure that the work area (keyboard, documents, etc.) is sufficiently illuminated, and adjust the screen's brightness to an appropriate level. Also, make sure that the screen is free of glare.
- When disposing of waste materials, chemicals, and liquids, properly sort them as prescribed by rules and regulations.
- See p. 59 for instructions on using an AED (automated external defibrillator) for cardiopulmonary resuscitation.

# Responding to Emergencies

## Basic Response Flow



See the back cover of this manual for emergency contact information.

## Responding to Fires

- Upon discovering a fire, first loudly alert others nearby.
- Press the fire alarm button (this will sound the bell and activate the hydrant pump).
- If during the day, call the administrative office of your department. After 5 p.m., call the Facility Center (ext. 63000). If no one answers, directly contact the fire department by dialing 0-119.
- Try to put out the fire with a fire extinguisher or hydrant, without exposing yourself to danger.
- Evacuate via the safest route.
- See the last page of this manual for details.

## Responding to Explosions

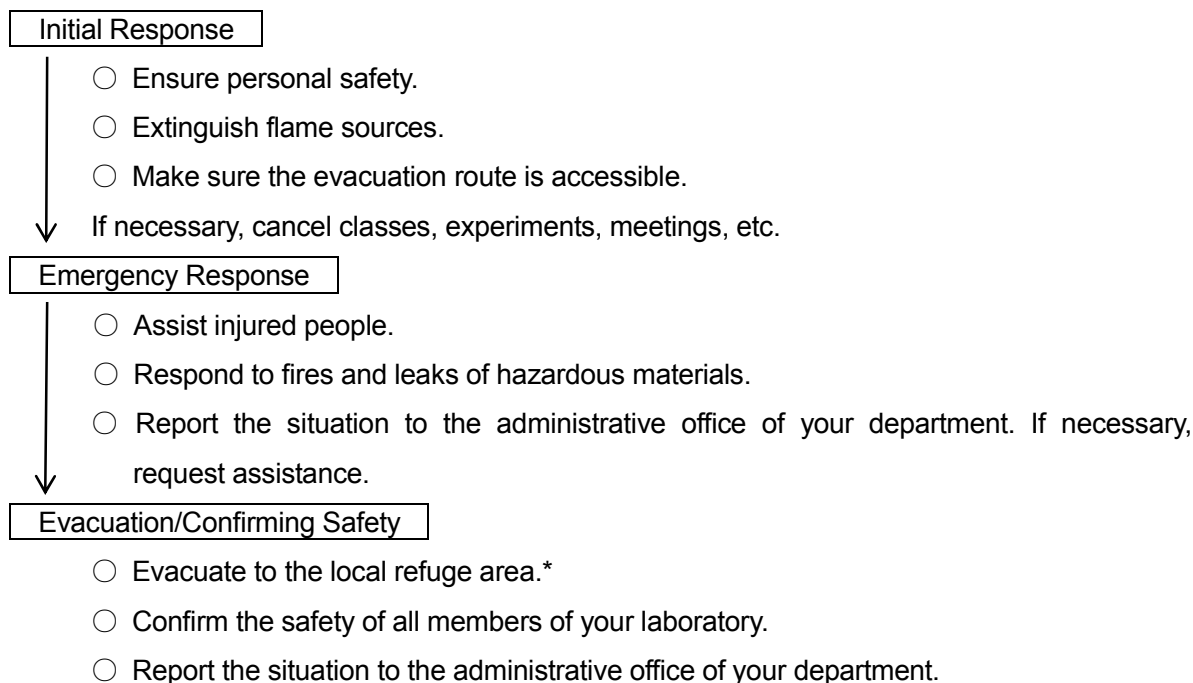
- Check the surroundings and assist anyone who has been injured.
- Immediately secure the device that caused the explosion to prevent further hazards. If this is difficult and there is a danger of further explosion, evacuate the premises immediately.
- In addition to examining the explosion source, check the surrounding area to avoid the risk of secondary accidents resulting from blast waves or flying debris.

## Responding to Chemical Leaks

- Immediately evacuate if the substance is extremely hazardous.
- When safely possible, stop the leak to prevent spreading.



## Responding to Earthquakes



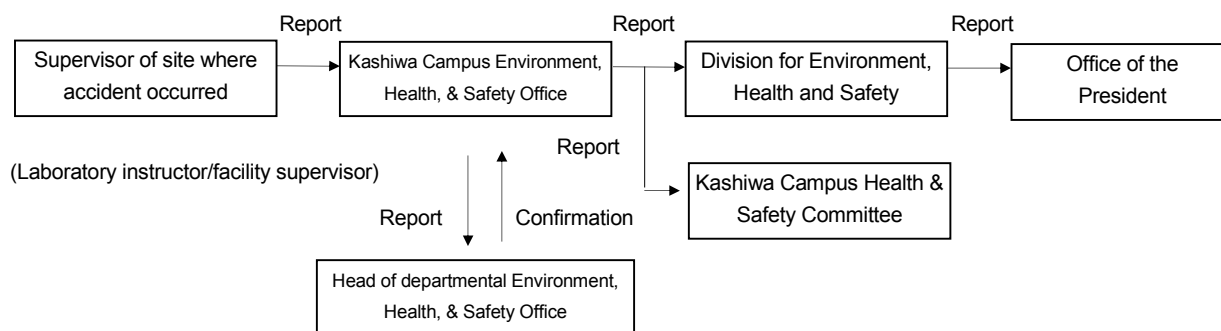
\*See the map of refuge areas on p. 21.

## Accident Reports

Whenever an accident occurs, immediately report it to the head of your department/division/facility and the Environment, Health & Safety Office.

**Note:** Promptly report accidents/disasters to your department's Environment, Health & Safety Office after taking action to assist victims and/or extinguish fires. Also, report each incident twice: first by phone, and second by submitting an Accident/Disaster Report.

### Flow of Reporting Procedure



## Office Safety

### When Using Visual Display Terminals

#### **Preventing eye fatigue**

- (1) Eyeglasses should have a focal length suited to the user's needs (being able to focus on objects 50 cm away is important).
- (2) To prevent eye dryness, keep your line of sight tilted downward and, if necessary, use eyedrops (refrain from sharing eyedrop dispensers with others).
- (3) To keep eye fatigue from building up, take a break of 10 to 15 minutes every hour.
- (4) Adjust the lighting of your work area to keep the monitor free of glare.
- (5) Use curtains or blinds to keep sunlight from causing glare or other visual problems.

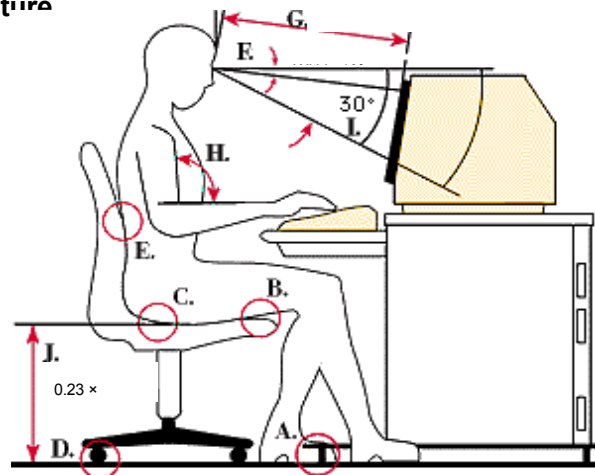
#### **Preventing body fatigue**

- (1) To prevent static muscle contraction, support your arms with a wrist rest, arm rests, etc. Maintain correct posture to reduce back strain.
- (2) To prevent chronic fatigue, take breaks regularly and use that time to do stretches and other fatigue-relieving exercises.

#### **Electromagnetic radiation**

There is no need to take measures against exposure to electromagnetic radiation from visual display terminals, such as wearing a protective apron or using a radiation filter screen (this includes pregnant women).

#### **Proper seated posture**



- A. Keep your feet flat on the floor.
- B. There should be a finger-wide space here.
- C. Adjust the seat height so that you can sit fully back in the chair.
- D. Use a stable chair that has a five-legged base.
- E. Use a chair that has a backrest with adjustable height/angle, and sit with your back against the backrest.
- F. The top of the screen should be viewed at an angle of depression of  $10^\circ$  or less.
- G. The screen should be at least 40 cm away from your eyes.
- H. Your arms should be bent at a comfortable angle that is no less than  $90^\circ$ .
- I. The bottom of the screen should be viewed at an angle of depression of  $30^\circ$  or less.
- J. The seat height should be 2 cm less than the height of your knees (this is because knee height decreases about 2 cm when seated), or 23% of your body height.

## Preventing Back Pain

### **When lifting heavy objects**

- (1) Generally, the maximum weight that can be handled by an adult male working alone is 55 kg, or 40% of body weight.
- (2) When working with a heavy object, stand as close to it as possible and keep your center of weight low.
- (3) When lifting, first position one foot slightly forward, and bend your knees to lower your hips sufficiently. Next, embrace the object and lift by extending your legs.
- (4) Use a work table of the proper height in order to reduce the frequency of bending at the waist.
- (5) When carrying a heavy object, keep your posture erect to limit twisting of your lower back.

### **Desk work**

- (1) Adjust your seat and desk as advised for visual display terminal work.
- (2) Position work-related items so that you can maintain natural posture when using them.
- (3) Regularly stand up and stretch your back.

### **Preventive exercise**

Exercise regularly to maintain the strength of your abdominal and back muscles.

### **Proper lifting technique**

Fig. a



Fig. b



Fig. a



Fig. b



Proper technique

Improper technique

# Compensation for Occupational Accidents

## Definitions

(1) Occupational accidents

Occupational accidents are work-related accidents that resulted in an employee's injury, illness, disability, or death. To qualify for occupational accident compensation, the accident must have occurred in the course of duties as an employee of the University of Tokyo.

(2) Compensation

Various forms of compensation are paid for occupational accidents, such as payment in kind for medical expenses, compensation for lost income, disability compensation, and survivor's compensation.

## Special-circumstance Occupational Accidents

(1) Accidents occurring during breaks

These accidents are eligible for compensation if they resulted from a fault in the facility or managerial practices.

(2) Accidents occurring during business trips

Since business trips are considered part of an employee's duties, these accidents are generally eligible for compensation, provided that they did not result from the employee's private activities.

## Commuting Accidents

(1) Commuting accidents are accidents that occurred during commuting to or from work and resulted in the employee's injury, illness, disability, or death. Although technically not considered occupational accidents, they are treated as the same for purposes of accident compensation.

(2) Accidents that occurred while deviating from the commuting path are not eligible for compensation. However, the following activities are considered exceptions.

- ① Purchasing of daily necessities, and similar activities
- ② Attending job training, school courses (such as evening high schools), and other such educational programs
- ③ Voting in elections, and similar activities
- ④ Receiving a medical examination or treatment at a hospital or clinic, and similar activities

## Filing for Compensation

Occupational accident insurance claims need to be filed with the local labor standards office by the employee or a family member, along with a certificate of occupational accident issued by the administrative office of the employee's division. In principle, claims must be filed within two years of the accident, or within five years if applying for disability or survivor's compensation.

# Maintaining Physical and Mental Health

## Health Exams

- (1) As a general rule, employees are expected to look after their health.
- (2) Personnel targeted by university-administered health exams are required to receive those exams. However, they may choose to receive equivalent exams at off-campus medical facilities instead, provided that they report the results to the university.
- (3) In addition to general health exams, the university requires specialized health exams for those involved in hazardous operations.
- (4) Employees are required to attend post-exam health guidance meetings, etc. when requested to do so.

## Mental Health

- (1) Depression is the most common mental health problem associated with work. If you experience any of the following symptoms, promptly seek consultation.
  - ① Insomnia, including frequent waking in the middle of the night or in the early morning
  - ② Not feeling fully rested after waking in the morning
  - ③ General loss of energy or interest
  - ④ Strong aversion to attending work
- (2) Consultation on mental health is offered at the university by the following providers.
  - ① Occupational physician, room #559b, 5th floor, ISSP Main Building, Ext. 63508
  - ② Department of Psychiatry, Kashiwa Campus Health Service Center, Ext. 63040

## Sexual Harassment

The University of Tokyo has established the following guidelines concerning sexual harassment.

- (1) Policy for Sexual Harassment
- (2) Declaration of Sexual Harassment Prevention

## **Consultation**

Consultation on sexual harassment is offered at the university by the following providers. The privacy of users is strictly protected, and no one is treated disadvantageously for seeking consultation.

- (1) Departmental counselors
- (2) Kashiwa Campus Harassment Counseling Center (room #162, 1st floor, General Research Building, Ext. 64495)
- (3) Kashiwa Campus Health Service Center (next to Plaza Ikoi, Ext. 63040)
- (4) Kashiwa Campus Student Counseling Center (room #117, 1st floor, Frontier Sciences, Environmental Studies Building, Ext. 63714)
- (5) Nandemo-Sodan (One-Stop Resources) Office Kashiwa Branch (room #2B5, 2nd floor, Frontier Sciences, Transdisciplinary Sciences Building, Ext. 64129)
- (6) Nandemo-Sodan (One-Stop Resources) Office (University of Tokyo Press (Second Refectory neighborhood), Hongo Campus, Ext. 27867)
- (7) Occupational physician (room #559b, 5th floor, ISSP Main Building, Ext. 63508)

# Laboratory Safety: General Rules

## Basic Safety Management

Be familiar with the hazards posed by the materials and equipment used in the laboratory, and with the pertinent safety regulations. Refer to material safety data sheets (MSDS), which are an effective tool for safety management. Also, consider replacing highly hazardous items with safer alternatives.



Formulate safety measures to prevent hazards from becoming accidents.



Conduct experiments and other lab work only when sufficient safety measures are in place.

## Safety Rules for Experiments

- (1) Keep the laboratory in a tidy state.
- (2) Do not leave an excessive quantity of chemicals on lab tables, and do not leave chemical containers on the floor.
- (3) Select goggles and other protective gear suited for the experiment.
- (4) Keep a serious attitude when performing experiments.
- (5) In principle, extremely hazardous tasks should not be performed at night or on holidays. Also, conduct such tasks in a group, never alone.
- (6) Prepare for accidents by familiarizing yourself with the locations of emergency exits, and the locations, types, and operation of fire extinguishers.
- (7) Whenever equipment must be left operating in an unattended laboratory, implement the necessary safety measures and post emergency contact information on the room door or in another highly visible location.
- (8) Although university laboratories tend to be perceived as exempt from external laws, they are in fact subject to the same health and safety regulations that apply to the laboratories of companies and other such organizations.
- (9) Eating and drinking are not allowed in laboratories.

# Laboratory Safety: Management of Hazardous Materials

## Chemical Management System

([https://utcris.adm.u-tokyo.ac.jp/CRIS\\_v1\\_0/index.aspx](https://utcris.adm.u-tokyo.ac.jp/CRIS_v1_0/index.aspx))

In the past, chemical management practices at the University of Tokyo varied by division and laboratory. However, a university-wide system was established in 2006 to require the appointment of a chemical safety manager for each laboratory to oversee the storage and amount of chemicals used. The purpose of this system is to ensure that chemicals are handled properly in compliance with the PRTR Act, the Poisonous and Deleterious Substances Control Act, the Fire Services Act, the Industrial Safety and Health Act, and other pertinent regulations.

The new system includes a computerized database to help laboratories to track their use of chemicals specified by the Industrial Safety and Health Act, a task that used to be performed in quarterly surveys. Since certain chemicals are subject to restrictions on the amount that may be stored in a particular building and area, make sure that your laboratory does not neglect to enter data on chemical quantities.

This system can also be used for management of compressed gas cylinders at the Hongo Campus. At the Kashiwa Campus, however, compressed gas cylinders are comprehensively managed at two local storage facilities, so use the high-pressure gas management system of the Cryogenic Service Laboratory at the Institute for Solid State Physics (see “Cryogenics and High-pressure Gas” below).

## Hazardous Materials

Below are common examples of hazardous materials, many of which are subject to regulations on their handling and storage. Other materials that pose the same degree of hazard as these must also be handled under sufficient safety measures, even when not stipulated by law.

- (1) Organic solvents: Types I–III (Industrial Safety and Health Act; Ordinance on Prevention of Organic Solvent Poisoning)
- (2) Specified chemical substances: Types I–III (Industrial Safety and Health Act; Ordinance on Prevention of Hazards Due to Specified Chemical Substances)
- (3) Poisonous substances: Poisonous substances and specified poisonous substances (Poisonous and Deleterious Substances Control Act)
- (4) Deleterious substances (Poisonous and Deleterious Substances Control Act)
- (5) Dangerous substances: Types I–VI (Fire Services Act)
- (6) High-pressure gases (High Pressure Gas Safety Act)
- (7) Special-material gases (High Pressure Gas Safety Act)
- (8) Biohazardous materials
- (9) Radioactive materials (see “Radiation and Radioactive Materials” below)

The materials listed above must be handled safely as indicated by your division’s safety manual. Promptly dispose of unneeded chemicals in order to keep them from ending up as unidentified substances.

## Before Handling Hazardous Materials

- (1) Before handling a particular chemical, you must ascertain its toxicity (acute toxicity and chronic toxicity, including carcinogenicity), flammability, explosiveness, and other such properties. Refer to the MSDS provided by the supplier.
- (2) Before handling a particular chemical, you must check whether it is subject to regulations. When statutory procedures are required, complete the necessary procedures after consulting with the Environment, Health & Safety Office.
- (3) When planning an experiment involving a material that is highly hazardous (due to toxicity, flammability, explosiveness, etc.), strive to minimize its use by thoroughly assessing the necessity of the material, the availability of safer alternatives, and other such considerations.
- (4) Safety management for chemicals is to be implemented under the leadership of each laboratory's chemical safety manager. In particular, materials regulated by the Ordinance on Prevention of Hazards Due to Specified Chemical Substances or the Ordinance on Prevention of Organic Solvent Poisoning in the Industrial Safety and Health Act must be handled appropriately as stipulated by the relevant law. These materials must be handled under detailed safety management, including the implementation of workplace environmental monitoring and specialized health exams for workers.

## Rules for Handling Hazardous Materials

- (1) Handling and transport of hazardous materials must be performed only by personnel with sufficient knowledge of the materials. In principle, administrative workers and other personnel who have not received training in hazardous materials handling should not be allowed to handle those materials.
- (2) Before using hazardous materials, consider measures to prevent fires and accidents, and take all necessary precautions. Personnel handling materials that pose a risk of fire or explosion must wear protective masks and heatproof clothing, and have fire extinguishers close at hand. Those handling materials that pose a risk of poisoning must wear protective masks, protective clothing, and other necessary safety gear.
- (3) Guard against splashing, scattering, leakage, and loss of hazardous materials. Use only sturdy containers with lids or stoppers to ensure that the contents do not spill, leak, seep, or evaporate.
- (4) Open-flame heaters must not be used in laboratories that use volatile solvents.
- (5) Know the location of fire extinguishers, and have them close at hand when performing tasks with a risk of fire.
- (6) Be sure to close the main gas valve before leaving a room unattended.
- (7) Before conducting a hazardous experiment, inform everyone in the vicinity and take the necessary safety precautions.
- (8) When working with hazardous materials, use only the minimum amount necessary. When using a material with unfamiliar properties, conduct a preliminary test on it.
- (9) When opening a glass ampoule containing a hazardous liquid, hold it inside a large container to guard against splashing.
- (10) The lids/stoppers of reagent bottles can become difficult to open as they age. If it is necessary to open such a bottle using a wrench or other tool, place a cloth or other soft material between the bottle and tool to prevent the bottle from breaking.
- (11) Do not dispose of hazardous materials together with general waste. Follow the specified procedures for chemical disposal.



## Rules for Storing Hazardous Materials

- (1) When storing large amounts of hazardous materials, separate them by class and store them in the proper facility as prescribed by law. Poisonous and deleterious substances must be stored in locked chemical cabinets.
- (2) Always close the lids/stoppers of chemical and liquid waste containers.
- (3) Regularly check the storage conditions and amount of hazardous materials in your custody, and implement the necessary measures for ensuring health and safety.
- (4) Generally, store hazardous materials in cool, shaded places away from open flame and other heat sources. Also, do not mix different materials for storage.
- (5) Implement the safety measures needed to prevent containers from breaking as a result of falling, toppling, or colliding during an earthquake. Also, store different chemicals in separate locations when there is a risk of fire or explosion due to spilling or mixing in an earthquake.
- (6) Loss or theft of hazardous materials may result in serious consequences, so be sure to report all such incidents to the materials manager.

## Material Safety Data Sheets

Below are the types of information included on MSDS. Information marked with an asterisk must be known by personnel who handle the material.

- (1) \*Name of material and supplier
- (2) \*Composition, ingredients
- (3) \*Hazard summary
- (4) \*First aid measures
- (5) Firefighting measures
- (6) \*Measures for responding to leaks
- (7) \*Precautions on handling and storage
- (8) Measures for protection and preventing exposure
- (9) \*Physical and chemical properties
- (10) Stability, reactivity
- (11) \*Hazardousness
- (12) Environmental impact
- (13) Precautions on disposal
- (14) Precautions on transport
- (15) Applicable laws
- (16) Other information

MSDS can be obtained from the material's manufacturer or distributor. (<http://www.siyaku.com/>)

## Laboratory Safety: Hazardous Operations

- (1) Implement sufficient protective measures and use extreme caution when handling equipment involving high temperature, high pressure, high voltage, high speed, or heavy weight.
- (2) When handling equipment with which you have little experience, carefully prepare for its use and, if possible, check all parts. Those using equipment for the first time must receive instruction beforehand from an experienced person.
- (3) Equipment requiring proficiency to operate should be handled only after undergoing training in basic operation, as unskilled use may result in a serious accident.
- (4) Always check equipment carefully after use. If any disorder is found, fix it or ensure that the next user is aware of the situation.
- (5) Try to minimize noise, vibration, odors, and other nuisances in your work environment, such as by improving work processes through the selection of low-vibration devices/tools and other equipment that does not release high levels of harmful energy.
- (6) Always maintain protective gear in optimum condition, and inform all workers of the gear's location.
- (7) Make sure that all workers fully understand how to use protective gear, and provide them with training in proper usage when necessary.
- (8) Make sure that protective equipment is disinfected and stored in a clean location after use.

## Laboratory Safety: Environmental Safety

All campus members involved in educational and research activities need to implement safety measures to prevent those activities from having negative effects on the environment within and outside the university.

- (1) The Environmental Science Center leads efforts to minimize the university's waste output and ensure safe disposal. Properly dispose of waste materials in accordance with the Center's instructions.
- (2) Disposal of chemicals considered harmful must be performed properly, even if the chemical is not a regulated substance.
- (3) Waste materials from medical activities and experiments involving living organisms must be processed properly at the source.
- (4) Large volumes of sewage, garbage, and paper waste are generated on campus on a daily basis. Constantly strive to reduce that output and consider measures for addressing the underlying causes of waste generation.
- (5) Actively pursue measures for conserving resources and energy, such as by sorting waste into recyclable categories (paper, metal, bottles, etc.) and by developing disposal methods that can recycle liquid waste, waste reagents, etc.
- (6) Chemicals that have lost their labels or otherwise become unidentified pose a threat to safety and entail enormous effort and costs for disposal, so make sure that all chemicals remain readily identifiable. This can be done by properly managing chemical supplies and waste with an inventory control system, promptly disposing of unneeded chemicals, and keeping chemical purchases to the minimum amount necessary. Also, chemicals often become unidentified when kept in sample containers, so be sure to promptly label such containers and dispose of their contents once they become unneeded.

## Laboratory Safety: Radiation and Radioactive Materials

- (1) Radiation and radioactive materials must be handled properly in accordance with the division's radiation safety rules.
- (2) Radiation and radioactive materials must be handled only in authorized radiation-control areas.
- (3) The fundamental principle for using radiation and radioactive materials is that the resulting benefits must outweigh the risks involved.
- (4) Those who wish to handle radiation (X-rays) or radioactive materials must first register in accordance with their division's radiation safety rules, undergo the training seminars held by the university and their division, and receive a specialized medical exam.
- (5) Those planning to use X-ray diffraction equipment or other such devices must complete the necessary X-ray operator procedures and comply with the instructions of the X-ray operation supervisor or the person in charge of the equipment in question (safety management is conducted in accordance with the Ordinance on Prevention of Ionizing Radiation Hazards). Management of synchrotron radiation facilities is regulated under the Radiation Hazard Prevention Act, so those planning to use such facilities need to register as radiation handlers under the same procedures for radioactive material handlers.
- (6) In the event of an emergency, notify the laboratory supervisor and the on-site person in charge, and contact the division's radiation safety manager.
- (7) Those who wish to use radiation facilities in other university divisions will need to present certification of their registration as radiation handlers. To obtain a certificate, contact your division's radiation management office.

## Laboratory Safety: Cryogenics and High-pressure Gas

- (1) Cryogenics (liquid nitrogen, liquid helium, etc.) and high-pressure gas must be handled properly in accordance with the Kashiwa Campus high-pressure gas management manual and the Kashiwa Campus rules on compressed gas cylinder handling.
- (2) Those who wish to use cryogenics or high-pressure gas must first undergo the training seminar held by the Cryogenic Service Laboratory (Institute for Solid State Physics) under the High Pressure Gas Safety Act. For details contact the Laboratory or visit its website at <http://www.issp.u-tokyo.ac.jp/labs/cryogenic/>.
- (3) When using cryogenics indoors, keep the room ventilated and take other steps to prevent asphyxiation. The use of an oxygen analyzer or other such safety devices is strongly recommended.
- (4) When handling cryogenics, take care to prevent frostbite, such as by wearing protective gloves. In case of minor frostbite, treat the affected area by immersing it in lukewarm water. In serious cases, immediately seek medical attention.
- (5) When handling high-pressure gas, take care to prevent explosions and other hazards. Note that sudden opening or closing of high-pressure gas valves can lead to accidents.
- (6) In the event of an emergency, notify the laboratory supervisor and the on-site person in charge, and contact the Kashiwa Campus Environment, Health & Safety Office.
- (7) Before installing experimental equipment subject to the High Pressure Gas Safety Act, consult with the Kashiwa Campus Environment, Health & Safety Office.
- (8) Do not touch equipment in a high-pressure gas manufacturing area.

## Laboratory Safety: Regulations on Carrying Hazardous Materials on Public Transportation

- (1) Carrying certain materials is either prohibited or restricted on public transportation. Take every care to avoid violating these regulations, and always use the appropriate means of transporting permissible laboratory chemicals/materials that are hazardous or contain hazardous substances.

### Examples of regulated materials

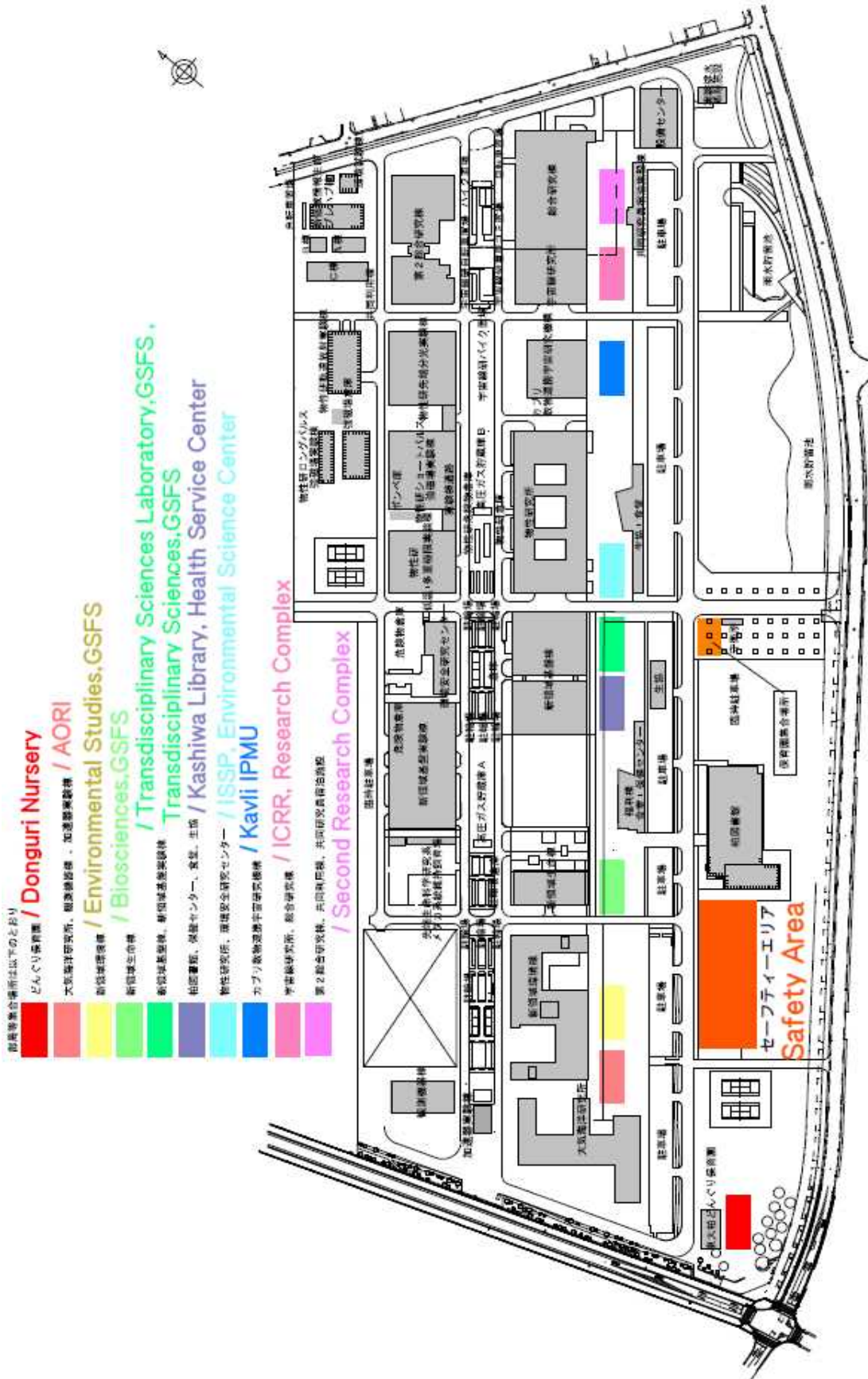
- explosives   ■ high-pressure/liquefied gases   ■ oilpaper
- flammable liquids/solids   ■ acids   ■ oxidized corrosives   ■ volatile toxins
- radioactive materials   ■ celluloids   ■ agrochemicals

- (2) If you plan to use public transportation to carry laboratory chemicals/materials that are hazardous or contain hazardous substances, be sure to pre-check for restrictions by referring to the information resources below and by consulting with the public transportation operator.

#### Restrictions on materials, amounts, etc. (in Japanese)

- JR East Regulations on Passenger Operations: Chapter 10 “Personal Items”  
[http://www.jreast.co.jp/ryokaku/02\\_hen/10\\_syo/01\\_setsu/index.html](http://www.jreast.co.jp/ryokaku/02_hen/10_syo/01_setsu/index.html)
- JR East Regulations on Passenger Operations: Annex 4  
[http://railway.jr-central.co.jp/ticket-rule/cjr-regulation/\\_pdf/000021424.pdf](http://railway.jr-central.co.jp/ticket-rule/cjr-regulation/_pdf/000021424.pdf)
- Ordinance for Enforcement of the Civil Aeronautics Act  
[http://www.mlit.go.jp/koku/03\\_information/15\\_kikenbutsu/kisoku.html](http://www.mlit.go.jp/koku/03_information/15_kikenbutsu/kisoku.html)
- Ordinance on Ship Transport and Storage of Hazardous Materials  
<http://law.e-gov.go.jp/htmldata/S32/S32F03901000030.html>

## Earthquake Refuge Area



## Health and Safety When Abroad

Travel to other countries can result in exposure to various illnesses and hazards different from those encountered in Japan. Accordingly, campus members who engage in educational or research activities overseas need to have proper knowledge and awareness of those risks. When traveling abroad, look after your health and safety by following the instructions listed below.

### I. Before Leaving Japan

- (1) Notify your division regarding where you will go, the length of your stay, and your activity schedule in accordance with the division's requirements.
- (2) Look up the contact information of your country's diplomatic office in the destination region.
- (3) Check the following websites (in Japanese) for information on hazards of your destination.
  - Ministry of Foreign Affairs:  
<http://www.pubanzen.mofa.go.jp/>
  - Japan International Cooperation Agency (JICA):  
<http://www.jica.go.jp/seikatsu/index.html>
- (4) Check the following websites (in Japanese) for information on infectious diseases, vaccinations, and healthcare in the country of your destination. If necessary, seek medical consultation regarding the need for vaccinations.
  - The Internal Medicine Clinic, The University of Tokyo Health Service Center provides medical consultation for students and staff planning overseas travel.:  
<http://www.hc.u-tokyo.ac.jp/>
  - Ministry of Health, Labour and Welfare, Quarantine Station:  
<http://www.forth.go.jp/destinations/index.html>
  - Japan International Cooperation Agency (JICA):  
<http://www.jica.go.jp/seikatsu/index.html>
  - Ministry of Foreign Affairs:  
<http://www.mofa.go.jp/mofaj/toko/medi/index.html>

Note that some West African countries require visitors to be pre-vaccinated against yellow fever.
- (5) Make a photocopy of your passport.

For further information on overseas healthcare, contact the University of Tokyo's Division for Environment, Health and Safety (e-mail: [anei-2@adm.u-tokyo.ac.jp](mailto:anei-2@adm.u-tokyo.ac.jp)).



## II. When Overseas

Be sure to abide by the following general precautions for overseas travel.

- (1) Avoid dangerous regions and places.
- (2) Act appropriately, based on full awareness of local laws, regulations, and customs.
- (3) Look after your health and guard yourself against infectious diseases.
- (4) Look after your safety, including at your lodgings.
- (5) If you become threatened with robbery or other crime, do not resist more than necessary, as the perpetrator may be armed.

Japanese diplomatic offices overseas offer the following services for Japanese nationals. Campus members of other nationalities should contact their country's diplomatic office to find out what services are available to them.

- (1) Information on entering and staying in the country.
- (2) Reissuing of passports and issuing of various certificates
- (3) Consultation on health-related matters
- (4) Support and advice regarding arrests and emergency hospitalization
- (5) Support and advice for those involved in accidents or other incidents
- (6) Support for emergency contact and evacuation in natural disasters, riots, war, etc.

## Chemicals Specified by the Industrial Safety and Health Act

### Type I Substances

Dichlorobenzidine and its salts	α-Naphthylamine	Polychlorinated biphenyl
Orthotolidine and its salts	Dianisidine and its salts	Beryllium and its compounds

(The thing contained exceeding 3% by weight, if it is in an alloy)

Formulations, etc. that contain any of the substances above in an amount exceeding 1% by weight

Benzotrichloride

Formulations, etc. that contain benzotrichloride in an amount exceeding 0.5% by weight

### Type II Substances

[Specified Type-2 Substances]

Acrylamide	Acrylonitrile	Ethylenimine	Ethylene oxide
Vinyl chloride	Chlorine	Chloromethyl methyl ether	Propylene oxide
Hydrogen cyanide	3,3'-dichloro-4,4'-diaminodiphenylmethane		1,1-dimethylhydrazine
Bromomethane	Tolylene diisocyanate	Nickel carbonyl	para-Dimethylaminoazobenzene
Hydrogen fluoride	para-Nitrochlorobenzene	Benzene	β-Propiolactone
Formaldehyde	Methyl iodide	Hydrogen sulfide	Dimethyl sulphate
Phosphoric acid dimethyl	2,2-dichloroethenyl		
Naphthalene	RCF		

[Special organic solvent etc.]

[Ethylbenzene etc.]

Ethylbenzene

[1,2-Dichloropropane etc.]

1,2-Dichloropropane      Formulations, etc. that contain 1,2-Dichloropropane in an amount exceeding 1% by weight

[Chloroform etc.]

Chloroform	Carbon tetrachloride	1,4-dioxane	1,2-dichloroethane	Dichloromethane	Styrene
1,1,2,2-tetrachloroethane	Tetrachloroethylene	Trichloroethylene	Methyl isobutyl ketone		

[Auramine etc. ]

Auramine                      Magenta

### [Controlled Type-2 Substances]

Alkyl mercury compounds (limited to those in which the alkyl group is methyl or ethyl)                      Indium compounds

Ortho phthalodinitrile                      Cadmium and its compounds      Chromic acid and its salts                      Vanadium pentoxide

Cobalt and its inorganic compound      Coal tar                      Sodium cyanide                      Potassium cyanide

Dichromatic and its salts                      Mercury and its inorganic compounds (excl. mercuric sulfide)

Nickel compounds (powdery state; excl. nickel carbonyl)                      Nitroglycol

Arsenic and its compounds (excl. arsine and gallium arsenide)      ※incl. arsenic trioxide

Pentachlorophenol and its sodium salts

Manganese and its compounds (excl. basic manganese oxides)

### Type III Substances

Ammonia	Hydrogen chloride	Sulfur dioxide	Phosgene
Carbon monoxide	Nitric acid	Phenol	Sulfuric acid

## Organic Solvents Specified by the Industrial Safety and Health Act

The following three classifications also apply to formulations, etc. that contain any of the substances below in an amount exceeding 5% by weight.

### Type I Organic Solvents, etc.

1,2-dichloroethylene      Carbon disulfide

### Type II Organic Solvents, etc.

Acetone	Isobutyl alcohol	Isopropyl alcohol	Isopentyl alcohol	Ethyl ether	
Ethylene glycol monoethyl ether	Ethylene glycol monoethyl ether acetate			Ethylene glycol mono-n-butyl ether	
Ethylene glycol monomethyl ether	1,2-dichlorobenzene	Xylene	Cresol	Chlorobenzene	
Isobutyl acetate	Isopropyl acetate	Isopentyl acetate	Ethyl acetate	n-Butyl acetate	
n-Propyl acetate	n-Amyl acetate	Methyl acetate	Cyclohexanol	Cyclohexanone	
N,N-dimethylformamide	Tetrahydrofuran	1,1,1-trichloroethane	Toluene	n-hexane	
1-butanol	2-butanol	Methanol	Methyl ethyl ketone	Methylcyclohexanol	
Methylcyclohexanone	2-Methyl-n-butyl ketone				

### Type III Organic Solvents, etc.

Gasoline	Coal tar naptha	Petroleum ether
Petroleum benzene	Turpentine	Mineral spirits

Petroleum naptha

## Acrylamide Use and Workplace Environmental Monitoring

Acrylamide is classified as a Type II Substances by the Industrial Safety and Health Act (ISHA), and is one of the most frequently used ISHA-specified chemicals at the University of Tokyo. The ISHA requires organizations using Type I and Type II Substances to carry out workplace environmental monitoring and have the relevant personnel receive specialized medical exams. Acrylamide can cause skin disorders, neural damage, cancer, and other adverse health conditions. Generally, the level of these risks is considerably higher when acrylamide is used in powdered form, as opposed to gels or solutions. For this reason, all laboratories must observe the following rules regarding acrylamide use.

1. Always strive to use commercially available acrylamide gels or solutions. Use powdered acrylamide only when special circumstances necessitate its use.
2. When using powder acrylamide (including the making of acrylamide solutions), be sure to record the amount of acrylamide used in the chemical use management log. Should the record already include the data of acrylamide solution, please note this fact in the comment column.

## Handling of Explosive and Ignitable/Combustible Substances

### 1. General Precautions

- (a) Before handling any hazardous material, be sure to fully ascertain all risks that it poses, including with regard to explosiveness (explosive limits), ignitability/combustibility (ignition point, flash point), and toxicity (threshold limit value, lethal dose), and consult with an experienced user. Also, take measures to minimize damage caused by the material in the event of an accident. Material safety data sheets provide important hazard-related information, so obtain and read a copy of the MSDS issued for the material you plan to use.
- (b) The following types of experiments require extra caution.
  - 1. Operations and reactions involving unknown hazards
  - 2. Operations and material handling involving multiple, diverse hazards
  - 3. Experiments involving both ignitability/explosiveness and toxicity
  - 4. Experiments involving reactions near hazardous thresholds (high pressure, high/low temperature)
- (c) Comply with the following important instructions when performing any experiment.
  - 1. Always wear safety glasses/goggles. Depending on the nature of the experiment, also use other appropriate protective gear, such as gloves, face shield, respirator, wire mesh, and safety screen.
  - 2. Check the location of fire extinguishers. When performing an operation that clearly poses a fire hazard, have fire extinguishers close at hand.
  - 3. If your eyes or skin come into contact with a hazardous chemical, immediately flush the affected area with water for more than 15 minutes and, if necessary, seek medical attention.
  - 4. Close the main gas valve before leaving the room unattended.
  - 5. Before disposing of a hazardous substance, take the necessary procedures to neutralize it.
- (d) Before conducting a hazardous experiment, inform everyone in the vicinity and take the necessary safety precautions.

### 2. Handling of Explosive and Ignitable/Combustible Substances

Depending on the ambient conditions, explosive and ignitable/combustible substances may cause explosions or fires when exposed to heat, flames, shock, friction, contact with other chemicals, or other stimuli. For this reason, handling, storage, and disposal of such substances must be done with extreme caution, based on full understanding of the hazards involved. The subsections below provide examples of substances that pose explosion/fire hazards.

#### 2.1 Explosive Substances

Substances that ignite or explode when subjected to heat, flames, shock, or friction, such as: chemicals with N-O, N-N, O-O, or O-halogen bonds; acetylene and its heavy-metal salts and halogen derivatives; and heavy-metal salts of oxalic acid (see Appendix 1 p.29 - p.31). The following precautions must be observed when handling these substances.

- (a) Do not handle explosive compounds/mixtures in large quantities.

- (b) Exothermic reactions may become uncontrollable. Use sufficient caution to avoid this hazard.
- (c) Do not use metal spatulas or glass stoppers to handle explosive compounds/mixtures, since these utensils can be a source of shock or friction.
- (d) Follow the same precautions prescribed for flammable/combustible substances.

## 2.2 Flammable/combustible Substances

Substances that do not ignite simply from exposure to air, but readily ignite in the presence of an ignition source. Flammable substances include ethers, carbon disulfide, acetone, hexane, benzene, and ethanol. Combustible substances include hydrogen, carbon monoxide, methane, ethylene, ammonia, and other combustible gases. The following precautions must be observed when handling these substances.

- (a) Take care to prevent accidental release of the gases/vapors of these substances.
- (b) Know the flash point, ignition point, explosive limits, and other properties of these substances.
- (c) Keep ignition sources away from these substances. Ignition sources include open flames (gas torches, etc.), electrical sparks, red-hot objects, and burning cigarettes.
- (d) Before processing glass containers holding these any of substances, be sure to purge them with air, nitrogen, or water vapor.
- (e) Check the location of fire extinguishers. When performing an operation that clearly poses a fire hazard, have fire extinguishers close at hand.
- (f) In general, solvent vapors are heavier than air and hence tend to spread across the floor. Consequently, even ignition sources located far away may cause the vapors to ignite or explode, so always be aware of this hazard.
- (g) In many cases, the vapor in the upper space of solvent containers is within its explosive limits. Be sure to keep the containers tightly sealed, and be especially cautious of ignition sources when dispensing small amounts of the solvent.
- (h) When distilling or refluxing flammable solvents, make sure that an adequate flow of cooling water is maintained and exercise caution regarding chemicals/equipment in the vicinity.
- (i) Ether and other volatile solvents should not be stored in the laboratory for long periods.

## 2.3 Pyrophoric Substances

Substances that readily generate heat or ignite when exposed to air, such as: organolithium, organoaluminum, yellow white phosphorus, reduced nickel, reduced palladium, silane, and phosphine. The following precautions must be observed when handling these substances.

- (a) These substances can ignite upon contact with air, so handle them only in a nitrogen- or argon-filled glove box.
- (b) These substances can ignite solvents, so do not place solvents in their vicinity.

## 2.4 Water-reactive Substances

Substances that generate heat or ignite upon contact with water, such as: alkaline metal, metal hydride, metal carbide, and organometallic compounds. The following precautions must be observed when handling these substances.

- (a) Take care to prevent these substances from coming into contact with moisture or skin.
- (b) Have dry sand on hand.
- (c) Before disposing of these substances, take the necessary procedures to neutralize them.

## 2.5 Hazardous Mixtures

In some cases, mixtures of two or more chemicals pose a greater degree of hazard than posed by each chemical alone. Hazards include the formation of products that are toxic or corrosive, and the risk of fire/explosion. This section focuses on the latter hazard.

Appendix 2 lists chemicals that, when mixed with certain other substances, readily generate heat, ignite, or form ignitable/explosive substances. Examples of combinations that readily generate heat or ignite upon contact include mixtures of oxidizing substances (sodium peroxide, chromium anhydride, potassium permanganate, calcium hypochlorite, etc.) and combustible substances, and mixtures of oxy-halogen acid salts (potassium chlorite, potassium chlorate, potassium bromate, etc.) and strong acids (concentrated sulfuric acid, etc.). Although not listed, pyrophoric/water-reactive substances (chemicals that generate heat or ignite upon contact with air or water) are also chemicals that pose mixture hazards.

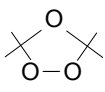
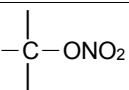
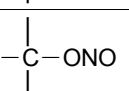
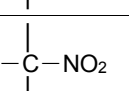
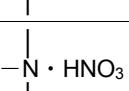
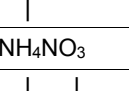
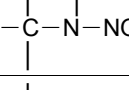
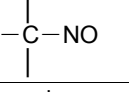
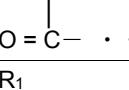
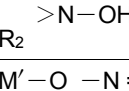
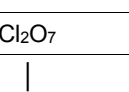
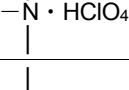

In order to prevent the accidental mixture of incompatible chemicals, one must become familiar with the combinations of chemicals that pose mixture hazards, and safely handle those chemicals during experiments. Also, it is important to implement measures to prevent fires resulting from the inadvertent mixture of chemicals during an earthquake. This includes taking steps to keep chemical containers from falling and rupturing (such as by anchoring storage cabinets or installing topple-proof cabinets), and planning a safe storage layout that avoids the potential for fires in the event that chemical containers release their contents.

Note that Appendix 2 is not an exhaustive list, as there are innumerable possible combinations of chemicals. Consequently, never assume that combinations not included in Appendix 2 are harmless. Before working with an unfamiliar combination, be sure to look up information on its hazards in *Bretherick's Handbook of Reactive Chemical Hazards* and other resources. The chemical hazard information in this manual was compiled with reference to the 2003 edition of the University of Tokyo Faculty and Graduate School of Engineering's safety manual.

※Appendix 2 (p.32 - p.33)

## Appendix 1: Structure and Formation of Explosive Compounds

Source: Chemical Society of Japan, *Safety Guide for Chemical Experiments*, 4th Ed. (Maruzen, 1999)

Bond	Explosive Compound	Chemical Structure	Formation Reaction
O—O	Conc. hydrogen peroxide solution	H <sub>2</sub> O <sub>2</sub>	
	Organic peroxides	R—O—O—R'	Alcohol + H <sub>2</sub> O <sub>2</sub> Halide + H <sub>2</sub> O <sub>2</sub> Aldehyde + H <sub>2</sub> O <sub>2</sub> Ketone + H <sub>2</sub> O <sub>2</sub> Carboxylic acid + H <sub>2</sub> O <sub>2</sub> Ether + O <sub>2</sub>
	Ozonides		Unsaturated hydrocarbon + O <sub>3</sub>
N—O	Nitrate esters		Alcohol + HNO <sub>3</sub> Carbohydrate + HNO <sub>3</sub>
	Nitrite esters		Alcohol + HNO <sub>2</sub> Halide + M'NO <sub>2</sub>
	Nitro compounds		Halide + M'NO <sub>2</sub> Hydrocarbon, etc. + HNO <sub>3</sub>
	Amine nitrates		Amine + HNO <sub>3</sub>
	Ammonium nitrate	NH <sub>4</sub> NO <sub>3</sub>	NH <sub>3</sub> +HNO <sub>3</sub>
	Nitramines		Dehydration of amine nitrates Amine + HNO <sub>3</sub>
	Nitroso compounds		Phenol + HNO <sub>2</sub>
	Ketone oximes		
	Hydroxylamine derivatives		
	Fulminates	M'—O—N=C	Metal nitrate + nitric acid + alcohol
X—O	Dichlorine heptoxide	Cl <sub>2</sub> O <sub>7</sub>	
	Amine perchlorates		
	Perchlorate esters		Alcohol + HClO <sub>4</sub>
	Perchloryl compounds		
	Chloric acid	HClO <sub>3</sub>	M'ClO <sub>3</sub> + acid
	Chlorine dioxide	ClO <sub>2</sub>	M'ClO <sub>2</sub> + acid

N—N	Diazo oxides	$\begin{array}{c}   \qquad \qquad   \\ \text{N}_2=\text{C} \cdots \cdots \text{C}=\text{O} \end{array}$	$\begin{array}{c}   \qquad \qquad   \\ \text{H}_2\text{N}-\text{C} \cdots \cdots \text{C}-\text{OH} \\ +\text{HNO}_2+\text{HX} \end{array}$
	Hydrazine derivatives	$\begin{array}{c}   \qquad   \\ -\text{N}-\text{N}- \end{array}$	
	Hydrogen azide	$\text{HN}_3$	Metal azide + acid
	Heavy-metal azides	$\text{M}'\text{N}_3$	$\begin{array}{c} \text{NaNH}_2 \quad \text{N}_2\text{H}_4 \\ + \qquad + \\ \text{N}_2\text{O} \quad \text{NaNO}_2 \\ + \\ \text{RONO} \\ \swarrow \searrow \\ \leftarrow \text{NaN}_3 + \text{heavy-metal salt} \end{array}$
	Halogen azides	$\text{XN}_3$	$\text{NaN}_3$ + halogen or hypohalite
	Organic azides	$\begin{array}{c}   \\ -\text{C}-\text{N}_3 \\   \end{array}$	Halide + $\text{NaN}_3$
	Isotetracene derivatives		
	Long-chain nitrogen compounds		
N—M	Nitrides	$\text{M}_3\text{N}$	
	Imides	$\text{M}_2\text{NH}$	
	Amides	$\text{M}'\text{NH}_2$	
	Amine metal complexes		$\text{MX} + x\text{NH}_3$
N—X	Nitrogen halides	$\text{NX}_3$	$\text{X}_2$ or $\text{M}'\text{XO} + \text{NH}_3$ or ammonium salt
	Nitrogen sulfide	$\text{N}_4\text{S}_4$	$\text{SCl}_2$ or $\text{S}_2\text{Cl}_2 + \text{NH}_3$
C—C	Acetylene	$\text{HC}\equiv\text{CH}$	$\text{CaC}_2 + \text{H}_2\text{O}$
	Heavy-metal acetylides	$\text{MC}\equiv\text{CM}'$	Heavy-metal salt + $\text{C}_2\text{H}_2$
	Acetylene halides	$\text{X}-\text{C}\equiv\text{C}-\text{X}$	
	Polyacetylene, acetylene derivatives, etc. and their halogen or heavy-metal derivatives		
	Heavy metal salts of oxalic acid	$\begin{array}{c} \text{COO M}' \\   \\ \text{COO M}' \end{array}$	$\begin{array}{c} \text{COO H} \\   \\ \text{COO H} \end{array} + \text{heavy-metal salt}$
	Ethylene oxide	$\begin{array}{c} \text{CH}_2 \diagup \\   \qquad \text{O} \\ \text{CH}_2 \diagdown \end{array}$	
X—O	Heavy-metal salts of chloric acid	$\text{M}'\text{ClO}_3$	$\text{KClO}_3$ + heavy-metal salt, heavy metal, Hg, Ag, Pb
	Ammonium chlorate	$\text{NH}_4\text{ClO}_3$	$\text{M}'\text{ClO}_3 + \text{NH}_3$ or ammonium salts
	Amine chlorates	$\begin{array}{c}   \\ -\text{N} \cdot \text{HClO}_3 \\   \end{array}$	$\text{M}'\text{ClO}_3$ + amine acid
	Chloric acid esters	$\begin{array}{c}   \\ -\text{C}-\text{OCIO}_2 \\   \end{array}$	



	Chlorites	$M'ClO_2$	
	Hypochlorous acid	$HClO$	
	Chlorine monoxide	$Cl_2O$	
	Hypochlorites	$MClO$	
	Hypochlorous acid esters	$\begin{array}{c}   \\ -C-OCI \\   \end{array}$	
	Amine bromates	$\begin{array}{c}   \\ -N \cdot HBrO_3 \\   \end{array}$	
	Ammonium bromate	$NH_4BrO_3$	
	Amine iodates	$\begin{array}{c}   \\ -N \cdot HIO_3 \\   \end{array}$	
	Ammonium iodate	$NH_4IO_3$	
	Permanganic acid	$HMnO_4$	$MMnO_4 + H_2SO_4$
	Dimanganese heptoxide	$Mn_2O_7$	$MMnO_4 + H_2SO_4$
	Ammonium permanganate	$NH_4MnO_4$	$MMnO_4 + \text{ammonium salt}$
	Amine permanganates	$\begin{array}{c}   \\ -N \cdot HMnO_4 \\   \end{array}$	
	Ammonium dichromate	$(NH_4)_2Cr_2O_7$	$M_2Cr_2O_7 + \text{ammonium salt}$
	Amine dichromates	$\left( \begin{array}{c}   \\ -N \cdot \\   \end{array} \right)_2 H_2Cr_2O_7$	
N—N	Amine nitrites	$\begin{array}{c}   \\ -N \cdot HNO_2 \\   \end{array}$	Amine + $HNO_2$
	Ammonium nitrite	$NH_4NO_2$	$MNO_2 + NH_4X$
	Nitrosamines	$\begin{array}{c}   \quad   \\ -C-N-NO \\   \end{array}$	$\begin{array}{c}   \quad   \\ -C-N+HNO_2 \\   \quad   \\ H \end{array}$
	Diazonium salts	$\begin{array}{c}   \\ -C-N^+ \equiv : \\   \quad X^- \end{array}$	Amine + $HNO_2 + HX$

## Appendix 2: Chemical Mixtures Posing Fire/Explosion Hazards

Source: Chemical Society of Japan, *Safety Guide for Chemical Experiments*, 4th Ed. (Maruzen, 1999).

The following lists are arranged by chemical structure and were compiled with reference to the US National Fire Protection Association's *Manual of Hazardous Chemical Reaction 491M* (1975).

### 1. Oxidizing Substances and Combustible Substances

#### (1) Oxidizing substances

(a) Oxy-halogen acid salts:	Perchlorates, chlorates, bromates, iodates, chlorites, hypochlorites, etc.
(b) Metal peroxides, hydrogen peroxide:	Metal peroxides: potassium peroxide, calcium peroxide, etc.
(c) Permanganates:	Potassium permanganate, etc.
(d) Dichromates:	Dichromate potassium, etc.
(e) Nitrates:	Potassium nitrate, sodium nitrate, ammonium nitrate, etc.
(f) Nitric acid, fuming nitric acid	
(g) Sulfuric acid, fuming sulfuric acid, sulfur trioxide, chlorosulfuric acid	
(h) Chromium (III) oxide	
(i) Perchloric acid	
(j) Peroxodisulfuric acid	
(k) Chlorine oxides:	Chlorine dioxide, chlorine monoxide
(l) Nitrogen dioxide (nitrogen tetroxide)	
(m) Halogens:	Fluorine, chlorine, bromine, iodine, chlorine trifluoride, bromine trifluoride, iodine trifluoride, chlorine pentafluoride, bromine pentafluoride, iodine pentafluoride
(n) Nitrogen halides:	Nitrogen trifluoride, nitrogen trichloride, nitrogen tribromide, nitrogen triiodide

#### (2) Combustible substances

(a) Non-metal elemental substances:	Phosphorus, sulfur, activated carbon, etc.
(b) Metals:	Magnesium, zinc, aluminum, etc.
(c) Sulfide:	Phosphorus sulfide, antimony sulfide, hydrogen sulfide, carbon bisulfide, etc.
(d) Hydrides:	Silane, phosphine, diborane, arsine, etc.
(e) Carbides:	Calcium carbide, etc.
(f) Organic substances:	Hydrocarbons, alcohols, ketones, organic acids, amines, etc.
(g) Other:	Metal amides, cyanides, hydroxylamine, etc.

- |   |   |
|---|---|
| 2. Hydrogen peroxide and metal oxides:                                  | Metal oxides: manganese dioxide, mercuric oxide, etc.   |
| 3. Persulfates and manganese dioxide                                    |   |
| 4. Halogens and azides:   | <p>Halogens: fluorine, chlorine, bromine, iodine, etc.</p> <p>Azides: Sodium azide, silver azide, etc.</p>  |
| 5. Halogens and amines:   | <p>Halogens: fluorine, chlorine, bromine, iodine, chlorine trifluoride, bromine trifluoride, iodine trifluoride, chlorine pentafluoride, bromine pentafluoride, iodine pentafluoride, etc.</p> <p>Amines: ammonia, hydrazine, hydroxylamine, etc.</p> |
| 6. Ammonia and metals:  | Metals: mercury, gold, silver compounds, etc.   |
| 7. Sodium azide and metals:   | Metals: copper, zinc, lead, silver, etc.  |
| 8. Organohalides and metals:  | Metals: alkali metals, magnesium, barium, aluminum, etc.  |
| 9. Acetylene and metals:  | Metals: mercury, silver, copper, cobalt, etc.   |
| 10. Substances that ignite or explode when in contact with strong acids |   |
| (1) Oxy-halogen acid salts:   | Perchlorates, chlorates, bromates, iodates, chlorites, hypochlorites, etc.  |
| (2) Permanganates:  | Potassium permanganate, etc.  |
| (3) Organic peroxides:  | Dibenzoyl peroxide, etc.  |
| (4) Nitrosamines:   | DPT, etc.   |

## Personal Protective Gear

The following rules apply to laboratories and other workplaces where the use of personal protective gear is required. For details, see the university's protective gear manual, which can be downloaded from:

[http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu\\_Manual\\_E1\\_1.pdf](http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu_Manual_E1_1.pdf)

- Personnel at workplaces where the following conditions exist must use the appropriate respiratory device. Also, strict safety management must be practiced at these workplaces.
  - (1) Workplaces where dust, fumes, mist, etc. are produced from grinding, welding, wood/stone/metal processing, or other such work: Wear an appropriate dust mask.
  - (2) Workplaces where harmful substances (organic solvents, other hazardous chemicals, etc.) are used and the use of a local exhaust ventilation system does not provide sufficient ventilation: Wear a respirator, etc. suited for the substances handled.
  - (3) Workplaces where there is a risk of atmospheric oxygen deficiency (such as rooms where a large amount of liquid nitrogen is used): Take the appropriate protective measures, such as having self-contained breathing apparatuses available.
- Appropriate helmets or hard hats must be worn at workplaces where there is risk of falling or being hit by flying/falling objects.
- Appropriate ear protection must be worn and work time limits must be observed at workplaces where loud noise is generated, in accordance with the results of local environmental monitoring.
- Appropriate light-filtering eyeshields/faceshields must be worn by personnel involved in welding, furnace work, and other operations with exposure to harmful light rays (ultraviolet/infrared rays, intense visible light, etc.). Also, appropriate safety glasses/goggles must be worn by personnel involved in grinding, cutting, and other work with exposure to sparks, flying particles/chemicals, etc.
- Appropriate gloves must be worn by personnel involved in work with exposure to acids, alkalis, organic solvents, and other harmful chemical gases, liquids, and aerosols, and by personnel who work with glass, sheet metal, and other materials that pose a risk of hand injury.
- Appropriate safety harnesses must be worn by personnel who work in high places (more than 2 meters above the ground).
- Appropriate safety shoes must be worn by personnel involved in transport of heavy objects and other work that poses a risk of foot injury (including injury from falling objects). Also, appropriate anti-static shoes must be worn by personnel involved in work where bodily static electricity might damage sensitive electronic equipment or result in explosion, fire, or electrical shock.
- Contact the Division for Environment, Health and Safety if you have any questions on the protective gear and other safety measures required for your workplace.

## Situations Requiring Use of Protective Gear

Below is a list of various personal protective devices and the types of situations for which they need to be used. For details, see the university's protective gear manual, which can be downloaded from:

[http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu\\_Manual\\_E1\\_1.pdf](http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu_Manual_E1_1.pdf)

- Respiratory devices
  - (1) Dust masks  
Use for work in which dust, fumes, mist, etc. are produced.
  - (2) Respirators  
Use for work in areas where harmful substances (organic solvents, other hazardous chemicals, etc.) are used and the local exhaust ventilation system does not provide sufficient ventilation.
  - (3) Self-contained breathing apparatuses  
Use for work in places with a risk of atmospheric oxygen deficiency (such as rooms where a large amount of liquid nitrogen is used).
- Helmets, hard hats  
Use for work involving a risk of falling or being hit by flying/falling objects.
- Ear protectors (earplugs, earmuffs)  
Use for work in areas where the sound level exceeds 85 dB(A).
- Protective eyewear
  - (1) Light-filtering eyeshields/faceshields  
Use for work with exposure to harmful light rays (ultraviolet/infrared rays, intense visible light, laser beams, etc.)
  - (2) Safety glasses/goggles  
Use for grinding, cutting, and other work with exposure to sparks, flying particles/chemicals, etc.
- Protective gloves  
Use for work with sharp materials (glass, sheet metal, etc.), cold/hot objects, and other materials that pose a risk of hand injury.
- Safety harnesses  
Use for work performed in high places (more than 2 meters above the ground).
- Safety shoes  
Use for transport of heavy objects and other work that poses a risk of foot injury (including injury from falling objects).
- Other protective gear  
Wear shoes with good traction when working on wet or slippery floors.  
Avoid wearing footwear that can easily come off your feet.  
Avoid wearing loose clothing that might snag on chemical bottles and laboratory equipment.

## Protective Eyewear

As centers for research, universities use a wide variety of chemicals generally not used for everyday purposes, including many substances that are toxic or corrosive. These substances pose, among other hazards, a risk of injuring the eyes, which are highly susceptible to chemical irritation due to their moist, mucus-membrane surface. In many cases, even minor eye damage can cause acute pain, and injury of the cornea can easily result in vision impairment. Because of these risks, it is necessary to protect the eyes when handling chemicals. Accordingly, the University of Tokyo requires all employees and students to wear protective eyewear (safety glasses/goggles, etc.) when handling chemicals.

Other sources of eye injury include dust and flying debris. For example, perforation of the eye by iron-containing fragments can result in siderosis bulbi, a condition in which iron reacts adversely with eye tissues, sometimes leading to a permanent loss of vision. Consequently, protective eyewear must also be worn when performing tasks that can produce dust, flying metal fragments, or other eye hazards. In addition, those who risk exposure to laser beams used in experiments are required to wear laser safety glasses.

### 1. Examples of eye injuries

(Source: Japan Industrial Safety and Health Association, *An Illustrated Guide to Occupational Diseases*)

A wire fragment from a wire brush became embedded in this shipyard worker's eye during rust removal work.



An iron fragment became embedded in the lens of this eye, but the worker did not seek medical attention for two months, despite noticeable impairment of vision. The injury has been complicated by a cataract (clouded area).



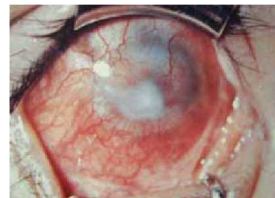
This eye was injured by caustic soda one month before the photo was taken. The cornea has opacified and the anterior chamber is hemorrhaging.



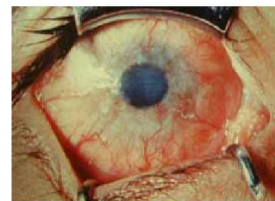
This photo, taken soon after the accident, shows an eye that has suffered chemical burn from exposure to cement dust. The cornea has opacified. (Stained with fluorescein.)



Condition of the eye 112 days after the accident. The cornea remains opaque and an ulcer has formed. Blood vessels have invaded the cornea.



Condition of the eye 15 months after the accident. The cornea continued to be afflicted with recurrent ulceration and secondary glaucoma, and remained opacified. A corneal transplant was performed after no improvement was seen, but the transplant opacified and vision was lost.



## 2. Types of protective eyewear

### Safety glasses

These have the same shape as regular eyeglasses, except that they feature side shields to prevent flying materials from entering from the side.



### Fit-over safety glasses

This type can be worn over regular eyeglasses.



### Safety goggles

This type fully shields the eye area. Gas-tight models also provide protection against vapors and gases.



## 3. Other requirements

Although corrective eyeglasses offer some protection from debris flying from directly in front of the eyes, they do not guard against debris approaching from oblique angles. As such, eyeglass wearers need to protect their eyes by also wearing fit-over safety glasses. Also, those who risk exposure to laser beams must use protective eyewear suited to the wavelength of the laser. For further information on protective eyewear, refer to the following resources on the Division for Environment, Health and Safety website.

- Resources compiled by the Environment, Health & Safety Office  
<http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/manyu.html>
- Protective gear manual  
[http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu\\_Manual\\_E1\\_1.pdf](http://www.adm.u-tokyo.ac.jp/gakunai/office/anzeneisei/ed/Hogogu_Manual_E1_1.pdf)



## Step Ladder Safety

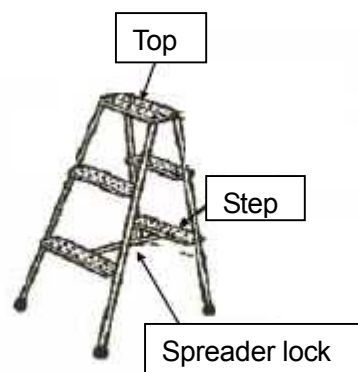
Sufficient caution must be exercised when using step ladders. This point was stressed at an accident prevention seminar hosted by the Chuo Labor Standards Inspection Office in May 2005. As reported by the instructor, many workers have suffered bone fractures and other injuries from falling off step ladders, and in one case a fall of just one meter resulted in the worker's death. Such accidents have also occurred at the University of Tokyo—in 2004, a person broke a bone from falling off a step ladder, and in 2005 another person strained a lower leg muscle when stepping off a ladder. Because of these hazards, those using step ladders are required to observe the following precautions.

### Step ladder precautions

- (1) Never work alone when using a step ladder. While on the ladder, have at least one person hold it to prevent falling.
- (2) Position the ladder so that its legs are firmly planted on the ground.
- (3) Never use a ladder if the spreader locks are damaged or corroded.
- (4) Never stand on the ladder top or any parts other than the steps.
- (5) Never hold too many objects when on a ladder, as doing so makes it difficult to maintain your balance.
- (6) Also use caution when stepping off the ladder.

### Step ladders and muscle strain

Leg muscle strain can result from skipping steps/rungs while descending a ladder. According to sports medicine experts, muscle strain occurs when a muscle tears from excessive eccentric contraction. Muscle contraction in which the muscle shortens while generating force is referred to as concentric contraction. In eccentric contraction, a contracting muscle is subjected to elongation from a strong load on the joint. For example, when a person lands on his or her toes while descending from a higher point, eccentric contraction occurs in the gastrocnemius muscles (part of the calf muscles). Eccentric contraction also occurs when a person turns about or makes other changes of posture involving the application of force. Eccentric contraction is stronger than concentric contraction, and can injure the contracting muscle, especially when a twisting force is also involved. This phenomenon is also the reason why descending a slope places greater stress on the knees than does ascending. Although it is all right to skip a step when climbing a ladder or stairs, you should take small steps when descending to avoid the risk of muscle strain.



## Laser Safety

Those using laser devices must familiarize themselves with the following information on physical hazards and precautions.

### **(1) Physical Hazards**

The main physical hazards posed by laser beams are eye and skin injuries. In some cases, laser radiation can cause major permanent damage, such as blindness from injury of the corneas. Also, laser damage to the front of the eye (cornea and crystalline lens) can result in cataracts and other adverse conditions, and high-power lasers can also burn the skin. In particular, short-wavelength radiation can cause photochemical reactions, so lengthy exposure should be avoided, even when the beam is of low intensity. Below are important precautions for preventing physical harm.

#### Eye Hazard Precautions

- (a) When using a laser, always wear protective eyewear suited to the laser's wavelength.
- (b) Never directly look at a laser beam, even if it is of low intensity and you are wearing protective eyewear.
- (c) Before using mirrors or other optical instruments with a laser, make sure that they are firmly secured.
- (d) Do not place highly reflective objects in the vicinity of the laser. Do not wear a watch while using a laser, as the glass face can reflect the laser beam (there have been accidents where blindness resulted from reflected laser radiation).
- (e) Avoid setting the laser beam path at eye level, including the level when walking or working.
- (f) Whenever possible, use the laser in a well-lit place.
- (g) Whenever possible, shield the laser beam path, including the area beyond its terminus, in order to prevent unplanned reflection.
- (h) Post appropriate warning signs on the doorway or safety partition of areas where lasers are used. Never place the laser device so that it is pointed at the doorway.

#### Skin Hazard Precautions

- (a) Never expose your body to laser radiation, including parts covered by clothing.
- (b) Minimize the potential for exposure, such as by wearing long-sleeved, fire-resistant clothing.
- (c) Never stand in or beyond the path of a laser beam.
- (d) Never place flammable materials (solvents, oil, paper, etc.) in a laser beam path.
- (e) Always use a purpose-built laser beam stopper or nonflammable shield (bricks, etc.) to provide a safe terminus for the beam.

### **(2) Other Precautions**

- (a) Lasers operate on high voltage, so never remove a laser device's housing at any time, unless absolutely necessary (such as when repairs are needed). Before removing the housing, take precautions to prevent electrical shock.
- (b) Always wear protective eyewear when a laser device's housing is removed, even if a laser beam is not being generated.
- (c) Use additional caution when working with excimer lasers, as they use halogen gas. Be sure to

check the gas piping for leaks, etc. and take other appropriate safety measures.

- (d) The dyes used in some dye lasers are carcinogenic, so exercise additional caution when using these lasers. Always wear protective gloves and eyewear when preparing dye solutions. When possible, dye solutions should be prepared in a local exhaust ventilation system.
- (e) When using a laser, take steps to ensure that unaware personnel can readily take notice that laser work is being performed.

## Laser Classes

The level of hazard posed by lasers rises with the power output of their beams. Under the March 25, 2005 revision of *JIS C 6802: Radiation Safety Standards for Laser Products*, lasers were classified by hazard level as follows.

Class	Description	Output (continuous emission)	Warning Label	Explanatory Label Text
1	Lasers that can be safely viewed by the naked eye, even when the radiation is focused by a lens or other optical instrument.	Up to 0.39 $\mu$ W	Not required	Class 1 laser product
2	Lasers emitting visible wavelengths (400–700 nm); the body's aversion responses (blink reflex, etc.) provide adequate defense against hazardous exposure.	Up to 1 mW	Required	Laser radiation / Do not stare into beam / Class 2 laser product
1M	Lasers emitting wavelengths in the range of 302.5–4,000 nm; beam can be safely viewed with the naked eye at a distance of at least 100 mm from the radiation source, but viewing through a lens may result in injury.	Up to 5 mW	Required	Laser radiation / Do not view directly with optical instruments / Class 1M laser product
2M	Lasers emitting visible wavelengths; the body's aversion responses provide adequate defense against hazardous exposure when viewing with the naked eye at a distance of at least 100 mm from the radiation source, but viewing through a lens may result in injury.	Up to 5 mW	Required	Laser radiation / Do not stare into beam or view directly with optical instruments / Class 2M laser product
3R	Lasers emitting wavelengths in the range of 302.5–4,000 nm; generally safe if not viewed with an optical instrument. Direct viewing of the beam with an optical instrument is hazardous.	Up to 5 mW	Required	Laser radiation / Avoid direct eye exposure / Class 3R laser product
3B	Lasers that pose a hazard of eye injury from exposure to direct or reflected beams, regardless of wavelength and method of viewing (naked eye or through optical instrument).	Up to 0.5 W	Required	Laser radiation / Avoid direct exposure to beam / Class 3B laser product
4	Lasers emitting beams that are hazardous to view, even when looking at scattered/reflected radiation, and that may burn the skin or set objects on fire.	Over 0.5 W	Required	Laser radiation / Avoid eye or skin exposure to direct or scattered radiation / Class 4 laser product

The warning/explanatory labels must be placed at a highly visible position on the laser device or its mounting.

Reference: University of Tokyo Faculty and Graduate School of Engineering's safety manual

## Electrical Facility Safety

A wide variety of electrical equipment is used on campus to enable the smooth, efficient performance of experiments and other research activities. It must be remembered that even little mistakes in the use of that equipment can result in electrical shock, short-circuiting, power outages, and fires. Laboratory work in particular poses a high electrical hazard, as personnel must sometimes repair electrical wiring/devices and perform tasks that place electrical systems under extreme operating conditions. As such, all laboratory personnel are expected to acquire a basic knowledge of electricity and a correct understanding of the rules for safe use of electrical facilities.

### Regulations

Electrical facilities are subject to the Electricity Business Act, technical standards, and various other regulatory controls. Under the Electricity Business Act, the electrical facilities at University of Tokyo campuses are deemed Electric Facilities for Private Use, and each campus is required to have a set of electrical safety rules and voluntarily carry out electrical facility construction work, inspections, operation, safety measures, and other responsibilities for compliance with technical standards. In particular, the act requires the installation of electrical wiring and other such work to be done by a qualified electrician wearing protective gear, using the appropriate materials and methods. In the event that a university member causes an accident through action in violation of such requirements, the relevant supervisor and chief electrical engineer would be held responsible under both the Industrial Safety and Health Act and the Electricity Business Act.

### Electrical Shock

#### Physical Effects

Electrical shock occurs when an electrical current from a conductor flows through a person to the ground or another conductor. It results from touching live, uninsulated parts of electrical wiring/devices or moving too close to an electrically charged component. The effects on the human body vary depending on such factors as the type of power source, the current path, and the duration of exposure, but in every case the amount of current is a big part of the equation. The direct effect of amperage varies, but in general, currents at least around 100 mA are considered lethal. However, even currents as low as 20 mA can be fatal—for example, grabbing a live conductor at this amperage would cause muscle spasms and nerve paralysis that could prevent the person from releasing the conductor, and hence lead to death.

#### Prevention

- (1) Never touch electrical equipment with wet hands.
- (2) Promptly replace damaged power outlets, plugs, etc.
- (3) Be sure to ground all electrical equipment. This is especially important for equipment that is located near water, uses water, or has metal housing.
- (4) Never place power strips or other such devices on the floor in laboratories where there is potential exposure to water, metal shards, etc.
- (5) Keep power outlets and electrical devices free of dust and grime.
- (6) Capacitors can remain charged even after the power supply is switched off, so never touch a circuit before completely discharging all capacitors in it.

- (7) The live parts of high-voltage and/or high-amperage laboratory equipment must be insulated to prevent electrical shock, and the area surrounding the equipment must be designated as a danger zone off limits to unauthorized personnel.
- (8) Never work alone when performing an experiment involving high voltages and/or strong currents. Also, post appropriate warning signs around the work area, such as “Danger! High Voltage.”

### **Short-circuiting Accidents**

Over time, electrical insulation can degrade from exposure to heat and other stress, resulting in the risk of short-circuiting. The accumulation of dust or moisture inside electrical equipment often results in short-circuiting, and can thus lead to a fire.

#### Prevention

- (1) Install a ground fault circuit interrupter at power sources with potential exposure to moisture.
- (2) Promptly try to determine the cause of any abnormalities detected in electrical equipment, such as strange sounds or odors.
- (3) Regularly inspect and clean electrical devices to keep them free of dust and grime.

### **Fires from Overheating**

Fires can result from overheating of electrical systems. Sources of overheating include heat-emitting devices, overloaded electrical wiring, and bad electrical contacts.

#### Prevention

- (1) Fires from electrical overheating are often caused by electrical heaters/burners and other heating devices, so exercise caution when using them. In particular, do not allow devices with exposed heating elements to operate unattended.
- (2) In general, heating devices draw a large current and are prone to overheating from bad contacts between their plug and the power outlet. Consequently, it is important to regularly check the electrical cords and outlets for damage or other problems.
- (3) Whenever a high-temperature electric furnace is to be operated unattended for a long time, measures need to be taken to prevent fire hazards, such as by removing flammable objects from the vicinity.
- (4) Power strips overheat when overloaded, so avoid using them to power heating devices, since such devices generally draw large currents.

### **Electric Sparks**

Fires and explosions can result from the release of electric sparks in places where combustible gases or vapors accumulate.

#### Prevention

- (1) Never place flammable/combustible materials near electrical switches, outlets, and other spark sources.
- (2) When planning to use electrical switches and other spark sources in places where combustible gases or vapors accumulate, select only devices with anti-explosion designs.

## **Precautions on Electric Cabling**

Normally, the walls of laboratories and other work rooms have power outlets and, in some cases, a power distribution board. In general, outlets are rated at 15 A, so power will have to be drawn directly from the distribution board in cases where the outlet capacity is insufficient, such as when using equipment that requires a heavy current.

### Precautions

- (1) Consult with the facility supervisor and other relevant managers before carrying out electrical installation work in the laboratory/work room.
- (2) When temporarily running electrical cabling across the floor, use cab-tire cables resistant to compression, and secure them to the floor with duct tape or other appropriate means.
- (3) Whenever possible, avoid cabling layouts that rely on plug strips to power multiple devices. If this is not possible, use plug strips that have a thick cable and can be secured to the wall (not the floor) with magnets, etc.

## **Responding to Electrical Accidents**

### Electrical Shock

First, immediately switch off the power supply. When this is not possible, use an electrically insulated pole, a dry wooden pole, etc. to separate the victim from the electrical shock source. Next, apply first aid to the victim and take other emergency procedures.

### Electrical Fires

First, switch off the power supply and then begin firefighting efforts. When the power cannot be turned off, avoid using water to fight the fire, as it may result in electrical shock and cause the fire to spread. Instead, use a dry chemical extinguisher, a carbon dioxide extinguisher, or other extinguisher designed for electrical fires.

## **<DVD for Protection Against Electrical Hazard>**

We are ready for lending DVDs (in Japanese) for protection against electrical hazard.

If you need, contact the office at the e-mail address below.

Environment and Safety Group

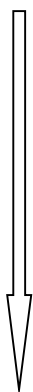
E-mail: [kankyoanzenka@ml.adm.u-tokyo.ac.jp](mailto:kankyoanzenka@ml.adm.u-tokyo.ac.jp)

## Confirming Qualifications for Hazardous Operations

The Industrial Safety and Health Act prohibits the performance of certain hazardous operations by unqualified personnel. Whenever university employees are scheduled to go on business trips involving the performance of operations listed in the attached Hazardous Operations Qualification Checklist, the relevant classroom supervisor (advisor, etc.) needs to confirm that the employee is qualified to perform the operations in question. Allowing unqualified personnel to engage in hazardous work can lead to serious accidents, and the relevant supervisor would be held responsible for the incident. Accordingly, be sure to follow the procedure listed below prior to the aforementioned business trips.

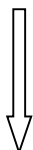
- Procedure for confirming hazardous operation qualification prior to travel

### Applicant



1. Put a checkmark in the "Hazardous Operations Qualification Checklist Attached" box of the (1) Travel Order/Petition Form & Report, or write a note in the remarks box of the (2) Travel Order/Petition Log indicating that the (3) Hazardous Operations Qualification Checklist is attached.
2. Fill out (3).
3. Attach (4) documentation attesting to the necessary qualification (copy of license, etc.) to (3).
4. Submit (1) or (2) with (3) and (4) to your classroom supervisor (advisor, etc.). This must be done prior to performance of the operations in question.

### Applicant's Classroom Supervisor (Professor, etc.)



1. Examine (3) and (4) to confirm that necessary qualifications are held, and stamp your seal in the classroom supervisor's authorization box of (3). If the applicant's qualifications cannot be confirmed, the applicant may not undertake the hazardous operation indicated.

### Applicant

1. Submit (1) or (2) with (3) and (4) to the administrative office.

# Hazardous Operations Qualification Checklist

Attachment

Signature of  
classroom  
supervisor

Applicant's name \_\_\_\_\_

*Operations listed in this table cannot be performed by persons who do not have the required qualifications or who have not received the necessary safety training in accordance with the Industrial Safety and Health Act.*

## Instructions

- ① Place a circle (O) in the relevant space under "Operation performed" for each operation performed.
- ② After confirming that the worker has the required qualifications or has received the necessary training, place a circle in the relevant space under "Qualification obtained" and "Safety training received."
- ③ Attach the necessary proof of qualification (copy of license, etc.).

For details on hazardous operations and required qualifications, see the Division for Environment, Health and Safety website – List of On-campus Forms – "Details of Hazardous Operations."

Name of operation	Operation performed	Qualification obtained	Safety training received
Handling of Class-1 pressure vessels			
Handling of small-sized boilers, other boilers			
Welding, maintenance, installation of circumferential joints on boilers, etc.			
Operation, maintenance of cranes			
Operation, maintenance of mobile cranes			
Operation of floor-operated cranes			
Operation of lifting appliances			
Operation, maintenance of derricks			
Adjustment, operation of jack-type lifting machines			
Operation of hoisting machines			
Sling work			
Operation of gondolas			
Elevator maintenance			
Operation of forklifts			
Operation of vehicles for work at height			
Handling, operation, etc., of electrical equipment			
Taking transparent photographs using X-rays, γ-rays			
Giving instructions, etc., to industrial robots, conducting inspections, etc., of industrial robots			
Arc welding, etc.			
Welding, melt-cutting, heating of metals			
Adjustment, etc., of power presses			
Handling of presses			
Handling of heat drying equipment			
Operation of skyline logging cable cranes			
Assembling, disassembling, etc., of skyline logging cable cranes, logging cableways			
Tree felling work, etc.			
Handling of chainsaws			
Woodworking			
Diving operations, operation of valves, etc.			
Operation of valves, etc., in high pressure adjustment work			
Operation of recompression lock, work in compressed air, operation of compressors			
Hazardous work in oxygen-deficient air			
Concrete blasting			
Ground excavation			
Excavation to recover rocks			
Replacement, etc., of grinding wheels			
On-board cargo handling work			
Operation of off-road cargo hauling vehicles, in-yard hauling vehicles, trucks and goods wagons			
Filling tires with air			
Maintenance of facilities for specified chemical substances			
Handling, etc., of hazardous materials (*See list of hazardous materials on next page)			
Maintenance of chemical facilities			
Handling, etc., of special chemical facilities			
Handling of nuclear fuel materials, etc.			
Specified dusty work			
Work involving the handling of lead			
Work involving the handling of tetraalkyl lead			
Liquefied oxygen manufacturing facilities			
Gas supply lines			
Operation of waste incineration facilities			
Blasting work			



Name of operation	Operation performed	Qualification obtained	Safety training received
Operation, maintenance of lifts for construction work			
Operation, maintenance of vehicle-type construction machines			
Operation, maintenance of vehicle-type material handling machines			
Operation of shovel loaders, fork loaders			
Operation of transporting vehicle on rough terrain			
Operation, maintenance of boring machines, pile driver/extractors			
Demolition, etc., of concrete structures			
Operation of equipment for concrete placing			
Concrete pumping truck			
Operation of power vehicle of railway equipment			
Erection, etc., of scaffolding, architectural structures, bridges, scaffolding, etc.			
Making and breaking of cargo piles			
Installation and removal of shoring and shielding devices			
Erection and dismantling of concrete form shoring			
Erection, dismantling or changing of steel frames			
Installation, dismantling and changing of metal parts in upper structures of bridges and concrete sections of upper structures of bridges			
Erection of structural components of wooden buildings, installation of roofs, exterior sheathing			
Work related to excavation, etc., of tunnels, erection, etc., of shoring devices, lining			

An operations chief is a person selected according to the type of work to supervise workers in order to prevent industrial accidents for work specified in the Industrial Safety and Health Act. (Article 14 of the act prescribes this position as a measure for accident prevention and requires certification for those appointed.)

An operation leader is a person selected according to the type of work to supervise workers in order to prevent industrial accidents for work specified in the Industrial Safety and Health Act.

\* Hazardous materials covered

A. Explosive materials

1. Nitroglycerol, nitroglycerin, nitrocellulose and other explosive organonitrates
2. Trinitrobenzene, trinitrotoluene, picric acid and other explosive nitro compounds
3. Peracetic acid, methyl ethyl ketone peroxide, benzoyl peroxide and other organic peroxides
4. Sodium azide and other metal azides

B. Ignitable materials

1. Metallic lithium
2. Metallic potassium
3. Metallic sodium
4. Yellow white phosphorus
5. Phosphorus sulfide
6. Red phosphorus
7. Celluloids
8. Calcium carbide (also known as carbide)
9. Calcium phosphide
10. Magnesium powder
11. Aluminum powder
12. Metal powders other than magnesium powder and aluminum powder
13. Sodium dithionite (also known as sodium hydrosulfite)

C. Oxidizing substances

1. Potassium chlorate, sodium chlorate, ammonium chlorate and other chlorates
2. Potassium perchlorate, sodium perchlorate, ammonium perchlorate and other perchlorates
3. Potassium peroxide, sodium peroxide, barium peroxide and other inorganic peroxides
4. Potassium nitrate, sodium nitrate, ammonium nitrate and other nitrates
5. Sodium chlorite and other chlorites
6. Calcium hypochlorite and other hypochlorites

D. Flammable substances

1. Substances with a flash point of less than 30 degrees C below zero, such as ethyl ether, gasoline, acetaldehyde, propylene oxide and carbon disulfide
2. Substances with a flash point of 30 degrees C below zero or over and less than zero, such as normal hexane, ethylene oxide, acetone, benzene and methyl ethyl ketone
3. Substances with a flash point of zero or over and less than 30 degrees C, such as methanol, ethanol, xylene, n-pentyl acetate (also known as n-amyl acetate)
4. Substances with a flash point of 30 degrees C or over and less than 65 degrees C, such as kerosene, light oil, turpentine, isopentyl alcohol (also known as isoamyl alcohol) and acetic acid

E. Combustible gases

Refers to combustible substances that are gases at a temperature of 15 degrees C and one atmospheric pressure, such as hydrogen, acetylene, ethylene, methane, ethane, propane and butane.

# List of Required Qualifications for Operations

For further details, contact the Environment, Health & Safety Office (Ext. 63585•6)

Name of operation	Description of operation	Required qualifications, etc.
Blasting work	Boring, charging, connection and ignition for blasting and inspection of remaining powder and chemicals after misfire	1. Licensed blasting operator 2. Licensed explosives handling and safety engineer 3. Person who has passed the Class A, B or D senior safety engineer test, the Class A or B blasting technician test, the Class A or D surface safety technician test, or the Class A, B or D pit safety technician test
Operation of lifting appliances	Operation of appliances with a maximum load of 5 tons or more	Person licensed to operate lifting appliances
	Operation of appliances with a maximum load of less than 5 tons	Person who has completed special training related to the operation of lifting appliances
Operation of boilers	Operation of boilers other than: steam boilers with an inside diameter of 750 mm or less and length of 130 mm or less; steam boilers with a heat transfer area of 3 m <sup>2</sup> or less; hot-water boilers with a heat transfer area of 14 m <sup>2</sup> or less; through-flow boilers with heat transfer area of 30 m <sup>2</sup> or less (for those with a steam separator, the steam separator must have an inside diameter of 40 mm or less and inner volume of 0.4 m <sup>3</sup> or less)	1. License of special class boiler operator 2. License of first class boiler operator 3. License of second class boiler operator
	Boilers other than the above	1. License of special class boiler operator 2. License of first class boiler operator 3. License of second class boiler operator 4. Person who has completed a skill training course in handling boilers
Operation of small-sized boilers	Operation of small-sized boilers	Person who has completed special training in the handling of small-size boilers
Welding of circumferential joints on boilers, etc.	Welding of boilers and first-class pressure vessels except where the welded section has a thickness of 25 mm or less or when attaching a tube stand or flange	Special class boiler welder's license
	Welding of circumferential joints on boilers where the welded section has a thickness of 25 mm or less or when attaching a tube stand or flange	1. Special class boiler welder's license 2. Ordinary class boiler welder's license
Maintenance of boilers, etc.	Maintenance of boilers, first-class pressure vessels	Licensed boiler maintenance worker
Operation of cranes	Operation of cranes with a lifting capacity of 5 tons or more (excluding the following)	Licensed crane operator
	Operation of cranes with a lifting capacity of 5 tons or more where the work involves the operation of a crane by an operator who stays on the floor and moves together with the movement of the lifted load	1. Licensed crane operator 2. Person who has completed a skill training course for operation of floor-operated cranes
	Operation of cranes with a lifting capacity of less than 5 tons	Person who has completed special training related to the operation of cranes
	Operation of a telfer flying over railways having lifting capacity of 5 tons or more	Person who has completed special training related to the operation of cranes
Operation of mobile cranes	Operation of a mobile crane with a lifting capacity of 5 tons or more	Licensed mobile crane operator
	Operation of a mobile crane with a lifting capacity of at least 1 ton but less than 5 tons	1. Licensed mobile crane operator 2. Person who has completed a skill training course for operation of light-capacity mobile cranes
	Operation of a mobile crane with a lifting capacity of less than 1 ton	Person who has completed special training related to the operation of mobile cranes
Operation of floor-operated cranes	Operation of floor-operated cranes	1. Person who passed the academic test of the license examination for crane operator and also passed the practical training test using a floor-operated crane 2. Person who passed the academic test of the license examination for crane operator and also completed the practical training course for operation of a floor-operated crane within one year from the day when the said test was conducted
Operation of derricks	Operation of derricks with a lifting capacity of 5 tons or more	Licensed derrick operator
	Operation of derricks with a lifting capacity of less than 5 tons	Person who has completed special training related to the operation of derricks
Diving operations	Operations conducted under water using a diving apparatus with air piped from an air compressor or hand-operated pump or supplied from a cylinder	Licensed diving worker
Welding, melt-cutting, heating of metals	Welding, melt-cutting or heating of metal using combustible gas and oxygen	1. Licensed gas welding operations chief 2. Person who has completed a skill training course for gas welding 3. Other persons specified by the Minister of Health, Labor and Welfare
Operation of forklifts	Operation of forklifts with a maximum load of 1 ton or more	1. Person who has completed a skill training course to operate a forklift 2. Person who has received forklift training in accordance with the Human Resources Development Promotion Act 3. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of forklifts with a maximum load of less than 1 ton	Person who has completed special training related to the operation of forklifts

Name of operation	Description of operation	Required qualifications, etc.
Operation of vehicle-type material handling machines (for grounding, transporting, loading and excavating)	Operation of machines weighing 3 tons or more	1. Person who has completed a skill training course to operate vehicle-type construction machines (for grounding, transporting, loading and excavating) 2. Person holding a construction equipment and technologies engineer license 3. Person who has completed a training course to operate construction machinery in accordance with the Human Resources Development Promotion Act 4. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of machines weighing less than 3 tons	Person who has completed special training related to the operation of small vehicle-type construction machines (for grounding, transporting, loading and excavating)
Operation of vehicle-type construction machines (for foundation work)	Operation of machines weighing 3 tons or more	1. Person who has completed a skill training course to operate vehicle-type construction machines (for foundation work) 2. Person holding a construction equipment and technologies engineer license 3. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of machines weighing less than 3 tons	Person who has completed special training related to the operation of small vehicle-type construction machines (for foundation work)
	Operation of machines other than self-propelled machines	Person who has completed special training related to the operation of construction machinery for foundation work
Operation of working devices of vehicle-type construction machines (for foundation work)	Operation of self-propelled working devices	Person who has completed the skill training course related to the operation of working devices of vehicle-type construction machines (for foundation work)
Operation of vehicle-type construction machines (for demolition)	Operation of machines weighing 3 tons or more	1. Person who has completed a skill training course for operation of vehicle-type construction machines (for demolition) 2. Person holding a construction equipment and technologies engineer license 3. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of machines weighing less than 3 tons	Person who has completed special training related to the operation of small vehicle-type construction machines (for demolition)
Operation of vehicle-type construction machines (for compacting)	Operation of self-propelled construction machines for compacting	Person who has completed special training related to the operation of compacting rollers
Operation of working devices of machines for concrete placement	Same as on the left	Person who has completed special training related to the operation of working devices of concrete pumping trucks
Operation of shovel loaders, fork loaders	Operation of loaders with a maximum load of 1 ton or more	1. Person who has completed a skill training course for operation of shovel loaders 2. Person who has completed training pertaining to the use of shovel loaders in accordance with the Human Resources Development Promotion Act 3. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of loaders with a maximum load of less than 1 ton	Person who has completed special training pertaining to the operation of shovel loaders, etc.
Operation of transporting vehicle on rough terrain	Operation of vehicles with a maximum loading capacity of 1 ton or more	1. Person who has completed a skill training course for operation of transporting vehicles on rough terrain 2. Person holding a construction equipment and technologies engineer license 3. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of vehicles with a maximum loading capacity of less than 1 ton	Person who has completed special training related to the operation of transporting vehicles on rough terrain
Operation of vehicles for work at height	Operation of vehicle with a working floor at a height of 10 m or more	1. Person who has completed a skill training course for operation of vehicles for work at height 2. Other persons specified by the Minister of Health, Labor and Welfare
	Operation of vehicle with a working floor at a height of less than 10 m	Person who has completed special training related to the operation of vehicles at height
Sling work	Sling work involving a limit load of 1 ton or more	1. Person who has completed a skill training course in sling work 2. Person who has completed the slinger training course in accordance with the Human Resources Development Promotion Act 3. Other persons specified by the Minister of Health, Labor and Welfare
	Sling work involving a lifting load of less than 1 ton	Person who has completed special training related to sling work
Replacement, etc., of grinding wheels	Replacement or trial operation	Person who has completed special training related to replacement, etc., of grinding wheels
Adjustment, etc., of power presses	Fitting, removal and adjustment of dies of press machines, blades of shears, or safety devices or safety enclosures of presses or shears	Person who has completed special training related to fitting, removal and adjustment of dies of power presses
Arc welding, etc.	Operations related to welding, melt-cutting, etc., using an arc welder	Person who has completed special training related to arc welding
Handling of electricity	Work of installation, inspection, repair or operation of high-voltage or extra-high voltage charged circuits or their supports, or work of installation or repair of low-voltage charged circuits and that for the operation of switches with exposed charged parts of low-voltage circuits installed in sectioned space such as switchboard rooms or substations	Person who has completed special training related to the handling of electricity
Operation of skyline logging cable cranes	Operation of skyline logging cable cranes	Person who has completed special training related to the operation of skyline logging cable cranes

Name of operation	Description of operation	Required qualifications, etc.
Tree felling work, etc.	Felling of standing trees with a chest-height diameter of 70 cm or more, felling of standing trees with a chest-height diameter of 20 cm or more with an extremely deviated center of gravity, felling of trees by such special methods as suspended cutting, etc., or disposing of trees, including hanging trees with a chest height diameter of 20cm or more	Person who has completed special training related to felling trees
Handling of chainsaws	Felling of standing trees, disposing of hanging trees or logging	Person who has completed special training related to the handling of chainsaws
Operation of boring machines	Same as at left	Person who has completed special training related to the operation of boring machines
Adjustment, operation of jack-type lifting machines	When engaging in construction work	Person who has completed special training related to the adjustment or operation of jack-type lifting machines
Operation of hoisting machines	Operation of hoisting machines other than electric hoists, air hoists and those for gondolas	Person who has completed special training related to the operation of hoists
Operation of power vehicle of railway equipment	Operation of vehicle used for carrying people or cargo on railway tracks	Person who has completed special training related to the operation of power vehicles of railway equipment
Operation of lifts for construction work	Same as at left	Person who has completed special training related to the operation of lifts for construction work
Operation of gondolas	Same as at left	Person who has completed special training related to the handling of gondolas
Operation of air compressors	Operation of air compressors for sending air to work chambers or air locks	Person who has completed special training related to the operation of air compressors
Operation of valves, etc., in high-pressure adjustment work (related to work chambers)	Operation of valves or cocks for adjusting the amount of air delivered to a high-pressure work chamber	Person who has completed special training related to high-pressure work
Operation of valves, etc., in high pressure adjustment work (related to air locks)	Operation of valves or cocks for adjusting the air flow to or from an air lock	Special training related to high-pressure work
Operation of valves, etc., for diving work	Operation of valves and cocks for the regulation of air to divers	Person who has completed special training related to high-pressure work
Operation of a decompression chamber	Same as at left	Person who has completed special training related to high-pressure work
Work inside a high-pressure chamber	Same as at left	Person who has completed special training related to high-pressure work
Work involving the handling of tetraalkyl lead	Manufacture, mixture with gasoline or repair, etc., of machinery, etc., used for these purposes; work inside tanks that are contaminated or suspected of being contaminated; handling, research, decontamination of residuum, drums, etc.	Person who has completed special training related to handling of tetraalkyl lead
Hazardous work in oxygen-deficient air	Same as at left	Person who has completed special training related to hazardous work in oxygen-deficient air
Handling, etc., of special chemical facilities	Handling, maintenance and repair of special chemical facilities	Person who has completed special training related to the handling, maintenance and repair of special chemical facilities
Taking transparent photographs using X-rays, γ-rays	Same as at left	Person who has completed special training related to work of taking transparent photographs
Handling of nuclear fuel materials, etc., at processing facilities	Handling of nuclear fuel materials, spent nuclear fuel, or materials contaminated with the foregoing substances in the controlled area of a processing facility, a reprocessing facility and other facilities where such substances are handled	Person who has completed special training related to the handling of nuclear fuel materials etc., at processing facilities
Handling of nuclear fuel materials, etc., at nuclear reactor facility	Handling of nuclear fuel materials, spent nuclear fuel, or materials contaminated with the foregoing substances in the controlled area of a nuclear reactor facility	Person who has completed special training related to the handling of nuclear fuel materials, etc., at nuclear reactor facilities
Specified dusty work	Same as at left	Person who has completed special training related to dusty work
Work related to excavation of tunnels, etc.	Tunnel excavation work and incidental work, such as muck-carrying work, material-carrying work, and concrete placing work, for tunnel linings	Special training related to excavation and lining, etc., of tunnels, etc.
Instruction, etc., of industrial robots	Operation of equipment related to work performed within an industrial robot's movable range and instructions, etc., performed outside of its movable range	Person who has completed special training related to instruction of industrial robots
Inspection, etc., of industrial robots	Operation of equipment related to adjustment, etc., (excluding instruction) of an industrial robot within its movable range and verification and other inspection work performed outside of its movable range	Person who has completed special training related to inspection, etc., of industrial robots
Filling tires with air	Filling tires with air using an air compressor	Person who has completed special training related to filling tires with air
Operation of waste incineration facilities	Handling of soot and dust, burnt ash and other ash residues	Special training related to operation of waste incineration facilities
	Maintenance and inspection of equipment, such as waste incinerators and dust collectors	
	Dismantling equipment such as waste incinerators and dust collectors, and handling of soot and dust and other ash residues associated with such work	

## Health and Safety Management Plan for Field Educational/Research Activities

### 1. Plan and Responsibilities

- The head of an educational/research unit (unit head) must submit a Health and Safety Management Plan for Field Educational/Research Activities to their department in advance of any such activities.
  
- Even if a student is to conduct field research alone and provided the research is for a required subject, all parties must be aware that the framework for that research will be conducted under the responsibility of the university president, managing director, dean/director, department head, laboratory head, project head, and the student's faculty supervisor collectively. If an accident should occur because of deficiencies in the plan or in the structure, responsibility extends from the supervisor to the entire university.
  
- The dean/director must confirm that every field research activity planned by any member of the department (faculty, students, researchers, and others) is conducted safely, that rules and related laws/regulations are complied with, and that any deficiencies are rectified. Depending on the situation, the dean/director may terminate the research.
  
- If field research is conducted under the guidance of a faculty supervisor, he/she is considered as the unit head. This also applies when a student conducts a research alone. Therefore, the supervisor must submit the Health and Safety Management Plan for Field Educational/Research Activities to their department.
  
- If a unit head does not accompany students in their field research, the unit head must select an assistant from participants, and have him/her be responsible for ensuring safety during the research activity. The assistant should maintain close contact with the unit head, and report such any execution of or changes in the plan, as well as reporting any and all accidents.
  
- A student should not be allowed to conduct field research alone unless the unit head feels confident that safety and close contact with the student will be maintained during the research activity.

### 2. Submission

- The unit head must prepare a plan including such information as location of the field research, schedule, lodging place, participants' names and emergency contact details such as home telephone numbers, means of transportation, measures for hazardous operations, measures for local/environmental hazards, measures for legal compliance, and emergency contact method. In addition, a detailed itinerary with an attached map, contact list of medical institutions, police and fire stations, statement of whether insured or not, emergency contact method for the unit head (if stays on campus), assumed date and time in case of requesting for a search should be attached if necessary.
  
- The content of the plan should be informed to all participants by the unit head, and submitted to the dean/director through the Environment, Health & Safety Office responsible for their department.

### 3. Procedures

- In principle, the deadline for submitting a Health and Safety Management Plan for Field Educational/Research Activities is one week prior to departure for research activities in Japan, and 2 weeks prior to departure for research activities outside Japan.
  - At the same time of submitting the Health and Safety Management Plan for Field Educational/Research Activities plan, inform all relevant people by e-mail (except dean/director).
  - Inform all relevant people of any changes in the plan by e-mail.
  - The head of the Environment, Health & Safety Office or the Department Safety and Health Representative confirms the health and safety management, requests the dean/director's approval, and then returns a copy of the approved plan to the unit head.
  - Because of travel regulations, maintain close contact with the department administration office.
  - The original copy of the plan is stored at the Environment, Health & Safety Office, Kashiwa General Administration Office (tel ext: 63585 or 63586; e-mail: anzen@kj.u- tokyo.ac.jp).
- ※For details, refer to the following URL for health and safety management/accident prevention guidelines:

<p><a href="http://www.ut-portal.u-tokyo.ac.jp/file/index.php/便利帳ファイル/本部/05環境安全衛生部/環境安全課/新ホームページ/教育/テキスト・マニュアル/その他/manyu_ver3.pdf">http://www.ut-portal.u-tokyo.ac.jp/file/index.php/便利帳ファイル/本部/05環境安全衛生部/環境安全課/新ホームページ/教育/テキスト・マニュアル/その他/manyu_ver3.pdf</a></p>
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Dean/ Director seal	
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Date: \_\_\_\_\_

Submitted to: \_\_\_\_\_

Affiliation:

Title:

Name: (Seal)

### Health and Safety Management Plan for Field Educational/Research Activities

I plan to engage in the field educational/research activity listed below.

1. Activity location	
2. Schedule	From _____ to _____ ( ____ days)
3. Location of lodgings	
4. Activity summary	
5. Names/contact information of participants	List in Attachment 1
6. Means of transportation	
7. Health & safety measures for hazardous operations	
8. Measures for local/environmental hazards	
9. Measures for legal compliance	
10. Emergency contact method	For contacting head of educational/research unit:
	For contacting dean/director
11. Contact information of Japanese diplomatic office (or equivalent office) of country of activity and country of stay	

Note: Attach a detailed itinerary to this form.

Health and Safety Management Plan for Field Educational/Research Activities

Attachment 1

**List of Activity Participants**

Mark name of educational/research unit head with ☉, and name of assistant with ○.

Name	Affiliation & title/class year	Contact information (home, etc.)	Remarks (Insured status, statutory qualifications, etc.)



## “Accident/Disaster Report”

All accidents and potential dangers, including those occurring during experiments or while commuting, must be reported through the UTSMIS.

URL [http://utsmis.adm.u-tokyo.ac.jp/UT\\_Anei\\_User/Report/Accident/](http://utsmis.adm.u-tokyo.ac.jp/UT_Anei_User/Report/Accident/)

Please prepare and submit your report promptly following each incident. In the case of traffic accidents, be sure to contact the police (call 110) as well, since the accident may entail compensation for permanent damage or other settlement.

In addition, Japanese law requires that all vehicular accidents be reported to the police.

## Accident/Disaster Report (Form 1)

Date filed:

No.:

Date of incident					Supervisor	Affiliation	
Location						Name, title	
Workplace category					Reporter	Affiliation	
Site situation	Instructor on duty		No. of persons in room (excl. victims)			Name, title	
Response	Contact to other units					Contact	

Victim A	Name, age, sex		Safety education		No. of lost-worktime days		Location & name of injury/illness	
	Affiliation, title/class year				Insured status		Protective gear worn	
Victim B	Name, age, sex		Safety education		No. of lost-worktime days		Location & name of injury/illness	
	Affiliation, title/class year				Insured status		Protective gear worn	
Victim C	Name, age, sex		Safety education		No. of lost-worktime days		Location & name of injury/illness	
	Affiliation, title/class year				Insured status		Protective gear worn	

Description of accident & activity at time of occurrence	
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## Accident/Disaster Report (Form 1) (No victim)

Date filed:

No.:

Date of incident					Supervisor	Affiliation	
Location						Name, title	
Workplace category					Reporter	Affiliation	
Site situation	Instructor on duty		No. of persons in room (excl. observers)			Name, title	
Response	Contact to other units					Contact	

Observer A	Name, age, sex		Safety education		Protective gear worn	
	Affiliation, title/class year					
Observer B	Name, age, sex		Safety education		Protective gear worn	
	Affiliation, title/class year					
Observer C	Name, age, sex		Safety education		Protective gear worn	
	Affiliation, title/class year					

Description of potential danger & activity at time of occurrence	
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**Accident/Disaster Report** (Form 2)

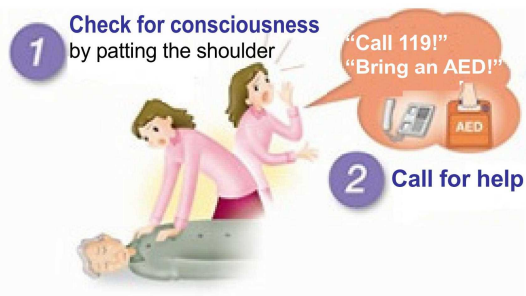
Date filed:

No.:

Cause of accident/disaster	Diagram of situation
Direct cause	
Underlying causes	
Measures to prevent recurrence	Confirmation of measures (filled in by Division for Environment, Health and Safety)

# You Could Save a Life!

## Learn cardiopulmonary resuscitation (CPR)



### 1 Check for consciousness

by patting the shoulder

"Call 119!"  
"Bring an AED!"

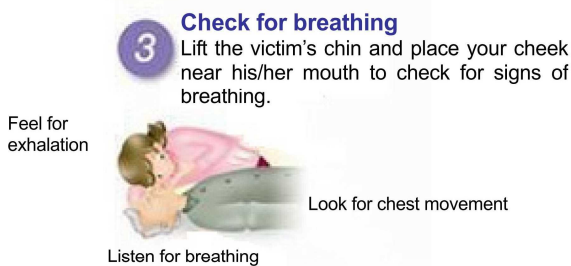
### 2 Call for help

#### 1. Check for consciousness.

Ask the victim "Are you okay?" three times while patting his/her shoulder (in the collar bone area) to try to stimulate a response

#### 2. Request an ambulance and AED.

Loudly call for assistance from people in the vicinity. Ask someone to call 119 and to bring an AED (automated external defibrillator).



### 3 Check for breathing

Lift the victim's chin and place your cheek near his/her mouth to check for signs of breathing.

Feel for exhalation

Look for chest movement

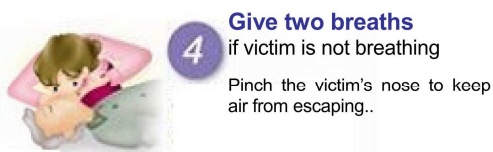
Listen for breathing

#### 3. Clear the airway and check for breathing.

Tilt the victim's head back and lift the chin to open up the airway. Place your ear near the victim's mouth and nose to check for signs of breathing.

Checking for signs of breathing

- (1) Look for chest movement (rising/falling).
- (2) Listen for the sound of breathing.
- (3) Feel for exhalation with your cheek.



### 4 Give two breaths

if victim is not breathing

Pinch the victim's nose to keep air from escaping..

#### 4. Give two breaths (possible to omit).

Keeping the victim's head tilted back, pinch his/her nose and give two breaths slowly (1 seconds each).

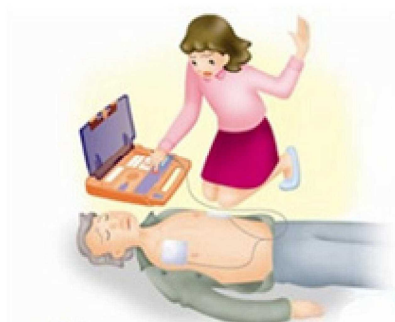


### 5 Perform 30 chest compressions

Give two breaths

#### 5. Perform chest compressions and artificial respiration.

- (1) Loosen the victim's upper clothing and place your hands stacked on the victim's chest, between both nipples.
- (2) Perform 30 chest compressions at a rhythm of 100 per minute. The chest should compress between 4 to 5 centimeters.
- (3) Keeping the victim's head tilted back, pinch his/her nose and give two breaths slowly (1 second each).
- (4) Do 5 sets of this cycle of chest compressions and artificial respiration. (About 2 minutes)



### 6 Apply electrical shock with an AED

Do not touch the victim when giving shocks.

#### 6. Start using the AED once it arrives.

- (1) Open the case and turn on the power.
- (2) Attach the electrodes to the victim (below right collar bone and on left side of chest).
- (3) Push the shock button if indicated to do so by the device.

- Akeno Observatory, Laboratory Entrance Hall
- Norikura Observatory, 1F Entrance Hall
- Kamioka Observatory
- Research Bldg – IPMU Research Bldg 2F Corridor
- Dormitory, Dining Room
- Mine (SK,CLIO,XMASS,LAB-E)



# Kashiwa Campus Environment, Health & Safety Office Activity Calendar for 2016 Academic Year

	Meeting of the Heads of University-wide Environment, Health, & Safety Offices (13:30~)	Meeting of Kashiwa Campus Environment, Health, & Safety Office / Committee (10:00~)	Workplace Patrols by Occupational Physicians / Health & Safety Patrols by Department Heads (13:15~)		Workplace Patrols by Health Managers		Other Activities
Apr	11 (Mon)	14 (Thu)	14 (Thu)	AORI (1), Kashiwa Campus Health Service Center	4 to 8 11 to 15 18 to 22	ISSP Harima Branch	<ul style="list-style-type: none"> <li>Specified chemical data tallying (4th Q)</li> <li>Guidance on departmental health and safety education</li> <li>Cryogenics Safety Education</li> </ul>
May	16 (Mon)	19 (Thu)	9 (Mon)	ISSP annexes (incl. SOR)	25 to 28 2 to 6 9 to 13	AORI (1)	<ul style="list-style-type: none"> <li>Seminar on health and safety (Kashiwa)</li> <li>High Pressure Gas Safety Education</li> </ul>
			19 (Thu)	FS Transdisciplinary Sciences (1)	16 to 20 23 to 27	Kashiwa Campus Health Service Center	<ul style="list-style-type: none"> <li>Routine student health exams</li> </ul>
Jun	13 (Mon)	16 (Thu)	16 (Thu)	ISSP Main Bldg.(1)	30 to 3 6 to 10	ISSP annexes (incl. SOR)	<ul style="list-style-type: none"> <li>Briefing on drug management system</li> <li>Cryogenics Safety Education</li> </ul>
			23 (Thu)	FSTS Experimental Bldg., FS Cell Research Bldg., FS Calorimeter Bldg., Kashiwa II	13 to 17 20 to 24	FS Transdisciplinary Sciences (1)	
Jul	5 (Tue) ※10:30~	14 (Thu)	14 (Thu)	ISSP Main Bldg.(2)	27 to 1 4 to 8	ISSP Main Bldg.(1)	<ul style="list-style-type: none"> <li>Specified chemical data tallying(1st Q)</li> <li>National Safety Day Lecture</li> <li>High Pressure Gas Safety Education</li> </ul>
			21 (Thu)	FS Environmental Studies (1)	11 to 15 19 to 22 25 to 29	FSTS Experimental Bldg., FS Cell Research Bldg., FS Calorimeter Bldg., Kashiwa II	<ul style="list-style-type: none"> <li>Laser Safety Education and Seminar on voluntary inspection of centrifuges / autoclaves / fume hoods</li> </ul>
Aug	8 (Mon)	24 (Thu)	12 (Fri)	ICRR Kamioka,IPMU Kamioka Satellite	1 to 5 8 to 12	ISSP Main Bldg.(2)	
			25 (Thu), 26 (Fri)	ICRR Norikura & KAGRA	15 to 19 22 to 26	FS Environmental Studies (1)	
Sep	12 (Mon)	15 (Thu)	15 (Thu)	FS Environmental Studies (2)	29 to 2 5 to 9	ICRR Kamioka,IPMU Kamioka Satellite	<ul style="list-style-type: none"> <li>Workplace environmental monitoring (1st semiannual)</li> <li>Gastric exams</li> <li>Gynecological/Bone density examsexams (to end of January)</li> </ul>
			29 (Thu)	Research Complex (RACE, CSIS, AORI), IPMU	12 to 16 20 to 23	ICRR Norikura & KAGRA	
Oct	17 (Mon)	20 (Thu)	3 (Mon)	FS Transdisciplinary Sciences (2)	26 to 30 3 to 7	FS Environmental Studies (2)	<ul style="list-style-type: none"> <li>Routine health exams</li> <li>Specialized health exams</li> <li>Specified chemical data tallying (2nd Q)</li> <li>Disaster drill</li> <li>Cryogenics Safety Education</li> </ul>
			7 (Fri)	ICRR Akeno	11 to 14		
			13 (Thu), 14 (Fri)	AORI International Coastal Research Center	17 to 21 24 to 28	Research Complex (RACE, CSIS, AORI) , IPMU	
Nov	14 (Mon)	17 (Thu)	16 (Wed)	FS Integrated Biosciences (1)	31 to 4 7 to 11	FS Transdisciplinary Sciences (2)	<ul style="list-style-type: none"> <li>High Pressure Gas Safety Education</li> </ul>
			24 (Thu)	FS Integrated Biosciences (2)	14 to 18	ICRR Akeno	
			25 (Fri)	ISSP NSL (Tokai)	21 to 25	AORI International Coastal Research Center	
Dec	12 (Mon)	15 (Thu)	15 (Thu)	ICRR	28 to 2 5 to 9	FS Integrated Biosciences (1)(2)	
			22 (Thu)	Research Complex (Shared Space, FS), UTFC	12 to 16 19 to 22	ISSP NSL (Tokai)	

	Meeting of the Heads of University-wide Environment, Health, & Safety Offices (13:30~)	Meeting of Kashiwa Campus Environment, Health, & Safety Office / Committee (10:00~)	Workplace Patrols by Occupational Physicians / Health & Safety Patrols by Department Heads (13:15~)		Workplace Patrols by Health Managers		Other Activities
Jan	16 (Mon)	19 (Thu)	19 (Thu)	Research Complex 2, Environmental Science Center, Kashiwa Branch, Kashiwa Library	29 to 3 4 to 6 10 to 13 16 to 20 23 to 27	Vacation ICRR Research Complex (Shared Space, FS), UTFC	<ul style="list-style-type: none"> <li>Specified chemical data tallying (3rd Q)</li> <li>Voluntary inspections of centrifuges/autoclaves/fume hoods</li> <li>Workplace environmental monitoring (2nd semiannual)</li> </ul>
Feb	13 (Mon)	16 (Thu)	16 (Thu)	AORI (2)	30 to 3 6 to 10 13 to 17 20 to 24	Research Complex 2 Environmental Science Center, Kashiwa Branch Kashiwa Library	<ul style="list-style-type: none"> <li>Specialized health exams</li> </ul>
Mar	13 (Mon)	16 (Thu)	3 (Fri)	ISSP Harima Branch	27 to 3 6 to 10 13 to 17 21 to 24	AORI (2)	
Apr					27 to 31 3 to 7 10 to 14 17 to 21	ISSP Harima Branch	

- The meeting of the heads of university-wide Environment, Health, & Safety Offices is held monthly from 13:30 at the Hongo Campus. The attendees are composed of heads of the Environment, Health, & Safety Offices in each division (or substitute who represent their division at faculty meetings) and assistant managers or higher level administrative staff involved in Health and Safety.
- Kashiwa Campus Health & Safety Committee and Kashiwa Campus Environment, Health, & Safety Office Meeting have a joint meeting. The committee chairperson becomes the chairperson of the joint meeting.
- An occupational physician's inspection requires the attendance of the head of each division/department/facility when required with the presence of a division health manager or a member of each division's Health & Safety Committee.
- The details of the patrols by health managers are as follows.
  1. Each division conducts a patrol once a week. Each patrol usually lasts about one hour.
  2. The patrols should focus mainly on the following places:
    - (a) Places previously requested to make improvements by the occupational physician.
    - (b) Places that use large quantities of hazardous chemicals.
    - (c) Places where accidents have occurred or where similar accidents are likely to occur.
    - (d) Other places deserving inspection.
  3. Following each patrol, the health manager needs to promptly fill out a report and submit it to the Kashiwa Campus Environment, Health, & Safety Office.
  4. The report form prescribed by the division is to be used. The report must be signed by the division's health manager.
  5. The report may be signed by the health promotion officer instead in the case of workplaces that have few employees or are located in remote areas.
- Patrol Coverage
 

FS Transdisciplinary Sciences (1): Advanced Materials Science, OceanTechnology, Policy and Environment

FS Transdisciplinary Sciences (2): Complexity Science and Engineering, Advanced Energy

FS Integrated Biosciences (1): North side,Basement

FS Integrated Biosciences (2): South side

FS Environmental Studies (1): Floors 4 to The roof

FS Environmental Studies (2): Basement to 3rd floor

ISSP Main Bldg. (1): Basement to 2nd floor

ISSP Main Bldg. (2): Floors 3 to 6

AORI(1): Floors 1 to 3, Observation Warehouse, Laboratory for Accelerator Mass Spectrometry

AORI(2): Floors 4 to The roof



## Safety Seminar Schedule

Notices on safety-related seminars will be provided by the Kashiwa Campus Environmental, Health & Safety Office, Facilities Team - Kashiwa General Administration Office, and every department's administrative office.

	Seminars	Held in
Mandatory seminars	Safety education	May
	Safety education provided during new student orientation	April, October
	Safety education provided during foreign student orientation	April, October
	Non-laboratory Safety Seminar	May (Hongo)
	Laboratory/non-laboratory Safety Seminar	May (Kashiwa)
Seminars mandatory for those engaging in certain tasks	Environmental Safety Seminar	Several times during year (Hongo)
		November (Hongo, in English)
		May, November (Kashiwa)
	Cryogen Safety Seminar	Twice in April, once each in June and October
	High-pressure Gas Safety Seminar	Once each in May, July, and November
	Training Course for Radiation Handlers (first-time and refresher)	Several times during both semesters (Hongo)
	Crane Operation Seminar	Approx. once every three years (Kashiwa)
	Special Crane Operation Seminar	
Seminars taken as needed	Seminars on operation of lasers, centrifuges, autoclaves, and fume hoods	July (Kashiwa, Hongo, etc.)
	Chemical & UTCRIS Seminar	June, November (Kashiwa, Hongo, etc.)
	Seminars on GMOs, etc.	May, June, November (Hongo) April (Kashiwa)

### Workplace Patrol Report (for Occupational Physicians)

Division patrolled:			Patrol date/time: _____ / __:__ to __:__ Weather:				
Patroller:			Accompanied by:				
Patrol route							
Safety/health issues			Room No.		Response		
1.					1.		
2.					2.		
3.					3.		
4.					4.		
5.					5.		
6.					6.		
7.					7.		
Departmental Health & Safety	Head of Departmental Environment, Health & Safety Office	Head of Kashiwa Campus Environment, Health & Safety Office	Occupational Physician (No. 1)	Occupational Physician (No. 2)	General Manager of Health & Safety	Director General of Division for Environment, Health & Safety	

Report flow: Occupational Physician → Departmental Environment, Health & Safety Office (stamped by Head) → OP (stamped by OP) → Division for Environment, Health & Safety (stamped by Head; 2 copies made, 1 for archives, 1 for OP) → Departmental Environment, Health & Safety Office (archiving of original)

### Workplace Patrol Report (for Health Managers)

Division patrolled:			Patrol date/time: _____ / __:__ to __:__ Weather:			
Patroller:			Accompanied by:			
Patrol route						
Safety/health issues			Room No.	Response		Health Manager confirmation
1.				1.		
2.				2.		
3.				3.		
4.				4.		
5.				5.		
6.				6.		
7.				7.		
Health Manager	Head of Departmental Environment, Health & Safety Office	Head of Kashiwa Campus Environment, Health & Safety Office				

Report flow: Health Manager → Departmental Environment, Health & Safety Office (stamped by Head) → Kashiwa Campus Environment, Health & Safety Office (archiving of original)

## Special Care during Research and Experiments

- 1 Use Caution with UV light-emitting Devices
- 2 Pointers for Safe Storage of Toxins/Irritants in Laboratory
- 3 Protect Your Eyes
- 4 Licensing and Registration of Narcotics and Psychotropics for Research
- 5 Important Reminders on Genetic Modification Experiments
- 6 Watch out for Leakage from Gas Cylinders
- 7 Beware of Toppling of Liquefied Gas Cylinders during Transport
- 8 Use Caution with Microwave Heating!  
Bumping, Shattering, and Spattering can Result in Burns or Eye Injuries
- 9 Beware of Anaphylaxis
- 10 What to Do About Bees/Wasps
- 11 Prevent Water Leaks when Using Water Aspirators
- 12 Beware of Bursting Mercury Thermometers during Heating

## Use Caution with UV light-emitting Devices

- Corneal damage from exposure to UV radiation **does not immediately produce pain.**
- Chronic exposure can lead to **impairment/loss of vision, cataracts, and skin disorders.**

When using an UV light-emitting device:

- Wear a face shield and gloves
- Position the device so that the UV light source is out of sight
- Turn off the device after use
- Close laminar flow cabinet doors when the UV light is on

Hazard prevention tips:

- Clear acrylic panels can be used as UV light shields
- Consider using a device designed to turn off the UV light source when the lid/panel is opened
- Place the device in a location and orientation that protects non-users from UV light exposure

# **TOXINS IRRITANTS** Important Points for Storage

## **Non – Medical Toxins**

- ★ Keep toxins in specially-designed containers
- ★ Faculty responsible for key management
- ★ Return toxins to container every time after use

## **Non – Medical Irritants**

- ★ Keep irritants in specially-designed containers
- ★ Faculty responsible for key management
- ★ Return irritants to container promptly after use

## **Common Rules**

- Lock storage/container (freezer and refrigerator also)
- Store **separately** from other chemicals
- Indicate presence of toxins/irritants with labels/signs
- Prevent containers/cabinets from toppling over/falling
- Check inventory records and usage log using **UTC RIS**
- Inventory stock at least once a year
- Dispose of unused needless chemicals



Labeled and Locked



Containers Separated



Locked and Anchored





# PROTECT YOUR EYES!

Division for Environment, Health & Safety

**Accidents involving eye injuries have occurred at UT recently!**

**Check 1: Are any of the following activities performed at your lab/workplace?**

- ▶ Handling of chemicals
- ▶ Handling of extremely hot or cold materials
- ▶ Activities that produce dust, cuttings, etc.
- ▶ Use of devices that emit laser beams, UV light, or IR light
- ▶ Handling of lab samples (blood, etc.) that contain pathogens



**Check 2: Is the proper protective gear used at your lab/workplace?**

Light shields	Protection against UV, IR, and intense visible light
Safety glasses	Protection against dust, splashes, and flying debris
Laser goggles	Protection against laser beams

## Misconceptions

- ▶ **WRONG:** "I don't need protective eyewear because I wear eyeglasses."  
→ Regular eyewear is no substitute for safety eyewear!
- ▶ **WRONG:** "I can't wear protective eyewear because I need to wear my eyeglasses."  
→ Use protective eyewear designed to fit over eyeglasses!



**Check 3: If chemicals or foreign objects come into contact with your eyes...**

- Immediately rinse your eyes with running water for **15 minutes (30 minutes in the case of alkaline substances!)**
- Ask someone to assist you with rinsing your eyes, inspecting for foreign objects, and arranging medical attention

## Medical contact Write the contact information of your local medical center(s)

Day:

Phone:

Night:

Phone:

Holidays:

Phone:

For information on eye protection, see the following the Division for Environment, Health & Safety webpage:  
<http://www.adm.u-tokyo.ac.jp/gakunai/office/anzenisei/ed/hogo.pdf>

Important reminder for university members engaged in research using narcotics, psychotropics, stimulants, stimulant raw materials, Cannabis or Opium

## ***Licensing and registration are required for possession and use***

**Unauthorized possession/use is illegal!**

**Please consult the environment, health, & safety at your department before use!**

### **○ Narcotics researcher's license**

- Required for possession/use of narcotics for scientific research
- Expiration: Dec. 31 of the following year
- Must be obtained by one member of each project (not required for other researchers involved in the same project)

### **○ Stimulants researcher's license**

- Required for possession/use of stimulants for scientific research
- Expiration: Dec. 31 of the following year

### **○ Cannabis researcher's license**

- Required for growing/possession/use of cannabis for academic research
- Expiration: Dec. 31 of the year

### **○ Registration of labs that use psychotropics**

- Required of all facilities that use psychotropics for scientific research or testing
- The application must be made under the name of the department head

### **○ Stimulant raw materials researcher's license**

- Required for possession/use of stimulant raw materials for scientific research
- Expiration: The first Dec. 31 following the elapse of 4 years from the designated starting date

### **○ Groups I/II grower's licenses (Opium)**

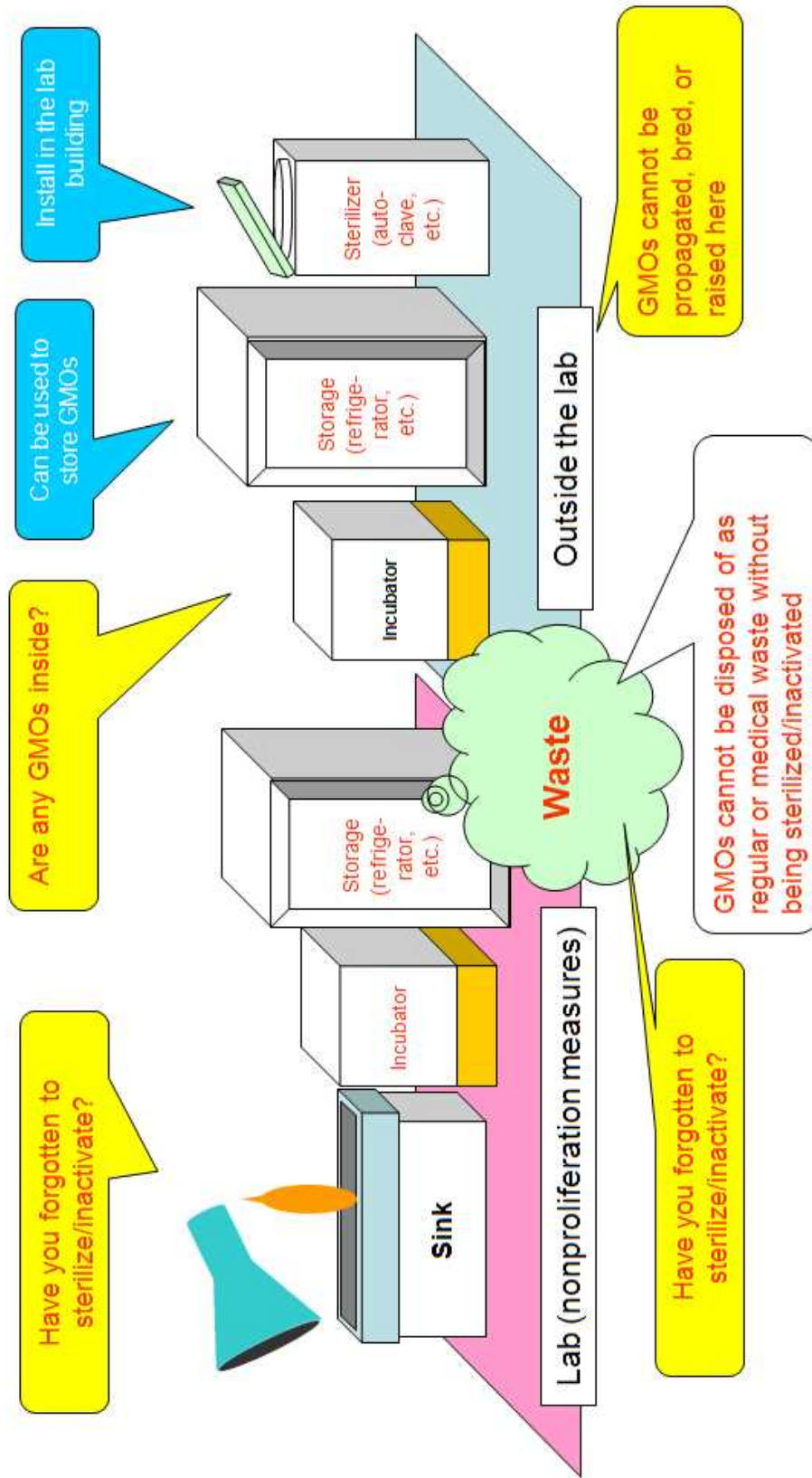
- Group I - Required for growing opium poppy flowers for academic research when opium use is necessary
- Group II - Required for growing opium poppy flowers for academic research when opium use is not necessary
- Expiration: The first Sep. 30 from date of issue.

Division for Environment, Health & Safety

Ext. 21051 / E-mail: anei-2@adm.u-tokyo.ac.jp



## Important reminders on genetic modification experiments



For more information, contact: [bioscience@adm.u-tokyo.ac.jp](mailto:bioscience@adm.u-tokyo.ac.jp)

# Watch out for leakage from gas cylinders!

In case of a gas leak, close the cylinder valve, notify authorities, ventilate the room, and evacuate!

\* Some gases pose a risk of explosion, poisoning, anoxia, or other serious hazards

**Cylinders are pressurized at nearly 150 atm = High risk for massive gas leakage!**

- Always cap the valve outlet of cylinders not in use
- When transporting cylinders, be sure to cap the valve outlet and put the protective cover over the valve
- When spindle-key-operated cylinders are not in use, do not leave the spindle key on the valve



Never leave the outlet cap on the handle (may result in failure to cap outlet or other problems)

## ● Wheel-handle valves

Outlet left uncapped



Outlet properly capped



Valve cover in place



## ● Spindle-key valves

Do not leave spindle key on valve when not in use



Division for Environment, Health & Safety



Ever had a liquid nitrogen/helium cylinder nearly tip over when its casters snagged on a bump on the floor?

## Beware of toppling of liquefied gas cylinders during transport!

In a recent accident at Kashiwa Campus, a cylinder filled with liquid nitrogen toppled on a person transporting it, resulting in injury. In order to prevent similar accidents from occurring, please comply with the following precautions for safe transport of liquid nitrogen/helium containers.

- Have **someone assist you with transport**.
- When full, a 100 L liquid nitrogen cylinder is extremely heavy, weighing as much as 150 to 200 kg
  - Serious injury may result if your feet are run over by the casters!
  - Never wear **sandals or other loose footwear** when transporting cylinders!
- Be very careful when crossing bumps!
  - Whenever possible, move cylinders by **pulling** them, not pushing them
  - Pass over bumps slowly, crossing with one caster at a time
  - Cylinders are **prone to tipping when only the handle on top is pushed or pulled**
  - If you have to push a cylinder, place one hand on the middle of the cylinder
- If a cylinder is about to tip over or has already tipped over, do not try to force it back up! Release your grip if necessary to protect yourself
- Do not let yourself get caught under a toppling cylinder. If you do, the cylinder won't be the only thing damaged—you yourself could be severely injured!
- You can repair a broken cylinder, but you can't "repair" bodily injuries so easily.



Movable cryogenic tanks

## ***Use caution with microwave heating!***

**Bumping, shattering, and spattering can result in burns or eye injuries!**

Many accidents have occurred from the use of microwave ovens to heat lab materials

### **Past Accidents**

- A flask containing agarose gel solution was stirred after microwave heating. As a result of **bumping**, the solution spewed over and burned the person's hand
- A flask was heated while stoppered. Upon removal from the oven, it **shattered**, causing cuts and burns to the person
- When a paraformaldehyde solution was heated and stirred, bumping caused the solution to **spatter** into the person's eyes



### **Safety Tips for Microwave Heating**

- Stay near the microwave oven and avoid overheating the material
- When heating solutions, do not fill the flask, beaker, test tube, bottle, etc. to more than 1/3 of its capacity
- Never heat containers sealed with a stopper, lid, etc.
- Wear impermeable heat-resistant gloves and protective eyewear

Read the microwave oven user manual to familiarize yourself with proper operation.



## **Beware of Anaphylaxis!**

**Anaphylaxis:** Acute allergic reaction that can result from animal bites.  
Symptoms may also appear in people normally not predisposed to allergies.

### Preventing bites by lab mice, etc....

- When performing experiments, secure the animal's hind legs
- Shrieking is a sign that the animal is agitated. Return the animal to the cage and allow it to calm down before using it
- Whenever possible, put on protective wear (thick gloves, etc.), use forceps or other utensils, and take other steps to prevent bites

### If bitten...

- Thoroughly rinse or wipe the wound
- Immediately notify nearby colleagues and concerned personnel

Contact: \_\_\_\_\_.

- Monitor yourself for **unusual physical conditions** (rashes, flushing, difficulty breathing, dizziness, elevated heartbeat, nausea, etc.)  
**Symptoms of anaphylaxis generally start to appear within 30 minutes**
  - Symptoms appear quickly in severe cases
  - Symptoms are more severe in people who have experienced similar reactions before

### **If you experience unusual physical conditions (especially difficulty breathing), immediately seek medical attention!**

- Call an ambulance or rush to a hospital
- Tell the doctor that you **may be suffering from anaphylaxis**

The University of Tokyo



## What to Do About Bees/Wasps

- ① Wear **white** or light-colored clothing: avoid black.
- ② Do not wear pure wool, fur, and loose-fit clothing.
- ③ Avoid wearing strong scents such as hair spray, hair tonic, scented soaps, and perfume.
- ④ Protect your entire body with protective hat with the veil, long-sleeve shirt, and gloves and boots. Always carry an wasp or bee insecticide spray.
- ⑤ Get rid of tiny nests if you find them in early spring.
- ⑥ **DO NOT go near** the nests in summer and fall when they are the most dangerous. Also, **DO NOT** make sudden movements in the nest area. If you are attacked by bees or wasps, do not try to shoo them away: lie face down and wait until they calm down.
- ⑦ Do not leave your uncovered food, drinks, or garbage around because they attract bees and wasps.
- ⑧ If you find full-size bees nest or a wasp colony in a tree or in the ground, clearly mark it. Also, inform other people of the nest to help prevent bee and wasp stings after that.
- ⑨ Check whether you are allergic to bee or wasp venom in advance.
- ⑩ If you are stung by a bee or wasp, do not pull the stinger out because this may squeeze more venom into the skin. Pinch the area around the bee sting so that the stinger rises above the surface of the skin and pull it out with tweezers. Or, scrape the stinger away in a side-to-side motion, and then wash the area with soap and water.  
Use an insect poison remover to remove the venom, cool down the skin with water; and if need be, apply an antihistamine cream to the sting area.  
If you are allergic to wasp venom, or experience more serious reactions such as hives, headache, vomiting, dizziness, and difficulty breathing, go to the nearest hospital for treatment.





## Prevent water leaks when using water aspirators.

Water leaks frequently occur from the use of water aspirators in labs. Below are two examples of the accidents that have occurred at our university.

### Case 1

Tap water was left running through an aspirator overnight, using an old hose. Due to rubber deterioration, the hose developed a leak during the night, spraying out water that seeped into the power control room below. The leak was not discovered until the morning...

### Case 2

A lab member put an aspirator into operation and then left it to work on a report in a room across the hall. Later, another lab member noticed water running on the floor and discovered that the aspirator's water outlet hose was writhing due to the force of the stream, causing water to spray out of the sink. The water seeped into the library below and soaked books in the collection...

## Precautions



- (1) Do not operate aspirators unattended or for long periods.
- (2) Regularly check rubber hoses for signs of deterioration.
- (3) Securely fasten the hoses.
- (4) Watch out for leakage of solutions, etc. into the water stream.

Division for Environment, Health & Safety  
Dec. 2009

Be sure to comply with **any aspirator usage rules or prohibitions** set by your department or school.

## **Beware of bursting mercury thermometers during heating**

Accidents involving **bursting** of mercury thermometers occur every year at the University of Tokyo, often resulting in the **spattering of mercury**. In addition to the risk of cuts from broken glass, these accidents can also lead to **health impairment from mercury absorption** and to **environmental contamination**.

### **Case 1**

In May 2007, a mercury thermometer broke during the mixing and **heating** of chemicals.

Due to the possibility of **mercury absorption**, the student performing the experiment and a student working nearby were required to undergo **examination at a hospital**.



### **Case 2**

In Nov 2009, an unattended mercury thermometer cracked after it was **heated above 300°C**.

As a result, the column snapped and the bulb shattered, allowing mercury to **leak out**.

## **Precautions**



- (1) Check the thermometer's maximum measurable temperature and do not use the thermometer in cases where you cannot keep the temperature from exceeding the maximum.
- (2) Do not use the thermometer for stirring. Minimize the risk of breaking by taking care to keep the thermometer from hitting people or things.
- (3) If the thermometer breaks, the proper emergency response must be made immediately, so promptly contact your department's Health and Safety Management Office (ext. ) so that the necessary response can be made promptly.

Division for Environment, Health & Safety  
Jan. 2010

Please use non-mercury thermometers whenever possible.  
Before disposing of mercury thermometers, please consult with your department's health & safety officer.



# Safety Guidelines for Cyclists



## 自転車に乗るときに心がけるべきこと

### 2 Five rules to follow to ensure safety when riding a bicycle

自転車の通行方法 自転車安全利用五則 を守りましょう。



Rule 1

**Rule 1** In principle, cyclists should ride on the street and use sidewalks only in exceptional cases

- Bicycles are classified as vehicles, so as a general rule, cyclists should use the street.
- Cyclists should use designated bicycle paths when they are available.
- Cyclists should use the lanes marked for bicycles on sidewalks or roads when they are available.
- Children under 13, adults 70 and over, and people with physical disabilities are permitted to ride a bicycle on the sidewalk.
- When the street is too narrow, cyclists can ride on sidewalks.

第一則 自転車は、道路が原則、歩道は例外。

- 自転車は車両と分類されるので、原則として道路を通行します。
- 自転車専用道があるところでは、自転車道を通行します。
- 歩道に自転車専用通行用の標識がある歩道は、自転車道で通行できます。
- 13歳未満の子ども、70歳以上の高齢者、体の不自由な人は、歩道を道路で通行できます。
- 道路が狭い場合、歩道を通行できる場合があります。



Rule 2

**Rule 2** Cyclists should ride on the left side of the street

- Only the left side of the street should be used by cyclists.
- Cyclists must not obstruct pedestrians if riding inside the lines marking pedestrian paths.

第二則 自転車は左側を通行。

- 道路の左側を走ることに。
- 歩行者を通行で妨げますが、歩行者の通行を妨げないこと。



Rule 3

**Rule 3** Cyclists must reduce speed on sidewalks and give pedestrians the right of way

- When passing pedestrians on sidewalks, cyclists should reduce speed enough to enable a sudden stop.
- Cyclists should stop riding if there is a risk of obstructing pedestrians on sidewalks.
- Cyclists should refrain from unnecessarily ringing bicycle bells at pedestrians on sidewalks.
- Pedestrians are given priority on sidewalks, so cyclists are expected to dismount their bicycle if necessary.

第三則 歩道は歩行者優先で、歩道乗りを減速。

- 歩行者を通過するときは、すぐ停止できるように減速で通行すること。
- 歩行者の通行を妨げるおそれのある場合は一時停止します。
- 無必要に歩行者に対してサイレンを鳴らすのは禁止されています。
- 多くは歩行者が優先です。必要に応じて自転車から降りましょう。



Rule 4

**Rule 4** Cyclists must obey safety rules

Finding double is prohibited.

第四則 安全ルールを守る。二人乗りは禁止。

**Rule 5** Cyclists must obey safety rules

Finding aids by side is prohibited.

第五則 安全ルールを守る。並走は禁止。



# Safety Guidelines for Cyclists

## 自転車に乗るときに心がけるべきこと

### 2

#### Five rules to follow to ensure safety when riding a bicycle

自転車の通行方法 自転車安全利用五則 を守りましょう。

##### Rule ①



**Cycling after drinking alcohol is strictly prohibited**



Offenders could face up to several years in jail or a large fine.  
Anyone who serves a person alcohol knowing that he or she will later ride a bicycle may also be subject to punishment.

飲酒運転は厳禁に禁じ  
罰金や禁固が科せられます。飲んで運転した人だけでなく、飲ませた人も罰金対象です。

##### Rule ② Cyclists must obey safety rules

Cyclists are prohibited from riding under the influence of alcohol.

第五則 安全ルールを守る。飲酒運転は禁止。

##### Rule ③



##### Rule ④ Cyclists must obey safety rules

Cyclists must use bicycle lights at night. Cyclists must also use bicycle lights in the daytime when riding through tunnels or during foggy weather.

第五則 安全ルールを守る。  
夜間はライトを点灯。  
トンネルや濃霧の中ではライトを点灯しましょう。

##### Rule ④



##### Rule ⑤ Children must wear a bicycle helmet

Parents and guardians must ensure that children wear a bicycle helmet in the following cases:

- When a child under the age of 6 is riding in the children's seat of a bicycle
- When a child under the age of 13 is riding a bicycle

第五則 子どもはヘルメットを着用。  
次の場合は、保護者はヘルメットを着用させなければなりません。  
●6歳未満の子どもの自転車利用座席に座せる場合  
●13歳未満の子どもの自転車に乗車する場合

### 3

#### Using intersections

交差点の通り方

##### 3-1



##### 3-1 When making a right-hand turn

At intersections with traffic lights. When the light turns green, the cyclist should cross the intersection in a straight direction and come to a stop on the opposite side with the bicycle facing right. When the light of the intersecting street turns green, the cyclist should proceed in a straight direction after looking both ways to check for safety.

At intersections without traffic lights. The cyclist should look behind to check for safety, cross the intersection in a straight direction, then slow down to make a right-hand turn, and check for oncoming cars before proceeding.

##### 右折するとき

- 信号機があるとき  
青信号で、交差点の左側に向かって向こう側の角まで十分に減速を確保して直進し、止まって向きを変えます。対向する信号が青色になってから、前後左右の安全を確認して直進します。
- 信号機がないとき  
後ろの安全を確認し、対向の右側に白線が、この線まで直進し、減速を速として右に曲がり、安全を確認してから進みます。



# Ride Safely by following **the Law**



## ✓ Use of headphones

It is against the law to ride a bicycle listening to music using headphones at such levels that prevent you from hearing sounds to ride safely.

(Max. fine of JPY 50,000)



## ✓ Riding single-handed while using umbrellas or cell phones

Riding with one hand occupied makes it difficult to steer and extremely dangerous.

(Max. fine of JPY 50,000)

## ✓ Riding under Influence

Just because it is a bicycle does not mean it is OK to drink & drive. Bicycles are "light vehicles" and since classed as vehicles it is illegal for you to be in charge of a vehicle while under the influence of alcohol.



(Max. imprisonment of 5 years or Max. fine of JPY 1,000,000)

## ✓ Riding without lights

Accidents have actually occurred on campus due to people riding at night without lights. The lights let pedestrians and cars know of your presence.



(Max. fine of JPY 50,000)

## ✓ Riding tandem

Don't do a "Roman Holiday" on a bicycle. It's illegal.

(Max. fine of JPY 20,000)

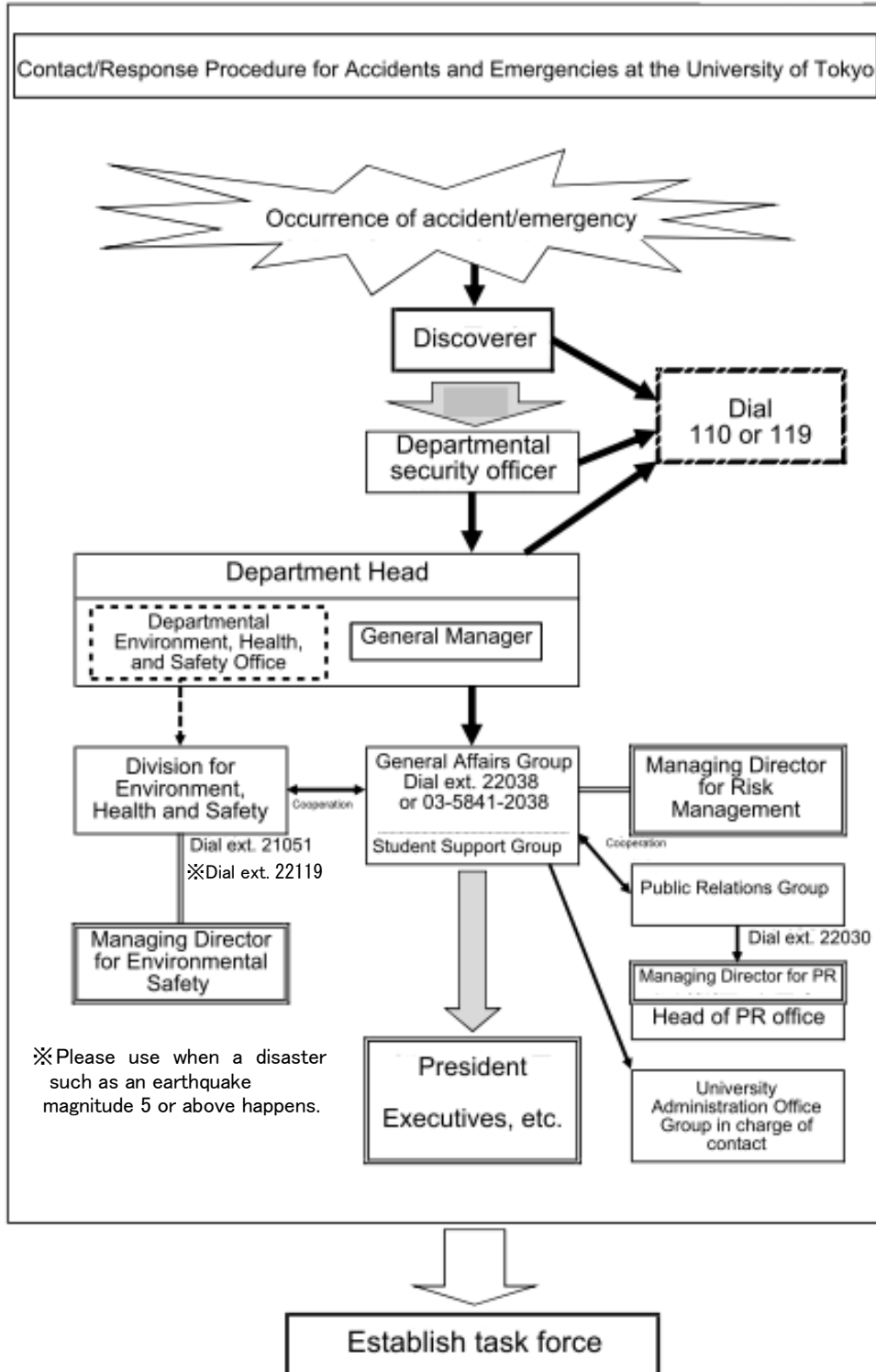


Obeying the Traffic Regulations is the first step to

**safety**



The University of Tokyo, Division of Environment, Health and Safety



**Kashiwa Campus Environment, Health, & Safety Office Contact Information**

Ext. 63586 or 63585

Outside calls: (from cell phone) 04-7136-3586

Fax: 04-7136-3269

E-mail: [anzen@kj.u-tokyo.ac.jp](mailto:anzen@kj.u-tokyo.ac.jp)

# 事故・火災・事件 が起きたら



IN CASE OF ACCIDENT, FIRE or INCIDENT

落ち着いて  
3つの手順を  
クリアせよ！



①助けを呼  
ぶ、周囲に知  
らせる  
Alert Others



大声で知らせる  
火災の場合火災報知機  
を鳴らす  
Shout out loud to others,  
press the fire alarm  
button in case of fire



②緊急車両を  
手配する  
Call Emergency



消防・救急  
Fire/Medical  
**0-119**  
警察  
Police  
**0-110**



③キャンパス  
内に連絡する  
Call Security  
Office



設備センター  
Facility Center  
**63000**  
守衛所  
Security Office  
**63010**



柏地区環境安全管理室 内線 63586・63585

# 事故・火災・けがが発生したら…

IN CASE OF ACCIDENT, FIRE or INJURED

## ①周囲に知らせる！

Alert Others !

### ・火災の場合… (FIRE)

大声で「火事だ！」Call out loudly "FIRE!"



### ・けがの場合… (INJURED)

人を呼べ！ Call for help !

## ②通報する！

Call Emergency !

消防署 (Fire Station)

0-119

携帯から (For mobile)

119

## ③設備センターへ！

Call Facility Center !

・設備センター  
(Facility Center)

63000

・守衛所 (Security Office)  
63010



### 近隣の病院など Nearby emergency hospitals

- ・柏保健センター—Kashiwa Health Service Center : 63040
- ・千葉・柏たなか病院 Chiba Kashiwa Tanaka Hospital : 0-04-7131-4131
- ・おおたかの森病院 Otakanomori Hospital : 0-04-7141-1117
- ・辻仲病院柏の葉 Tsujinaka Hospital Kashiwanoha : 0-04-7137-3737

### 通報の際に伝える内容 Report as below:

- 場所 (Fire site)
  - ・東柏キャンパスの The University of Tokyo, Kashiwa Campus,
  - ・〇〇研究所/研究科で火災発生 Building Name...
- 状況 (Fire situation)
  - ・何が (薬品名 等) Burning material (Name of burning chemicals, etc.),
  - ・どのくらい (天井が) 届くほど など 燃えているか Fire scale (Reach a height of the ceiling, etc.)
- その他・近くに引火性の薬品あり など Other information: Flammable substance at a nearby site

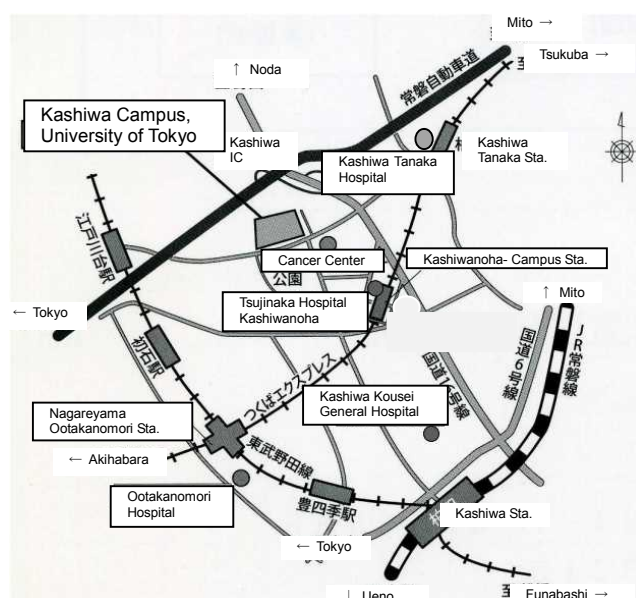
柏地区環境安全管理室 内線 63586、63585



## When an Emergency Occurs...

	What to Do	Contacts	Phone Numbers (calling from campus phone)	What to Say
Injury	<ol style="list-style-type: none"> <li>1. Turn off equipment involved.</li> <li>2. Summon help from others nearby.</li> <li>3. Perform first aid. Bleeding: Stop with a handkerchief. Unconsciousness: Perform CPR.</li> <li>4. Contact the places listed on the right.</li> <li>5. If the injury is minor, take the victim to the Health Service Center.</li> </ol>	(1) Tsujinaka Hospital Kashiwanoha, KashiwaTanaka Hospital, Ootakanomori Hospital or Kashiwa Kousei General Hospital	0-7137-3737  0-7131-2000 0-7141-1117 0-7145-1111	A _____ at the University of Tokyo Kashiwa Campus has suffered a _____ (injury), so we are taking him/her to your hospital.
		(2) Fire Dept. (to call for ambulance) Kashiwa Fire Dept.	0-119  0-7133-0119	A person has been injured at the _____ (school/institute) at the University of Tokyo Kashiwa Campus, so please send an ambulance. The location is Room No. _____ on the _____ floor of the (building name). The address is 5-1-5 Kashiwa-no-ha. My name is _____.
		(3) Administrative offices Before 5 p.m. on weekdays GSFS ICRR ISSP AORI General Research Kavli IPMU IOG ITC  After 5 p.m. Facility Center	Ext. 64003 Ext. 63102 Ext. 63207 Ext. 66032 Ext. 64435 Ext. 65972 Ext. 66676 Ext. 66702 (Kashiwa) or 27710 (Hongo)  Ext. 63000	A person has been injured in Room No. _____ on the _____ floor of the _____ Building. I have called an ambulance, so please guide it to the building.
Fire	<ol style="list-style-type: none"> <li>1. Summon help from others nearby.</li> <li>2. Turn off equipment involved and close the gas valve.</li> <li>3. Contact the places listed on the right. (Relax and take a deep breath)</li> <li>4. When safely possible, try to extinguish the fire. If a large fire, evacuate.</li> </ol>	(1) Fire Dept. Kashiwa Fire Dept.	0-119 0-7133-0119	A fire has broken out at the _____ (school/institute) at the University of Tokyo Kashiwa Campus, so please send a fire truck. The location is Room No. _____ on the _____ floor of the (building name). The address is 5-1-5 Kashiwa-no-ha. My name is _____.
		(2) Administrative offices Before 5 p.m. on weekdays GSFS ICRR ISSP AORI General Research Kavli IPMU IOG ITC  After 5 p.m. Facility Center	Ext. 64003 Ext. 63102 Ext. 63207 Ext. 66032 Ext. 64435 Ext. 65972 Ext. 66676 Ext. 66702 (Kashiwa) or 27710 (Hongo)  Ext. 63000	A fire has broken out in Room No. _____ on the _____ floor of the _____ Building. I have called a fire truck, so please guide it to the building.

**\*In case of illness\***  
Kashiwa Telephone Service  
**0-7163-0119**  
(From 10 p.m. to 8 a.m.  
and Holidays)



Make a copy of this page, fill in the blanks with the appropriate information, and keep the copy near the phone.

Also, make a memo of the necessary information for fighting fires involving hazardous materials, and keep a copy near the phone and posted on the laboratory doorway.

Kashiwa Campus address:  
5-1-5 Kashiwa-no-ha, Kashiwa-shi

Tsujinaka Hospital Kashiwanoha address:  
148-6 Kashiwanoha Campus, 178-2 Wakashiba Kashiwa-shi

KashiwaTanaka Hospital address:  
70-1 Kooota, Kashiwa-shi

Ootakanomori Hospital address:  
113 Toyoshiki, Kashiwa-shi

Kashiwa Kousei General Hospital address:  
617 Shikoda, Kashiwa-shi

Division for Health Service Promotion  
Kashiwa Health Service Center Ext. 63040