TWIns

Tokyo Women's Medical University – Waseda University
Joint Institution for Advanced Biomedical Sciences

Safety Guide

Ver. 2.5

Center for Advanced Biomedical Sciences Safety and Hygiene Committee

Foreword

— To those conducting experiments / research at TWIns —

TWIns（Tokyo Women's Medical University - Waseda University Joint Institution for Advanced Biomedical Sciences）is a facility established for the purpose of cutting-edge research and there are rules and guidelines that must be observed. The Facilities Management Committee formed by the Tokyo Women's Medical University and Waseda University, and the Safety and Health Committee of Center for Advanced Biomedical Sciences, Waseda University, have formulated a variety of rules and are conducting a range of activities to ensure safety management and protection of the environment.

In line with advances in research activities so too are potential risks diversifying, creating a need for greater knowledge to reinforce what we already know about safety protocols. While a large number of standards established for the purpose of conducting experiments safely are stipulated by law, these are growing stricter year by year.

As a result, it is the responsibility of researchers to be aware of whether their research activities are not in conflict with the relevant laws and regulations in terms of the environment, safety and ethics and to proceed with the utmost caution. In today's modern society, failure to observe the relevant laws and regulations calls to question your quality as a researcher.

Research at TWIns involves the handling of a variety of equipment, devices, instruments, chemical substances, radioactive substances and living things, etc. A single error in the handling of any of these, depending on the scale of such error, can result in loss of social credibility. This must be avoided at all costs.

The important thing is for everyone involved in the handling of these materials to be fully aware of not only the capacity and properties of the materials they are handling, but also the potential risks, and be aware of their responsibility as researchers to act appropriately in accordance with the relevant laws and regulations and safety standards of this institution.

This TWIns Safety Guide contains measures to be taken in the event of an emergency and safety information we believe necessary when conducting experiments or research at the facility. Regardless of your field of research, we ask that you carefully read through each section of this guide and conduct your experiments or research in a safe manner. In order to ensure that our safety measures remain up to date, we hope to channel our energy into raising awareness and reinforcing our compliance framework moving forward.

We hope that you will make ample use of this booklet and keep safety in mind as you strive towards achieving outstanding research results etc. at TWIns.

TWIns Safety Guide Editing Team

TWIns Safety Guide

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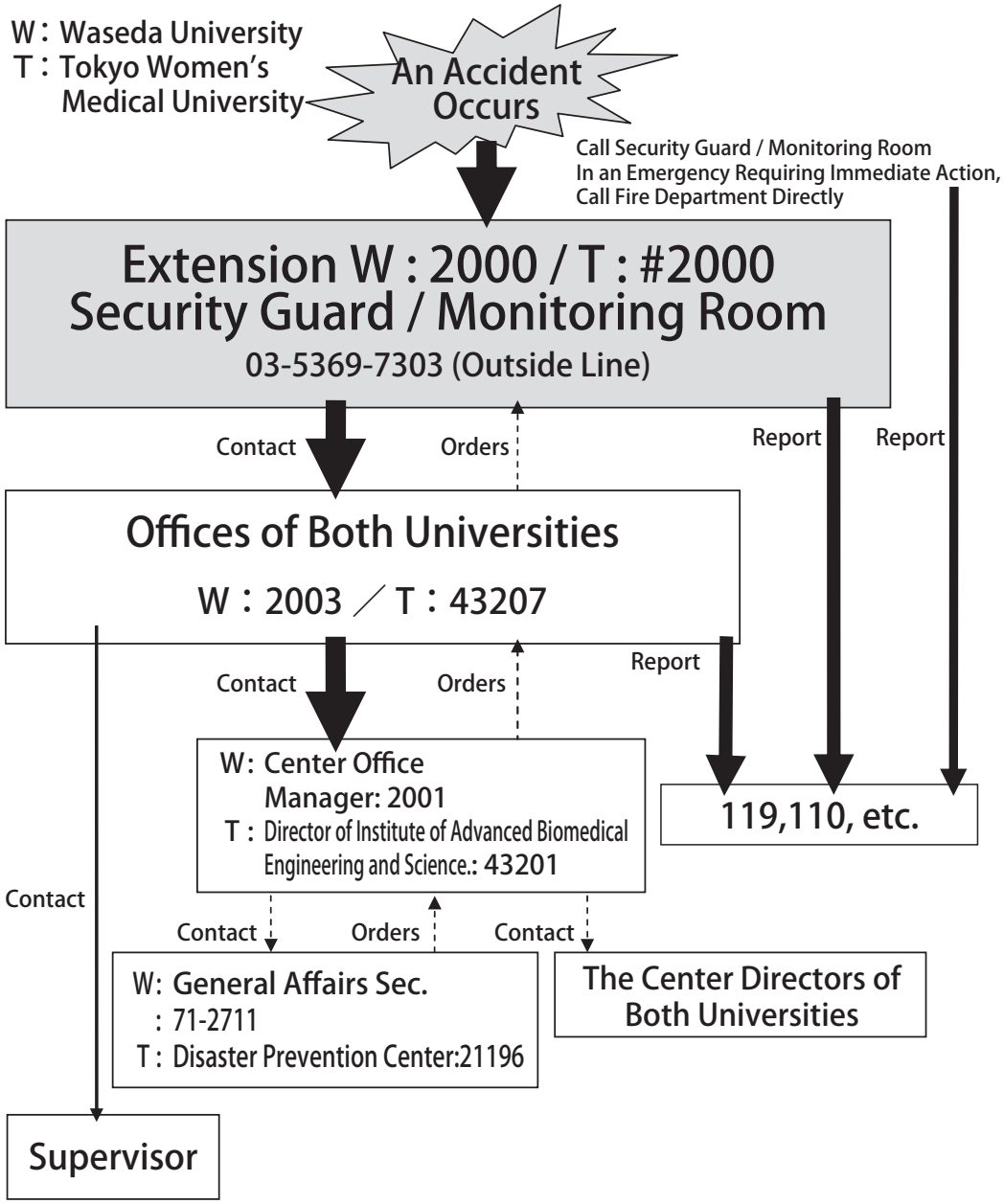
Responding to Emergencies

1 — 1. About Responding to Emergencies

1 Flowchart of Treatment in emergencies

＊ W refers to Waseda University, and T refers to Tokyo Women's Medical University. This flowchart shows not only the flow of communication after an accident has occurred, but also who the recipients of an emergency call should contact next. **The people involved in the accident are not required to contact people at every stage of the flowchart from top to bottom.**



＊ Add # when calling extension numbers between Waseda ←→ Tokyo Women's Medical University

Figure 1-1-1. Example of communication flow in an emergency

Table 1-1-1. Example of Making a Report to the Tokyo Fire Department

〈In case of a Fire〉	
Questions from the Tokyo Fire Department	**The Report**
Fire department. Is that a fire or emergency?	**"This is a fire" or "This is an emergency."**
What is the exact location?	**Room ... on the ...floor of TWIns at 2-2 Wakamatsu-Cho, Shinjuku-ku.**
What is on fire? What is the problem?	**(Something / A chemical substance) is burning. A student is unconscious. He/She is not responding.**
I've got it.	**Please extinguish the fire. / Rescue him/her.**

Points to Consider When Calling the Fire Department

◎ Calls to 119 are received at the Disaster & Emergency Information Center in Otemachi, Chiyoda-ku.

Therefore, explain the situation accurately without panicking when giving the TWIns address (2-2 Wakamatsu-cho, Shinjuku-ku), the floor number, and room number or name. It is a good idea to keep information, like the address near phones.

◎ It is important to make secondary calls.

Say "This is a secondary call" and accurately explain anything you could not explain during the first call and any new information. You should describe what is burning and its condition in case of a fire, and the condition, etc. of sick or injured people in case of an emergency.

※ If you call the Fire Department directly, you must make the same call to the Security Guard / Monitoring Room (extension 2000/#2000).
When doing so, remember to give them your name and contact number along with the name of the laboratory and department!

1 — 2. Conduct When Responding to Emergencies

Because emergencies never be forecasted, it is important to confirm how to respond to them on daily basis so that you can react appropriately and without panicking. A person in charge or first person to find must decide what action is required during emergency according to the time and situation.

Please refer to the "Response Flow for Emergencies (Figure 1-1-1)" and react accordingly while keeping the following in mind.

1 In Case of a Life-threatening Accident

- ○ Call out to obtain help from people nearby.
- ○ Call the Security Guard / Monitoring Room (extension 2000/#2000).
- ○ Call the fire department or ambulance.
- ○ Take emergency measures.

Make priority to confirm your own safety, to take measures to save victim and to make emergency call. Avoid acting alone.

2 In Case of Fire

- ○ Shout out "Fire" to warn others.
- ○ If the fire is small, try to put away all hazardous materials in the vicinity, and use a nearby fire extinguisher to put them out during the initial stage.
- ○ Evacuate the area immediately if the fire cannot be extinguished, and call the Fire Department directly, or call and report (request reporting of) the emergency to the Security Guard / Monitoring Room (extension 2000/#2000). When calling 119 directly, always report it also to the Security Guard / Monitoring Room.

3 When People Become Sick or Injured

- ○ There is a cot and a first-aid kit in Waseda university TWIns office located on the 3rd floor. Take appropriate action based on your own judgement. (Any medical treatment by doctor or nurse is not available.) Cot is available only in the office opening hour and only when you do not have high fever.
- ○ Health support center Nishi-Waseda branch is available to get consultation.(In 73-2640, Out 03-5286-3021)
- ○ When there is a need for medical treatment, please refer below list of hospitals nearby. If you want to go to Tokyo Women's Medical University Hospital, please check P8 for detail.

Hospitals nearby

Tokyo Women's Medical University Hospital 03-3353-8111	Tokyo Yamate Medical Center 03-3364-0251
Center Hospital of the National Center for Global Health And Medicine 03-3202-7181	Kato Eye Clinic 03-3200-9307
Daido Hospital (Internal medicine, surgical and other) 03-3981-3213	Sukegawa Clinic (Orthopedic, dermatology and 03-3209-3333
Seihoku Clinic (Internal medicine, surgical and other) 03-3203-5660	Uematsu Clinic (Internal medicine/dermatology) 03-3209-5608

4 In Case of Exposure or Spillage of Chemicals

Be sure to be aware of location of the nearest emergency shower in case of emergencies.

○ Wash the exposed area and surrounding area with copious quantities of water. Use the emergency shower depending on the situation (refer to P.16–17 About the Emergency Showers).

○ In the case of exposure to toxic or large quantities of chemicals, requiring evacuation or first aid, seek the help of those around you and remain calm.

○ Contact the person in charge of chemical substances at your university (the office located on the 3rd floor) for information on how to handle chemical substances or measures to take when toxic gases have been inhaled. For more information on the handling of chemical substances you may also refer to the instructions listed on the relevant Safety Data Sheet (SDS) (refer to Environmental Safety Center Guide P.8)

○ There is the danger of an explosion in the case of spillage of highly flammable solvents. Seek the help of others around you to cordon off the area to prohibit entry, and keep ignition sources away. Remain calm and clean up the area following proper procedures.

5 In Other Situations

○ If large quantities of special gas are to leak from the centralized piping system setting on alarm sensors, close off the room, evacuate and contact the Security Guard / Monitoring Room (extension 2000/#2000). Send out order for people working nearby or in neighboring laboratories to take refuge.

○ In the case of an accident caused by the facility building, contact the Security Guard / Monitoring Room immediately (extension 2000/#2000).

6 In the Case of a Major Earthquake

(For more details, refer to 4-5. Responding to Major Earthquakes)

○ People are required to act calmly in a major earthquake.

○ During an earthquake, find an emergency exit and hide under a table to protect yourself from falling objects, and wait for the shaking to stop.

○ After the shaking has stopped, if you consider the inside of the building to be "unsafe," take refuge accordingly. Do not use the elevator while evacuating.

Evacuation area: North side area of Tokyo Women's Medical University Hospital Ambulatory Care Center (Figure 1-5-2 P.19)

Safety Evacuation Area: Toyama Park.

○ Waseda University has published "Earthquake Response Manual For Students (https://www.waseda.jp/top/en/about/work/organizations/general-affairs/earthquakes)," which you should read.

○ Comprehensive disaster prevention drills are held twice annually at TWIns. Be sure to actively participate in these drills and confirm actions which need to be taken during disasters.

7 About the Contact System in Emergencies

○ In the event of an accident or fire, you must contact the Security Guard / Monitoring Room (extension 2000/#2000) immediately.

○ Back cover is a list of contact information in emergencies. A contact system is to be prepared, notified and confirmed every year within each laboratory to enable quick communication at any time.

○ The supervisor of students engaging in research has all the responsibility in emergencies, so if an accident occurs during the course of research, you must report it to your supervisor and receive instructions accordingly. If you are unable to contact your supervisor, you must obey instructions given by senior researchers nearby who are within TWIns.

※【For reference】Compensation scheme covering accidents, injury and compensation for damages

Applicable to Waseda University Students

- Full-time students in all departments and graduate schools at the university
- All postgraduate research students
- Special students

○ *Gakushōho*

Waseda University Student Compensation Scheme (Accident & Injury Compensation)

This is a compensation scheme unique to Waseda University that can be used in the event of accidents or injury during the course of education or research activities authorized by the University. The amount of compensation awarded is ultimately determined by the university following evaluation by a claims adjuster.

○ *Gakubaiho*

Waseda University Student Compensation Scheme (Liability Compensation)

This is a scheme to compensate students for legal liability incurred as a result of injury caused to another person or damage caused to the belongings of another person during the course of an internship/practical training in Japan or overseas authorized by the University. This does not cover accidents that occur while travelling to or from the activity venue.

※ This scheme covers the same students at the Gakushoho scheme above.

※ In order to be covered by the liability compensation scheme the venue of the activity you are participating in (internship, practical training, volunteer activity, experiment/practical exercise outside regular classes) must be authorized by the faculty as one part of your official educational or research activities at the university.

For more information on the compensation scheme terms and conditions, please see the following URLs.

- Waseda University Student Compensation Scheme (Accident & Injury Compensation):
  http://www.waseda.jp/inst/student/en/support/injury/
- Waseda University Student Compensation Scheme (Liability Compensation):
  http://www.waseda.jp/inst/student/en/support/liabilitycoverage/

1 — 3. About Tokyo Women's Medical University Hospital

Below are details of the Tokyo Women's Medical University Hospital location, contact information, access information, and after hours visits.

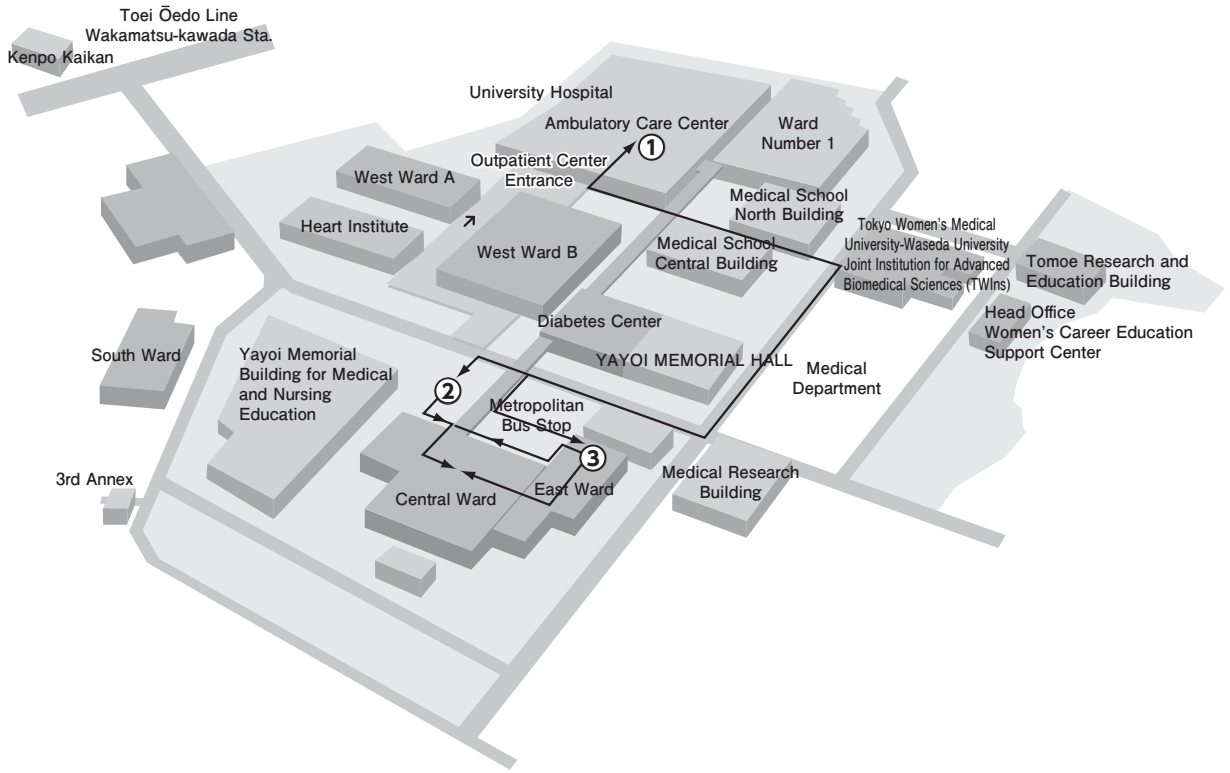
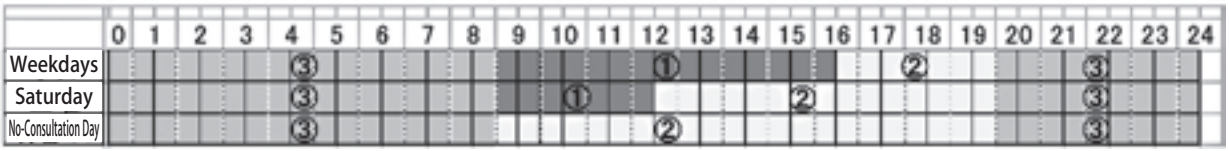


Figure 1-3-1. Access from TWIns

Table 1-3-1. Where to go for consultation at different times of the day (refer to Fig. 1-3-1; ① General Outpatient Center, ② & ③ Central Ward)



Tokyo Women's Medical University Hospital 03 — 3353 — 8111

※ In the case of an accident requiring urgent medical attention, do not hesitate to seek consultation. Let staff know that you are a student or researcher at TWIns when booking your consultation.

※ The Tokyo Women's Medical University Hospital is an advanced medical institution. Out of pocket expenses for your initial consultation will cost 8,800 yen.
If you are a student at Waseda University you may be refunded part of your consultation fee under the Student Health Promotion Mutual Aid Association Scheme. (http://www.waseda.jp/inst/student/en/support/medicalfee_reimbursement)

1 － 4. Using the Safety Equipment of the TWIns Facility

1 Fire Extinguishing Equipment

1 － 1）Fire Extinguisher（消火器）

○ Be sure to take note of their locations by confirming signs in corridors (Figure 1-4-1).

○ There are three types of fire extinguishers at the facility.

Ⓐ：ABC powder extinguisher — For use on general fires in which mainly solids such as paper, wood, fibers and resins are burning.

Ⓑ：ABC powder extinguisher (large) — For use on oil and gasoline fires.

Ⓒ：Water and alkali salt powder fire extinguisher — Can be used for electrical equipment fires.

Figure 1-4-1. Example of a place where a fire extinguisher has been installed

○ When in use, please follow the procedure written on the fire extinguisher.

1 － 2）Indoor Fire Hydrant（屋内消火栓）(Figure 1-4-2)

○ Be sure to take note of their locations by confirming signs in corridors (Figure 1-4-2).

○ This is for use by firefighters, but you may use it depending on conditions such as when the arrival of firefighters seems to be late. Under such circumstances, you will follow the operating instructions on the back of the fire hydrant door, and use it with two or more people (Figure 1-4-3).

Figure 1-4-2. Example of a place where an indoor fire hydrant has been installed

Figure 1-4-3. How to operate an indoor fire hydrant

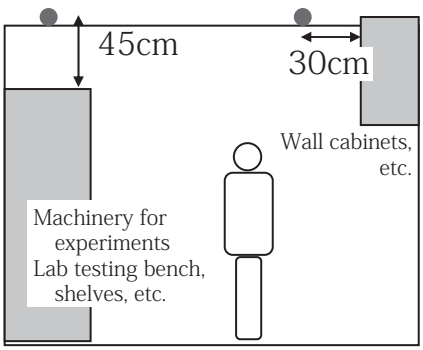
1 － 3）Sprinkler System

○ This system has been installed on all floors including those in the basement of the facility, with the exception of special rooms.

○ Two types of sprinklers have been installed depending on what the rooms are used for.

• Water sprinkler system

This is a system of water pipes connected to sprinkler heads which begin spraying water when the trigger system melts. It has been installed mainly in communal areas (corridors, halls, etc.).



● Sprinkler Head

• Pre-activated Fire Sensor
This system starts spraying water when the fire sensor mentioned in 2-1) is activated, and the sprinkler head melts at the same time. It requires the activation of both the sprinkler head and the fire sensor for it to start operating. It has been installed mainly in areas occupied by people such as laboratories.

For more information on fire sensors, refer to 2 Equipment for Sensing and Preventing Fires, on the next page.

1 — 4) Nitrogen Gas Fire Extinguisher Equipment

○ Fires will be extinguished using nitrogen gas in rooms where water cannot be sprayed, such as the basement machine room, or the chemical storage room where small quantities of hazardous materials are handled.

○ In the case of a fire, only the room where the fire was detected will be sprayed with nitrogen gas, upon activation of both the "fire alarm" and the "explosion-proof sensor for the nitrogen fire extinguisher (installed only in room for handling small quantities of hazardous materials)."

○ Fires are extinguished by lowering the oxygen concentration to around 12.5%, which is lower than the "15% cutoff line said to be needed for matter to continue burning."
It is said that "the borderline for protecting human lives is an oxygen concentration of 10%," however "an oxygen concentration of 12.5%" does not guarantee the safety of people. You are asked to evacuate the area quickly. Please refer to the section, "3-11. Safety Measures for Liquid Nitrogen", where cases of accidents have also been introduced.

○ The areas targeted for extinguishing have been divided into small sections shown on a diagram which could not be printed in its entirety in this guide. It will be left up to the responsibility of individuals to check with the office.

2 Equipment for Sensing and Preventing Fires

2 — 1) Automatic Fire Alarm System

○ The following types of fire sensors have been installed depending on the room specifications.
When a fire sensor goes off, an alarm panel in the Security/Monitoring room is activated and personnel from the Security/Monitoring room will call to assess the situation.

• Sensor Operated Alarm
This is a sensor which is activated by detecting changes in the surrounding temperature. Inside laboratories, flames must be kept away from areas directly under (or near) these sensors.

• Smoke Sensor
This is a sensor which is activated by smoke. Careless release of smoke in laboratories will result in this alarm going off.

• Explosion-Proof Sensor
This is an explosion-proof sensor. They have been installed in chemical storage rooms on every floor.

2 — 2) Emergency Announcements

○ In the case of a fire (when the fire sensor goes off), depending on details of what is reported to the Security Guard / Monitoring Room, an emergency announcement will be made to evacuate. Follow the instructions of such announcements and exit the building quickly.

2 — 3) Fire Doors

○ The doors shown in the fire prevention block plan are fire doors. The fire doors (large) are normally left open, and the small fire doors are kept closed and hidden away inside the large doors.

○ The large fire doors close when the fire alarm goes off. Be careful not to collide with the door because it closes with strong impact.

○ The large fire doors close automatically when the fire alarm goes off, but the small fire doors can be opened in the direction to evacuate (the direction to evacuate is toward the 1st floor emergency exit) (Figure 1-4-4). In the case of an emergency, go through the fire doors, and evacuate from the emergency exit on the first floor as quickly as possible.

○ Some of the small fire doors have locks with caps on them, which are kept locked (Figure 1-4-5). These doors are to be used in emergencies only (they may not be used otherwise). Remove the cap to unlock the door when evacuating.

○ The front of the fire doors must be kept clear of objects at all times.

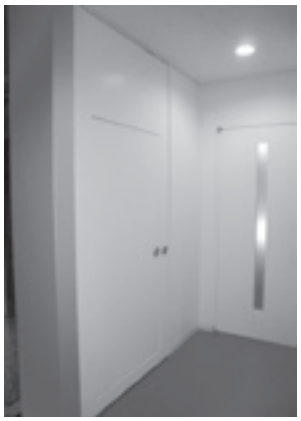


Figure 1-4-4. Fire doors (large and small) which close when the fire alarm goes off

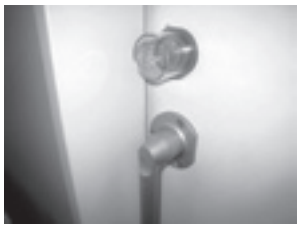


Figure 1-4-5. A capped lock

2 — 4) Automatic Doors and Others

○ At time of emergency, all automatic doors and doors with security card locks will unlock. Push them open with your hands to evacuate.

2 — 5) Interior Materials

○ Noncombustible materials have been used on the interior of the facility including the walls and ceiling. The carpet tiles on the floor are also fireproof.

2 — 6) Fire Shutters

○ There are fire shutters installed in several locations within the facility (Figure 1-4-6).

○ The fire shutters close automatically when the fire alarm goes off. In an emergency, to open the shutter by hand, press the emergency button on the nearby operating panel.

○ Use the operating panel to reclose the fire shutter (Figure 1-4-7).

○ Keep the space below the fire shutter free of objects at all times.

○ The fire shutter has a hazard prevention mechanism (the hazard prevention mechanism automatically stops the shutter from closing to prevent people from getting trapped under the shutter. When the obstruction is removed, the shutter resumes closing until it is fully closed).

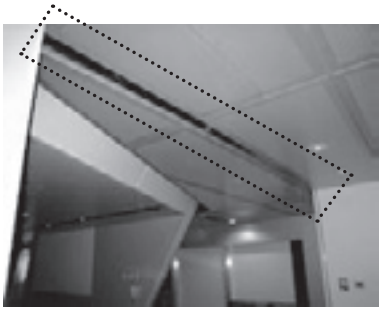


Figure 1-4-6. Fire shutter

Figure 1-4-7. The fire shutter operating panel

2 － 7）Smoke-Proof Hanging Partition Wall

○ Due to smoke control regulations, smoke-proof hanging partition walls have been installed on the first floor (refer to Figure 1-4-8). In a fire, the smoke-proof hanging partition walls are lowered automatically from the ceiling up to 50 cm when the smoke sensors go off.

○ The smoke-proof hanging partition walls can be restored to their original positions after use by using the operating panel（防煙壁手動操作箱）shown in Figure 1-4-9.

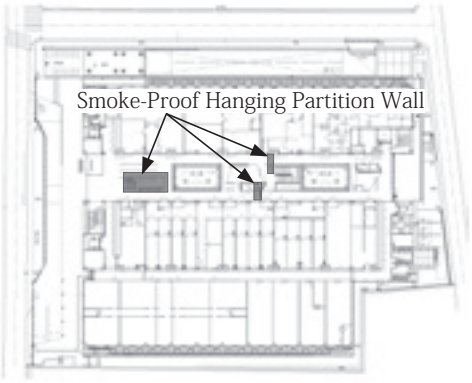


Figure 1-4-8. Places where the smoke-proof hanging partition walls have been installed on the first floor

Figure 1-4-9. The operating panel of the smoke-proof hanging partition walls

2 － 8）Smoke Ventilation Windows

○ There are smoke ventilation windows on the first floor (refer to Figure 1-4-10). In a fire, they are opened manually by pressing a switch (Figure 1-4-11).

○ To close the smoke ventilation windows, use this switch as a handle to wind the window shut.

○ The smoke ventilation windows are to be used only in a fire. They normally cannot be used.

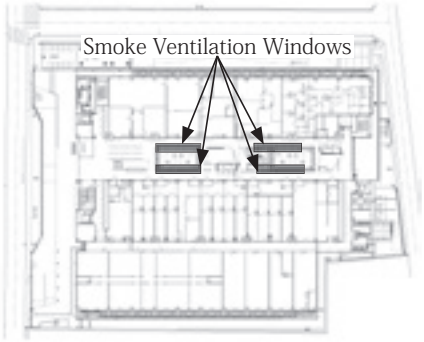


Figure 1-4-10. The locations of smoke ventilation windows

Figure 1-4-11. The smoke ventilation window switch

3 Evacuation Equipment

Evacuation equipment installed at the facility include fire ladders, evacuation ramps and emergency exits.

3 － 1）Fire Ladders（避難はしご）

○ There are fire ladders on the 2nd and 3rd floor terraces on the eastern side of the facility. They are used to evacuate the building, for example, in an emergency when there is a fire on a lower floor.

○ To evacuate the building, please prioritize escaping using indoor stairs if possible.

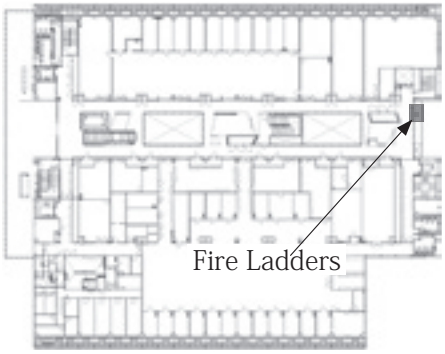


Figure 1-4-12. Floor plan of 2nd floor showing locations of fire ladders

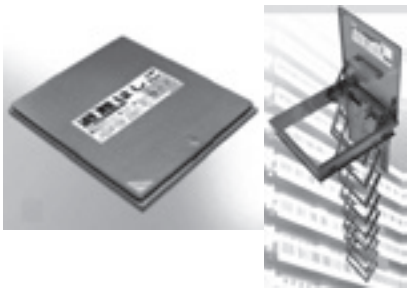


Figure 1-4-13. A closed and opened fire ladder

3 － 2）Evacuation Ramps

○ An evacuation ramp has been installed on each of the southern and northern balconies.
(Places installed) Southern side: B1, 2F, 3F. Northern side: 3F.
※ The balcony on the 1st floor has an exit.

○ When evacuating from the balconies, grasp the handrail firmly to prevent from falling. (There is an exit on the 1st floor balcony).

○ The evacuation ramps are steep compared to normal stairs. Please watch your step when using them.

○ Unless absolutely necessary during an emergency, use the interior stairs to descend to the 1st floor to evacuate the building.

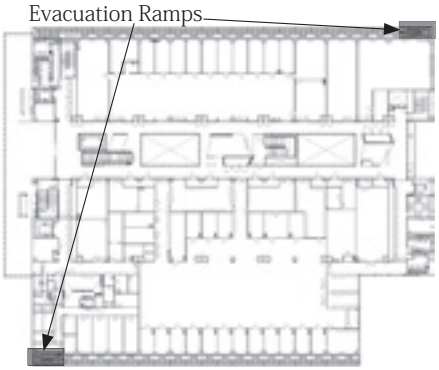


Figure 1-4-14. Floor plan of 2nd floor showing locations of evacuation ramp

Figure 1-4-15. An evacuation ramp

3 — 3) Emergency Exit

○ The chemical synthesis laboratory on the 1st floor (2), and the chemical synthesis laboratory on the 2nd floor have emergency exits to allow escape out onto the balcony. But these exits can only be used in emergencies. (The exits are normally locked and caps fitted to the locks.)

○ When using these emergency exits for evacuation, grasp the railings firmly and leave the building calmly.

Figure 1-4-16. The emergency exit of the chemical synthesis laboratory on the 1st floor (2)

Figure 1-4-17. The emergency exit of the biomedical synthesis laboratory on the 2nd floor

4 First-Aid Facilities

4 — 1) Emergency Shower

○ There are emergency showers in two locations on each floor. Be sure to take note of their locations by confirming signs in corridors.

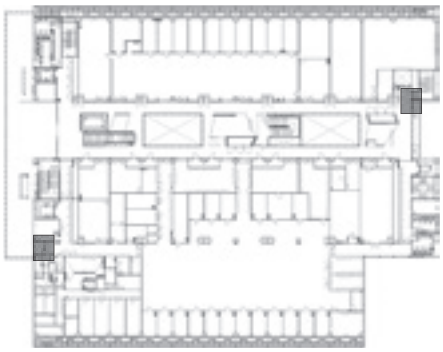


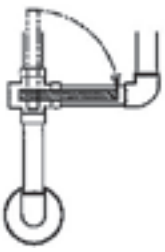
Figure 1-4-18. Locations of emergency showers on the 2nd floor

Figure 1-4-19. Emergency shower

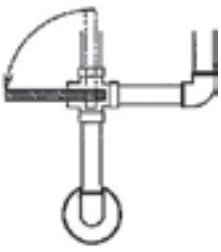
○ Use emergency shower as shown below.

• Operating the emergency shower valve

A) Normal position of handle. Pull the lever to turn on the shower.



B) Position of handle during inspection. Drains water left inside the pipe.



C) Position of handle while closed.

4 － 2） AED (Automated External Defibrillator)

○ Located in the Security Guard / Monitoring Room on the 1st floor at TWIns.

○ AED is a medical device for restoring a normal heart beat in sick or injured. It can be legally used by anyone to automatically analyze a heart beat (electrocardiogram) and provide electric shock to the person when necessary. Use it when offering emergency assistance.

○ Follow the voice instructions to do the three steps: ① Open the lid, ② Put the electrode pad on the person's chest, ③ Press the button.

Figure 1-4-20. AED

○ About Simple Lifesaving Measures (First Aid)

- Talk to the person
- Move the person (decide whether or not it is safe to move the person)
- CPR (artificial respiration, heart massage)

First aid is be administered to the sick and injured while maintaining a close watch on their state, and care is needed not to exacerbate their pain.

Ambulance services will take 6 to 7 minutes to arrive, so the first aid administered during that time will be crucial. Continue to administer first aid with the help of others around you until ambulance services arrive to take over.

※You can learn how to operate the AED on "Waseda Moodle". This short course also includes important information on how you can protect your life in the event of a large earthquake or fire.

1 — 5. Evacuation Route and Place in Case of Emergency

1 Evacuating TWIns

An evacuation route is displayed on each floor of TWIns, as an example shown in Figure 1-5-1. Stick to the evacuation route and leave the building calmly in an emergency.

Be sure to know the evacuation route from the room where you are staying in your research.

【For Reference】

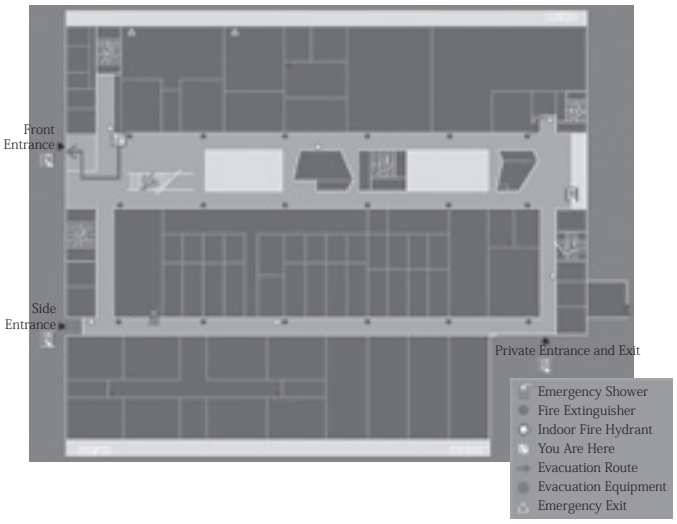


Figure 1-5-1. Evacuation route from the northwestern side of the 1st floor of TWIns

2 Evacuating from TWIns to the Evacuation Area

The evacuation area for TWIns is on the North side area of Tokyo Women's Medical University Hospital Emergency Center. Stick to the evacuation route shown in Figure 1-5-2, and evacuate the building calmly.

○ Exit the front entrance or the side entrance on the eastern side of the building, cross the pedestrian crossing adjacent the Toei Wakamatsucho Apartment and continue down the right side of the road and turn left just before the Mizunohara Children's Playground.

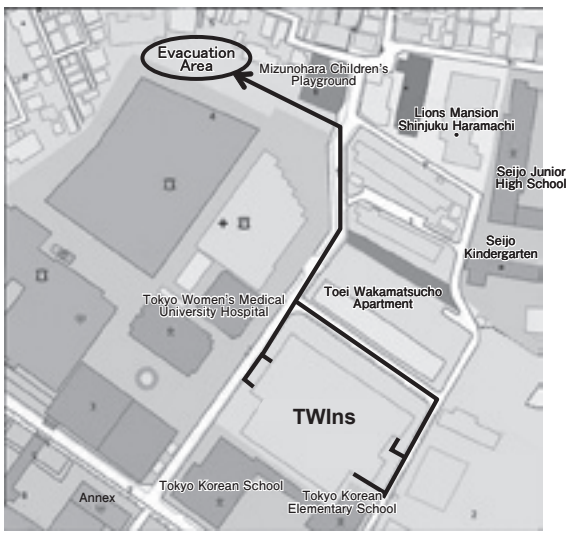


Figure 1-5-2. Route to evacuation area

NB : The assignment of Emergency Assembly Areas for each facility is based on the location of classrooms, each building, and other factors. Actual evacuation of each building will take into account various factors including the severity of damage to the structure and the occurrence of fire.

1 — 6. Cases of Recent Accidents

It is impossible to predict when and where accidents will occur, but in order to be able to act appropriately, you must familiarize yourself with the ways to prevent to these situations.

Please use the following examples of past accidents to prevent to accidents in your own research rooms and laboratories.

Table 1-6-1. Examples of close calls and accidents at TWIns between 2009-2024

Date & Time of Accident	Injuries	Countermeasures
2009/4/10 12:00	Cut	A Finger was cut while opening an ampule resulting in a lot of blood. Gauze from the first-aid kit was used to stop bleeding and a bandage was applied.
2009/7/3 16:00	Cut	Accidentally cut his/her own finger in an experiment involving cutting up a pig. Treated with the first-aid box in the laboratory. The wound was small, but he/she went to university hospital just in case of infectious diseases.
2009/7/8 14:00	Cut	Thumb on left hand was cut on a cutter blade while using a cryostat to prepare tissue samples. Bleeding did not stop, so visited university hospital A&E to get stitches.
2009/9/11 15:00	Burn	Because the agarose would not dissolve well while preparing a gel for electrophoresis, the gel solution was microwaved for longer than usual. Then a stir bar was added, and it began producing bubbles like boiling tips, causing the gel solution to spatter out of the Erlenmeyer flask. The solution spilled onto the left hand seeping into the work glove and burning the hand. The burn could not be treated at the office, so the person was taken to the university hospital (injury requiring 4 weeks to heal completely).
2010/3/3 16:40	Puncture wound	Stabbed finger with glass pipette during an experiment causing bleeding. When the pipette was removed from the wound the tip was broken. Examined at the university hospital for fear that the broken glass was still inside the wound.
※ 2010/4/2 17:00	Laceration	While cleaning the cryostat in the evening, lacerations were caused on the fingers of the right hand by a blade. Medical treatment was administered at the office.
2010/10/17	Chemical burn	A test-tube dropped when it slipped out of the hand while extracting RNA, resulting in TriPure being spilled onto the body. The exposed part of the body was washed by water for over 30 minutes, and then the person visited the emergency room of Tokyo Women's Medical University Hospital. A steroid ointment was administered, and a plastic surgeon was consulted the following day.
2011/4/8 13:20	Burn	While using a clean bench, ethanol was spilled on the hand and container holding a culture medium. While flame sterilizing the culture medium with a gas burner, the flame spread to the hand.
2012/1/13 16:10	Chemical burn	H_2O_2 or some other chemicals came into contact with the skin underneath the lab coat and gloves in the chemical synthesis lab fume hood (acid), causing pain. Injury was treated with bandages.
2012/5/10	Chemical burn	HFIP (hexafluoroisopropanol) was spilled into the left eye. The person experienced burn-like symptoms. Examined and received treatment at the Tokyo Women's Medical University Hospital.
2012/10/12	Chemical burn	Phenol chloroform was spilled on the right bicep. A burn was resulted from the phenol, leaving a red swelling approx. 2 cm in diameter. Examined and treated at the Plastic Surgery Department of the Tokyo Women's Medical University Hospital.
2012/12/3	Laceration	Hit a sharp piece of metal while working. Examined and treated at the Tokyo Women's Medical University Hospital.
2013/4/18 15:30	Smoke	Connection jack between a ceiling reel outlet and water bath in the chemical synthesis lab was burnt and emitting smoke. It was soon discovered by a student, avoiding what could have been a serious incident.
2013/11/19 11:30	Water leak	Ultrasonic cleaning device was left over after starting to fill it with water via a hose connected to a tap. The floor was flooded and water leaked through to lower floors. The water was immediately removed and there was no damage to equipment.
2014/4/14 15:00	Burn	Received mild burn on a fingertip while using a flame sterilizing burner on a clean bench. The area was cooled using running water and an ice pack. Given that a small blister appeared, no special treatment was required.
※ 2014/5/20 16:00	Cut	Cut hand while preparing a frozen tissue sample. Cleaned wound with water however could not stop bleeding so visited university office. Bandage was applied after disinfecting the wound.
※ 2014/6/3 15:30	Cut	Cut index finger on left hand when removing aspirator from a Pasteur pipette. Tape was applied after cleaning and disinfecting the wound.
2014/6/30 14:10	Cut	Received small cut on fingertip with cover slip. No treatment, including disinfectant or bandage was required.
2014/9/18 16:00	Chemical burn	Hazardous material spilled on body. Inflammation occurred on both wrists and neck. Affected areas washed under running water for 15 mins. Examined and treated at the Tokyo Women's Medical University Hospital.

2014/10/27 6:00	Water leak	Water leak occurred from ultrasonic cleaning device on a sterilization room. Situation was rectified immediately and no serious damage occurred.
2014/11/28 14:30	Burn	Received burn on leg by hot culture medium during experiment. Skin around the burn was peeling so the wound was examined and treated at the Tokyo Women's Medical University Hospital.
2015/1/30 12:30	Chemical burn	Reagent container was overturned on a bench in a research laboratory. Trifluoroacetic acid was spilled on face, neck and left leg. Affected areas were washed under running water for five minutes and examined and treated within 30 mins of incident at the Tokyo Women's Medical University Hospital.
2015/2/6 20:00	Glove caught fire	Attempted to sterilize culture medium container treated with sterilizing ethanol with flame before ethanol was properly volatilized on a clean bench in a culture room and flame spread to the glove. Immediately prepared tray filled with water and extinguished the flame. There were no injuries etc.
2015/3/11 17:30	Puncture wound	Received puncture wound to the index finger on right hand when using a glass pipe to construct a piece of experiment equipment. Wound was cleaned under running water and disinfected before being examined and treated at the Tokyo Women's Medical University Hospital.
2015/3/13 10:40	Burn	Received burn on right hand because ethanol caught fire when using a gas burner in a sterilization process. Burn was cooled down immediately using cold water and examined and treated within 30 mins of incident at the Tokyo Women's Medical University Hospital.
2015/3/17 17:00	Chemical burn	While a person was working at a clean bench another person sitting next to him accidently sprayed 70% sterilizing ethanol on the person which came into contact with his left eye. The contact lens was immediately removed and the eye was flushed for more than five minutes under running water. The person was examined and received treatment at the Department of Ophthalmology.
2015/3/19 14:30	Cut	Received a cut to the finger because test sample slipped and the blade touched the right hand while trimming a block with a cryostat to prepare a frozen tissue sample. Wound was examined and treated at the Tokyo Women's Medical University Hospital.
2015/5/13 15:00	Waste liquid spill	While clearing chemicals in the laboratory, a plastic container containing waste liquid (Paraformaldehyde from approx. 2013) fell off the shelf and the liquid spilled on the leg. The affected area was immediately cleaned under running water and was treated at the Tokyo Women's Medical University Hospital on the advice of an industrial physician and monitored in the time following.
2015/5/22 15:00	Chemical spill	A person came to the office after spilling formic acid on his/her arm and leg during research at a research enhancement facility. Affected areas were washed by a shower located in a cleaning staff room. Student returned to their room without going to hospital.
2015/7/11 13:35	Cut	Cut on index finger of left hand with a piece of glass. Visited the office after unsuccessful attempt to stop the bleeding. Doctor from the Tokyo Women's Medical University Hospital who was in the building came to the office and treated the finger.
2015/9/10 17:30	Chemical burn	Accidently spilled 2-mercaptoethanol on right thigh during an experiment in the laboratory. Affected area was immediately washed under running water. Area was examined by Doctor from the Tokyo Women's Medical University Hospital who was in the building at the time and was monitored in the time following.
2015/9/17 16:30	Cut	Base of the thumb was cut by the corner of a blade during an experiment. Pressure was immediately applied to stop the bleeding. Wound was examined by a doctor from the Tokyo Women's Medical University Hospital who was in the building at the time. Wound was then examined at the Tokyo Women's Medical University Hospital and received five stitches.
2016/2/8 15:00	Generation of gas and nasty odor resulting from liquid waste contamination	Yellow gas and nasty odor was generated when a person disposed of waste liquid from an experiment in the waste liquid tank shared with the culture room. The gas filled the space of the culture room. All personnel were immediately evacuated from the culture room therefore there were no physical injuries.
2016/2/13 16:25	Cut	While washing a glass flask in a sink in the laboratory, a person slipped, breaking the glass resulting in a 1 cm cut to the left knee. The wound was immediately examined and treated at the Tokyo Women's Medical University Hospital.
2016/4/6 13:00	Cut	When picking up a sample that fell down during making a frozen section at the histology laboratory, a student slightly hurt his right hand by a blade of the cryostat. Student's wound was sterilized immediately at the office and a bandage was applied on it.
2016/4/7 13:00	Cut	When washing the slide glass, a student cut his right thumb, and came to the office.The wound was examined by Doctor from the Tokyo Women's Medical University Hospital who was in the building at the time and applied a bandage on the wound.
※ 2016/7/6 14:00	Punctue wound	During the animal experiment of Biomedical Science Laboratory l, a student mistakenly stung an injection needle for anesthetic injection into a finger. Because it was a mild puncture wound, it was disinfected and the student checked it.
※ 2016/8/6 16:50	Cut	In a Culture room on the 1st floor, a student cut his elbow with a plate, and his wound was sterilized by another student and covered with a gauze.
2016/8/29 19:00	Burn	During heat sterilization of the test tube using a gas burner, a student accidentelly touched it, and suffered a minor burn on the left hand finger. After cooling by running water, the injured student was examined and treated at the Tokyo Women's Medical University Hospital.
2016/10/4 13:00	Chemical spill	During the tracing experiment, concentrated hydrochloric acid was spilled on the thighs from the top of the jeans. The student immediately took off his pants and washed his leg in water. The acid didn't come into contact with skin directly, so there were no injury.

2016/10/13 11:00	White smoke	While a student was heating an empty oven at 120 degrees C/℃ setting, white smoke was generated from the air mouth of the oven. He quickly extinguished it with a home fire-extinguishing spray, and there were no injury.
2016/11/2 17:00	White smoke	Smoke occurred while a student was using a vacuum molding machine (set at 500℃ for 135 seconds). Soon it was extinguished with a home fire-extinguishing spray, and there were no injury.
2017/4/15 15:45	Cut	A student broke the glass test instrument because he was trying too strongly to replace the tip of it in the culture room and cut the right index finger. The wound was immediately examined and treated at the hospital.
2017/4/22 15:00	Waste liquid tank expansion	There was a report from a student that the waste-containing tank (II-i division) was expanding abnormally. Immediately after the supervisor handled it (lid open inside the draft and lower the internal pressure), it was collected as experimental waste.
2017/6/9 15:00	Chemical burn	During washing the laboratory equipment studied by the student with alkali, the aqueous solution of sodium hydroxide adhering to the equipment splashed into the right eye. After washing with running water because he felt painful, the wound was examined and treated at the Tokyo Women's Medical University Hospital.
2017/10/24 15:30	Laceration	When a student tried to open a glass container (desiccator) in the laboratory, he cut the left index finger. The wound was immediately examined and treated at the Tokyo Women's Medical University Hospital.
2018/7/10 8:30	Swelling of a toe	When a student tried to move a camera in the laboratory, he dropped an iron plate on his foot.The wound was immediately examined and treated at the Tokyo Women's Medical University Hospital.
2018/8/2 21:30	Cut	When a student tried to open the cap of the erlenmeyer flask during an experiment in the laboratory, the left index finger was cut because the cap was closed too tightly to open and the erlenmeyer flask was broken. Immediately washed the wound with tap water, stopped bleeding with gauze, and treated.
2018/12/26 11:30	Chemical burn	When a student pressed the container of an adhesive in order to adhere the circuit at the machine operating and processing room (Tokyo Women's Medical University side) in B1, the deteriorated container cracked. The adhesive splashed and adhered to the face, and also in the eyes. Immediately flushed with running water, and treated at the Tokyo Women's Medical University Hospital.
2018/12/27 11:30	Water leak	A student forgot to stop the water injection into the cleaning tank of the ultrasonic washing machine installed in the biological sterilization room. The tap was opened for more than 1 hour, so a large amount of leakage occurred in the experimental area (1F, B1).
2019/4/10 15:00	Improper use of dry heat sterilizer	While using a dry heat sterilizer in the Life Science and Medical Bioscience Washing room, a student accidentally returned home with the door inside the plastic incubator. The plastic part of the door in the incubator was completely melted and solidified, but no smoke was generated.
2019/5/19 22:00	Chemical burn	About 20 to 40 μl of dichloromethane used during the experiment entered the right eye. Immediately flushed with running water, the injured student was examined and treated at the Tokyo Women's Medical University Hospital.
2019/6/13 18:00	Right ankle lateral ligament injury and Suspected right foot heel fracture	On the way to the room with luggage from her own experimental bench, the passage in the open laboratory was wet with water and slipped and fell.Examined and treated at the hospital.
2020/9/28 18:00	Empty burning of the autoclaving	Due to the empty burning of the autoclaving in the Life Science and Medical Bioscience Washing room, burnt smoke was generated. It stopped immediately and there were no human.
2021/6/3 11:05	Cut	While a student was working in the laboratory, he cut his left thumb with a scalpel and bleeding. Immediately examined and treated at the Tokyo Women's Medical University Hospital.
2021/7/26 16:05	Laceration	When a student went shopping outside and tried to open and close the east side door with luggage in her left hand, she got her right middle finger caught. Immediately examined at the Tokyo Women's Medical University Hospital and received three stitches.
2022/11/16 14:50	Cut	In an in vitro experiment, when I added Ringer's solution with an intestinal tract suspended using a syringe with an injection core, I accidentally pricked my finger with a needle and bled. The next day she saw a dermatologist.
2023/6/20 16:30	Chemical injuries to the face	Chemical (HFIP) adhered to face (side of mouth) while cleaning up equipment in the synthesis room. Visited the emergency department of the Tokyo Women's Medical University and treated.
2023/10/18 15:00	Switch panel heat generation	In the laboratory living space on 3rd floor, switch panel was heat generated. Facility management found short circuit inside then replaced the whole switch unit to new one.

2024/2/20 12:30	Arm burns	A student, who had just been posted to the laboratory accidentally stepped on the pedal of a gas burner while cleaning inside a safety cabinet, resulting in burns to her arm. The student visited a dermatologist and received treatment. Rules for the use of gas burners and cabinets were reviewed in the laboratory.
2024/11/14 12:30	Cut wound	During use of the cryostat, when attempting to adjust the angle of specimen stand, because handwheel was not fixed, the specimen stand moved, resulting cut on the thumb of hand with the blade that had been placed beforehand. Visited Tokyo Women's Medical University hospital and received 4 stitches.

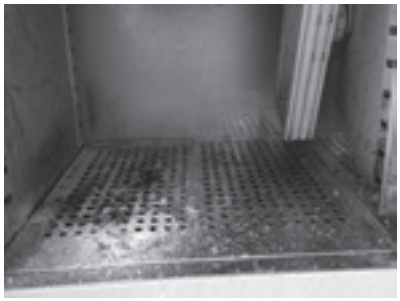
※ As of 2024, we do not perform any medical treatment at Waseda university TWIns office.When injured, refer P5 of this guide.

1 Accident Due to Overheating

Overheating above upper temperature limits is dangerous, potentially leading to fires. It is necessary to confirm upper temperature limits when conducting heating experiments. The accidents shown below are the results of inadequate confirmation of upper temperature limits. In general, **each laboratory should lay down rules on heating experiments such as not conducting them late at night or on weekends and holidays or alone when there are not many people around, and ample care should be taken while carrying out these experiments.**

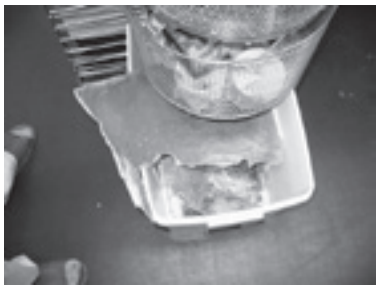
Make sure that the last person left the room has double-checked if there are any equipment such as heating machine left operating.

1 － 1） Smoke occurred in Resin Laboratory



While a student was heating the empty oven at 120℃ setting, white smoke was generated from the air mouth of the oven. About 3 weeks later, white smoke occurred while a student was using a vacuum molding machine (set at 500℃ for 135 seconds) in the same laboratory. In both cases, the smoke was quickly extinguished with a home fire-extinguishing spray, and there were no human injuries.

1 － 2） Overheating of Plastic inside Sterilizer



Equipment used in an experiment was placed in a sterilizer for drying without lowering the temperature setting, resulting in the equipment melting. This gave off smoke. The hot air oven sterilizer was set at a temperature of 150℃ (during dry heat sterilization), but autoclaving should have been carried out at 121℃ . The experimenter had mistaken in thinking the plastic would be able to withstand a 30℃ increase in temperature.

Another reason was that the sterilizer had been used as a dryer in the past although not anymore, but the experimenter had not been adequately notified of this.

About Safety Management at TWIns

※From this chapter on are basically the rules of Waseda University. Tokyo Women's Medical University rules are mentioned in certain sections, but the rules may differ depending on the university, so be sure to confirm with your university for the proper management of safety, research and experiments.

1 Safety and Health Management System

The management of safety and health at TWIns as far as Waseda University is concerned, is overseen by Waseda University's Center for Advanced Biomedical Sciences Safety and Health Committee as shown in Figure 2-1-1.

The Safety and Health Committee is run by Head of Center for Advanced Biomedical Sciences with participation of the industrial physician, safety officer, health officer, chemical safety officer and faculty and staff representing workers, who discuss and make decision on matters related to safety and health assurance.

The University takes the same approach with students assigned to laboratories as it does with faculty members who are also workers. (Participation in safety checks, risk assessments, special health examinations) For this reason, we ask some of our safety and health activities be handled in the laboratory through safety liaison officer (Chemical Safety Officer).

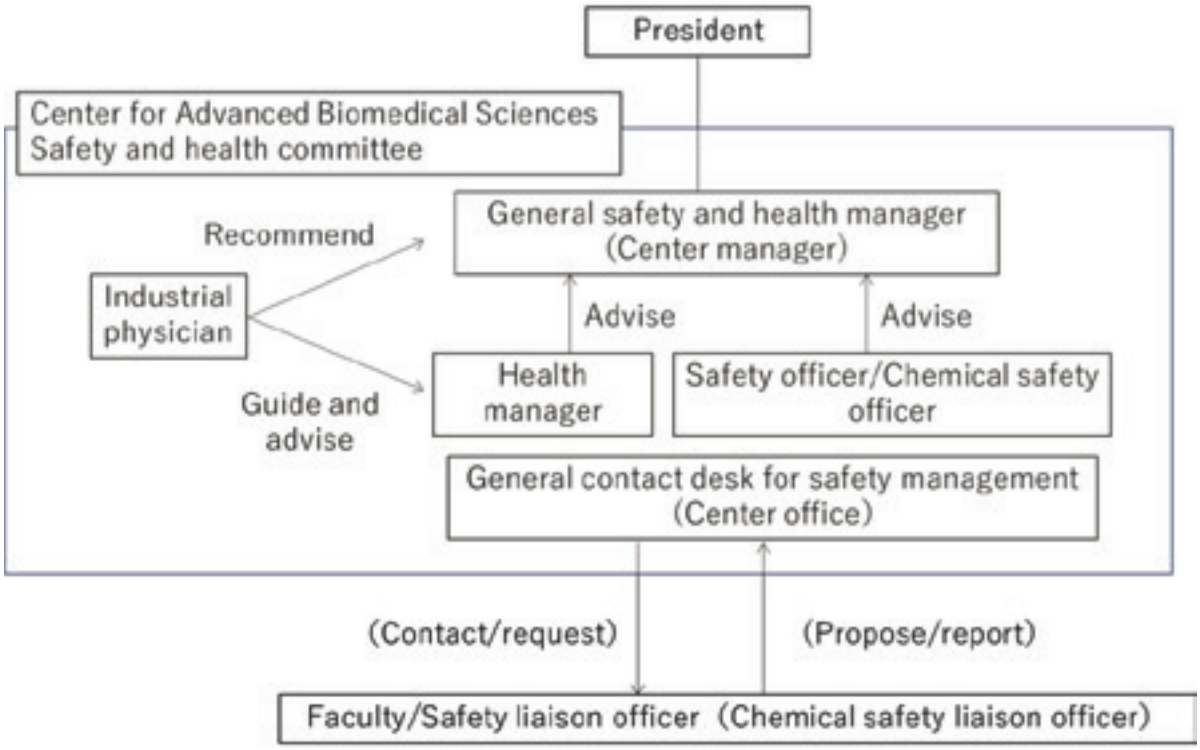


Figure 2-1-1. Safety and Health Management System of Center for Advanced Biomedical Sciences, Waseda University

2 About health and safety plans and activitie

To ensure the safety and health of faculty, staff, and students, we review our action plan for safety and health every fiscal year. Safety and health activities in laboratories and experiments are carried out by the office and the supervisor/safety liaison (chemical safety liaison).

2 － 1） Safety Management Desk (Office)

All kinds of information on safety are provided by the office. If in doubt about anything regarding experiments and hands-on training, please consult a person in charge at the office located on the 3rd floor.

Table 2-1-1. Consultation and Response Details

Fields of Support	Details
Chemical Substances / Waste / Draining	Use of SDSs and Chemical Registration Information Systems (CRIS), handling of chemical substances, use of fume hoods, drainage measures, poison control, waste from experiments, etc.
High-pressure Gases	Consultations concerning use of high-pressure gases, stock management, quantity management, etc.
Radiation / X-Rays	Consultations concerning purchase of X-ray equipment, receipt notifications, radiation education and training, and management of badges for exposure dosimetry,
Fire Prevention Management / General	Management of obstruction of evacuation passages, fall-prevention measures, management of various equipment (firefighting equipment, emergency broadcasting systems, fire prevention equipment and utility gases), etc.
Animal / Gene Recombination	Consultations of notifications, receipt, and inspections for equipment of related departments.
Electrical / Wiring	Electronics and wiring of self-made or remodeled equipment, electrical wiring inspections, etc.
Shared Analytical Equipment	Machinery maintenance, operation of reservation system, operation support, etc.

2 － 2） Safety Liaison Officer (double as Chemical Safety Liaison Officer)

Engage in safety and health-related activities within the research room with supervisory teaching staff. The Safety Management Desk will contact the Liaison Officer when conducting safety management each time. Please follow instructions to carry out activities with supervisory teaching staff.

○ Safety Liaison Officer (to be Decided on Where Necessary)

Contact and report the use and management of facilities including electricity, gas and machinery, and problems associated with overall safety and health, to the relevant section and the person in charge.

○ Chemical Safety Liaison Officer (as Stipulated in the Waseda University Chemical Management Regulations).

Confirm the status of chemical substance use and storage, and report discrepancies to the person in charge of chemical substance management.

Act also as a liaison for sections and ensure thorough notification of everyone regarding safety information.

※ Chemical Substances Manager (as Stipulated in the Waseda University Chemical Management Regulations).

Full-time lecturers of research rooms for example, are to be assigned to this post, and they will be responsible for the suitable management of chemical substance use and storage.

※ Reference: Activities run by Waseda University, including courses etc. concerning health and safety at TWIns and the Nishi-Waseda Campus are as shown in the table below.

Table 2-1-2. Waseda University's Main Activities and the Role of Liaison Officers at TWIns

Period	Activities	Roles	Notes
January - March July - September	Working Environment Measurement	Publicizing at laboratories and notification of hearings and sampling	Targeting research rooms using specified chemicals
March–April	Environmental protection and safety training seminars regarding handling of chemical substances	Publicizing at laboratories and management of participants	Targeting people assigned to new research rooms
Around April	Safety and Health training seminars		
Mid-July	All Campus Safety and Health Inspections	Implementation of preliminary inspection (if required) Presence during on-site confirmation Response to inadequacies and reports	
April October	Evacuation Drills	Participation in advance meeting, Evacuation guide and reports.	Everyone at the facility
November	Planned pawer outage	request of temporary power supply	
As needed	A seismic and tip-resistant construction	Publicizing at laboratories, constructions based on requests	
As needed	Information and inspection relating to safety and health	Publicizing at laboratories, inspections based on requests, reports	

Chapter 3

Rules to Prevent Accidents

3 — 1. Basic Precautions for Experiments

When conducting experiments, it is important to think about "preventing accidents from occurring," and "how to minimize damage if an accident occurs."

Please observe the basic precautions below to avoid accidents during experiments.

1 How to Prepare Experiments

The seven points below are essential for preparation of experiments.

(1) Be in good physical condition.

(2) Wear appropriate clothing in the lab.

(3) Understand, in advance, objectives and procedures of the experiments, specifications of devices and equipment that will be handled and nature of materials and chemical substances.

(4) Keep the working table, instruments, etc. well-organized.

(5) Never take your eyes off equipment, etc. when in operation.

(6) Do not bring food or drink in laboratories, nor eat or drink them.

(7) Do not use mobile phones during experiments.

2 Protection from Bodily Harm

Protection from bodily harm; in other words, wearing appropriate clothes, shoes and hairstyle, is a basic and important consideration. Please remember to keep the "**exposure of skin to the minimum**".

(1) Wear a lab coat or work clothes.

Always wear a lab coat during chemical experiments etc. or work clothes during machine processing etc. to prevent accidents. As well, avoid wearing skimpy clothes such as shorts or skirts, and wear long pants. Please adhere to the local rules in each laboratory.

(2) Wear protective glasses.

Always wear protective glasses to protect your eyes.

Protective glasses will protect your eyes from leaked or diffused chemical substances, broken glassware or machining swarf and cutting agents during machining.

(3) Keep your hair neat.

Tie back long hair.

Wear a cap at all times when operating a machine tool.

Hair can be ignited by gas burners, or get caught in the rotating parts of machines, etc.

(4) Wear proper footgear.

Wear shoes that do not expose the skin and that allow you to move freely (such as sneakers).

Do not perform experiments wearing high heels. Please adhere to the local rules in each laboratory.

(5) Wear gloves.

Wear gloves as needed when handling chemical substances. Do not wear gloves outside the laboratory.

However, do not wear gloves when operating machine tools as they may get caught in moving parts.

(6) Masks containing activated charcoal (When handling organic solvents)

When handling organic solvents, prolonged inhalation may cause symptoms of poisoning such as headaches and dizziness. Be sure to wear a mask containing activated charcoal.

(7) Other notes.

Keep your fingernails trimmed short. One type of accidents that people often fail to notice, are accidents caused by long fingernails. There have been cases of minor accidents caused by working with long fingernails.

3 Other Precautions

Individual rules concerning the use of chemical substances, electricity, etc. are described next. Carefully read and observe each of them. Please refer to Table 1-6-1 for example cases of accidents and warnings regarding overheating.

3 — 2. Safety Measures for Communal Areas such as Halls and Stairways

1 Introduction

TWIns has been accredited as a building with "excellent fire safety standards".

TWIns **firmly prohibits leaving of objects in communal areas.** Securing evacuation routes is the most important safety measure. Explanations of terms related to safety measures and of the importance of securing evacuation passages are provided below.

(1) Definitions of Communal Area and Obstructive Object

■ Communal area

A space utilized by an unspecified number of people on a daily basis and not supervised by any particular laboratory, etc. It includes halls, stairways, elevator halls, etc.

■ Obstructive object

Fire prevention ordinances forbid such conduct as "leaving objects that hinder fire prevention or evacuation, deteriorating access to fire prevention equipment and hindering operation of such equipment in evacuation facilities."

An obstructive object refers to "an object that hinders fire prevention or evacuation." Objects that are left as shown in Figure 3-2-1 are regarded as objects that hinder evacuation (obstructive objects).

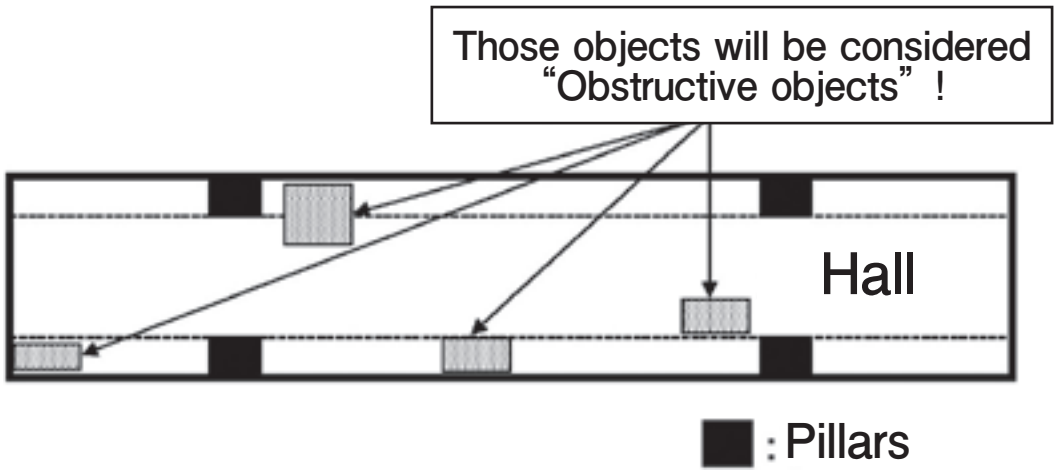


Figure 3-2-1. Obstructive object

(2) Risks of Dangerous or Obstructive Objects in Communal Areas

If communal areas of the campus are cluttered during a disaster, such as a fire or an earthquake, these areas will be a bottleneck when students, faculty and staff members attempt to evacuate these areas simultaneously, and this may cause a panic.

Furthermore, damage may be greater if obstructive objects are blocking important equipment, such as disaster prevention or evacuation equipment, because they may delay fire extinguishing or evacuation.

(3) Safety precautions for research rooms and laboratories

When taking objects etc. from the top shelf of racks etc. fitted in research rooms and laboratories, do not use **chairs with castor wheels** in the place of step ladders. Always use step ladders to remove objects etc. from the top shelf of racks (step ladders are available from the office on the 3rd floor).

(4) An example case of an accident in communal areas such as corridor and staircase (reference: case of an accident on the Waseda University Nishi-Waseda Campus).

The below accident occurred in a communal areas on the Waseda University Nishi-Waseda Campus.

In order to prevent a repetition of this kind of accident, you must not conduct experiments or work in communal areas without a permit.

Table 3-2-1. An Example of an Accident in a Communal Area

Overview	Sparks from rolling of solid sodium ignited an organic solvent in an eggplant flask during an experiment in a hall. The fire spread because the eggplant flask fell onto the floor and combustible materials in the hallway were ignited by the flames.  
Presumed Causes	Besides experimental procedures, the experiment was conducted in a hall. Flammable objects are placed in the hall.
Countermeasures	The handling of dangerous objects in communal areas is strictly prohibited. Forbidding leaving objects in communal areas.

2 Safety Measures in Communal Areas Such as Corridors and Stairways

○ Do not place objects from laboratories or lockers in communal areas.

○ Never handle hazardous materials in communal areas.

Be sure to obey this rule, as obstacles hindering evacuation may endanger lives.

3 — 3. Safety Measures for Chemicals

1 Introduction

Large amounts of chemicals are regularly used at TWIns in research and educational activities.

In order to ensure their own safety and the safety of those around them, people using these chemicals are responsible for their proper management, from procurement to usage, storage and disposal.

Remember that abiding by the laws and ordinances, and campus regulations (chemical substance management regulations, etc.) leads to safer laboratories.

For further information on the overall safety-related issues at Waseda University, please refer to the "Environmental Safety Center Guide".

2 Precautions for Handling Chemical Substances (in the case of Waseda University)

2 — 1) Purchase

The steps required for ordering and delivery of chemical substances are described below.

Table 3-3-1. The Flow of the Processes from Ordering to Disposal

Task	Instructions
1) Ordering	Place an order directly with the supplier by telephone, facsimile, or e-mail.
2) Notification of delivery information	The supplier informs the chemical management office (the office located on the 3rd floor) regarding the delivery information no later than the morning of the delivery date.
3) Issuance of a barcode allocation table and barcode labels	The chemical management office issues a barcode allocation table and barcode labels based on the information provided by the supplier.
4) Receipt of the barcode allocation table and barcode labels by the supplier	Before delivery, the supplier goes to the chemical management office and receives the barcode allocation table and barcode labels.
5) Delivery	The supplier delivers the chemicals with the barcode allocation table and barcode labels to the users.

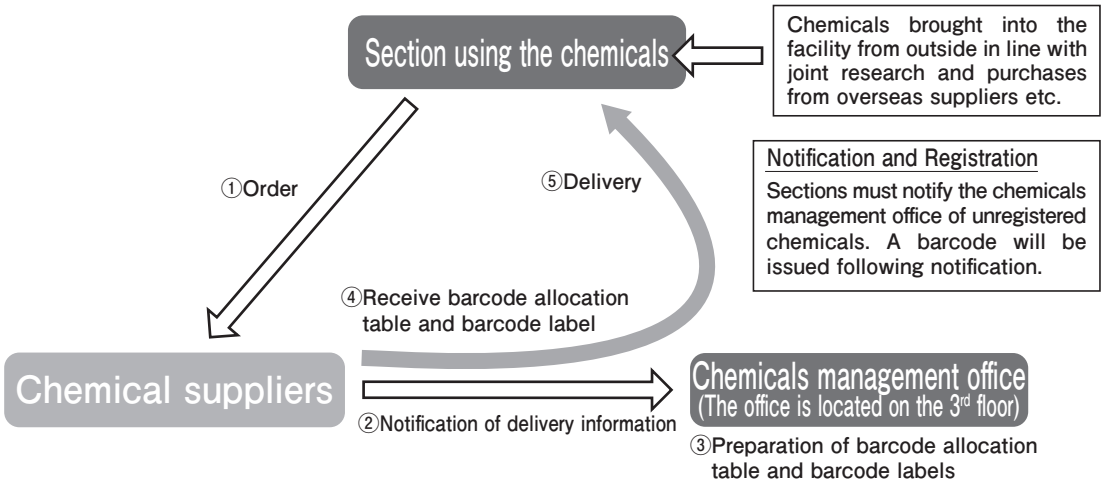


Figure 3-3-1. From Ordering to Delivery

【Notes】

① In the case where chemicals substances are delivered without passing through the chemical manegement office (example: direct deliveries from private contractors etc.), be sure to report it to the person in charge at the office located on the 3rd floor, and act according to the instructions given.

② A report must be submitted to the appropriate government office if narcotics, psychotropic agents, stimulants, ingredients for stimulants or specified poisonous substances are to be handled. If these substances are to be handled for the first time, you must contact and discuss the matter with the person in charge at the office located on the 3rd floor beforehand.

③ Substances registered in the Chemical Reagent Information System (CRIS) are constantly being updated. Please ensure to check the latest information on the Environmental Safety Center website.

2 － 2）Usage and Storage

The following contents are notes concerning usage and storage of chemicals.

（1）General Notes for Usage and Storage of Chemicals

① Always wear a lab coat, gloves and protective glasses when handling chemicals.
Where necessary, always use a fume hood and masks containing activated charcoal.

② Be aware of the danger, toxicity etc, of a substance to be handled by referring to its SDS (Safety Data Sheet).（https://j-shiyaku.or.jp/Sds）

③ Store chemicals in chemicals lockers and take measures to prevent the lockers form falling over. Ensure that dividers are also installed in the lockers to prevent the stored chemicals from tipping over during an earthquake or other related accidents.

Information concerning chemicals considered as hazardous materials, poisonous and deleterious substances, organic solvents and specified poisonous substances, is described in the Table 3-3-2 below.

Table 3-3-2. Hazardous Materials, Poisonous and Deleterious Substances, Organic Solvents, and Specified Poisonous Substances

Legal Classification	Specifications	Laws and Ordinances
Hazardous Materials	Flammable	Fire Service Act
Poisonous and deleterious substances	Substances that are harmful to the body in relatively small amounts	Poisonous and Deleterious Substances Control Act
Organic solvents	Substances that are volatile and can potentially cause health problems such as acute poisoning or organ damage	Ordinance on Prevention of Organic Solvent Poisoning, Industrial Safety and Health Act
Specified Chemical substances ※	Substances that can cause health problems such as cancer, dermatitis, or nerve damage	Ordinance on Prevention of Hazards Due to Specified Chemical Substances, Industrial Safety and Health Act

※Definition of the term “Specified Chemical Substances” varies depending on the relevant law and regulation. The definition used in this guide is in accordance with the above-mentioned laws and regulations.

(2) Storage of Hazardous Materials

① Some combinations of hazardous materials might cause a fire if mixed or contacted. Therefore, check the hazardous material category specified on the label attached to the reagent bottle and store the hazardous material separately according to Table 3-3-3 "Combinations of Hazardous Materials in Mixed Storage (regulations relating to hazardous materials)" and Table "Classification of hazardous materials specified by the Fire Service Law" (4-2. Supplementary Information on Chemicals). These tables show dangerous combinations of hazardous materials.

Table 3-3-3. Combinations of Hazardous Materials in Mixed Storage

	Characteristics	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Class 1	Oxidizing Solids		×	×	×	×	○
Class 2	Flammaple Solids	×		×	○	○	×
Class 3	Pyrophoric materials and Water-prohibiting materials	×	×		○	×	×
Class 4	Inflammable Liquids	×	○	○		○	×
Class 5	Self-reactive Substances	×	○	×	○		×
Class 6	Oxidizing Liquids	○	×	×	×	×	

○ mark: combinations that can be stored together
× mark: combinations that are prohibited to be stored together

② The permissible quantity of hazardous materials stored in each storage compartment is ordained by the Fire Service Act and local government Fire Prevention Ordinances. Do not store a hazardous material in a quantity that exceeds the permissible limit.
At Waseda University, the quantity of each hazardous material stored in each room is determined by the CRIS system. Check the quantity regularly. Please refer to the "Environmental Safety Center Guide" issued by the Environmental Safety Center for information on the CRIS system.

< Storage quantities of hazardous materials >

In light of the risk posed by hazardous materials, the amount of each material that can be stored is specified under government regulations. This quantity is called the "specified quantity". The quantity of hazardous materials that can be stored in laboratories is restricted by a value called a "multiple". The permissible amount of hazardous materials that can be stored in each fire-proof compartment for a general room is no more than 0.2 while the amount that can be stored in a room designated as fit for the storage of small amounts of hazardous materials is no more than 1.0. The formula used to calculate these multiples is as shown below. (The specified amount for each hazardous material is listed in "Section 4-2. Supplementary Information on Chemicals".)

$$\frac{\text{Hazardous Material A Storage Quantity}}{\text{Hazardous Material A Specified Quantity}} + \frac{\text{Hazardous Material B Storage Quantity}}{\text{Hazardous Material B Specified Quantity}} + \frac{\text{Hazardous Material C Storage Quantity}}{\text{Hazardous Material C Specified Quantity}} + \cdots\cdots = \text{Multiple}$$

(3) Storage of Poisonous and Deleterious Substances

① Store poisonous and deleterious substances separately from general reagents in a solid vault that can be locked to prevent them from being stolen or lost. The storage vault should be light impenetrable. Display labels such as "Non-Medicinal Poisonous Substances (医薬用外薬物)" or "Non-Medicinal Deleterious Substances (医薬用外劇物)" on the storage vault (Figure 3-3-2).

医薬用外毒物

(White lettering against a red background)

医薬用外劇物

(Red lettering against a white background)

Figure 3-3-2. Pictures of the storage vault (upper), labels as seen on the vault (lower)

② Store poisonous and deleterious substances together in a place/room for centralized management.

③ Hazardous materials classified as poisonous or deleterious should be treated and managed as poisonous and deleterious substances.
Be aware that certain combinations of hazardous materials may result in a fire. When storing them, refer to the standards for storing hazardous materials in Table 3-3-3.

④ In order to prevent the lost and release of any poisonous or deleterious substances, do not carry them outside TWIns.

⑤ After a poisonous substance is used, register the amount used in the CRIS without fail. Note that a poisonous substance cannot be cleared from the inventory until the remaining amount reaches 0 based on the amount of use registered.

(4) Usage and Storage of Organic Solvents and Specified Chemical Substances

① Use localized ventilation equipment (such as fume hoods) when handling organic solvents (Types 1 and 2) and specified chemical substances (Types 1 and 2) and avoid exposure as much as possible.

② Display the designated labels such as "Classifications of Organic Solvents, etc." and "Precautions for Usage of Organic Solvents, etc." when handling organic solvents (Figure 3-3-3).

Type 1

第一種有機溶剤等

(White lettering against a red background)

Type 2

第二種有機溶剤等

(Black lettering against a yellow background)

Type 3

第三種有機溶剤等

(White lettering against a blue background)

Figure 3-3-3. Classification of Organic Solvents

2 — 3) After Use

Waste, liquid or solid, often contains harmful substances and must be disposed appropriately. Please dispose them by following the procedures below.

(1) Procedures

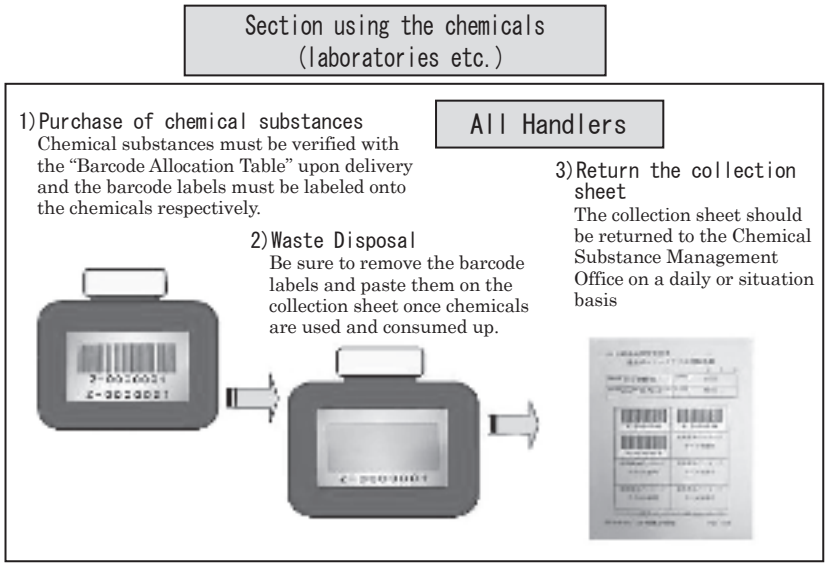


Figure 3-3-4. Disposal Procedure

Please be sure to return the barcode label to ensure that the quantity in CRIS matches the quantity in the actual inventory. Chemicals are managed in CRIS, which is required to be submitted in the event of inspections by government agencies or in the event of a fire. Please check regularly with each laboratory as this is related to the overall chemical holdings of TWIns.

(2) Disposal of Liquid and Solid Wastes

Liquid and solid wastes released from experiments, and reagents that are no longer required must be disposed according to the appropriate procedures. Refer to "3 — 13. Classification Waste Dumping and Management of Waste From Experiments" for these procedures.

Laws and regulations relating to disposal that require attention include the Law on the Control of Releases to the Environment of Specific Chemical Substances and the Promotion of Improvements to the Management. The PRTR (Pollutant Release and Transfer Register) is a system for compiling and publishing data on how much hazardous chemical substances are released into the environment from which sources, or are transported out of business premises in waste. The university also monitors the amount of waste purchased from CRIS and the amount of laboratory waste treated from disposal-request slips when the laboratory waste is received, organizes these data and reports to the administrative authorities once a year. Ensure that the names and quantities of substances put into disposal containers are properly controlled and that the contents are accurately transcribed on the slip at the time of disposal.

(3) Disposal of chemical container

Small empty chemical container can be put in the specific laboratory waste container (P or G) according to the clarification (not necessarily cleaned and dried) then bring to the Waste Storage Rm.2 (Fig. 3-3-5). Large one like 18L square can and gallon bottle be taken directly to the room, if applicable, after air dry.

3 Fume Hoods

(1) What is a fume hood?

Chemical experiments are often accompanied by the danger of inhaling or coming into contact with gases, steam or fumes from chemicals or reactions. Therefore, extreme caution is required when handling highly volatile or hazardous substances such as organic solvents, specified poisonous substances, acids, etc.

A fume hood (Figure 3-3-6) is used as a first barrier in preventing such dangers from occurring. It is a hooded enclosure that is designed for localized ventilation, preventing hazardous gases or fumes from being released into a laboratory space.

(2) Fume hood structure

Hazardous substances that are released into the hood pass through an air duct and are exhausted into the atmosphere by a fan. To prevent polluting the atmosphere, the following types of exhaust-gas treatment equipment are generally installed along the air duct.

These exhaust-gas treatment equipment can either be installed with the fume hood or at the rooftop of a building.

Table 3-3-4. Types of exhaust-gas treatment equipment

Type	Treatment	Maintenance
Scrubber type (wet type)	Clean using water. The water is circulated and pH is adjusted by adding a cleaning solution such as NaOH.	Periodic replacement of water and cleaning solution
Adsorption type (dry type)	Hazardous substances are filtered through adsorbent materials such as activated charcoal or chemical adsorbents.	Periodic replacement of adsorbent materials

Figure 3-3-5. Fume hood equipped with a scrubber unit (scrubber equipment is shown on the right side)

Figure 3-3-6. Scrubber facilities on the rooftop

Figure 3-3-7. Fume hood equipped with activated charcoal (built-in activated charcoal cartridge at the top of the unit)

(3) Precautions in handling the fume hood

① Face velocity

As a standard, the recommended face velocity at the sash opening is 0.5 m/sec.

If the face velocity is low, there is a risk that hazardous substances will leak out of the fume hood. A fume hood that has an alarm system to notify the user when the face velocity drops is recommended.

Face velocity can be affected by the following conditions:

- Air conditioning equipment installed within the room.
- Opening/closing of the room door.
- Movement in front of the sash opening.
- Items within the fume hood (obstruction of air flow).
- The use of heat within the fume hood (generation of upward air flow).

Based on these conditions, it is therefore important to avoid placing items inside the fume hood, or to minimize people walking near the hood while it is being used.

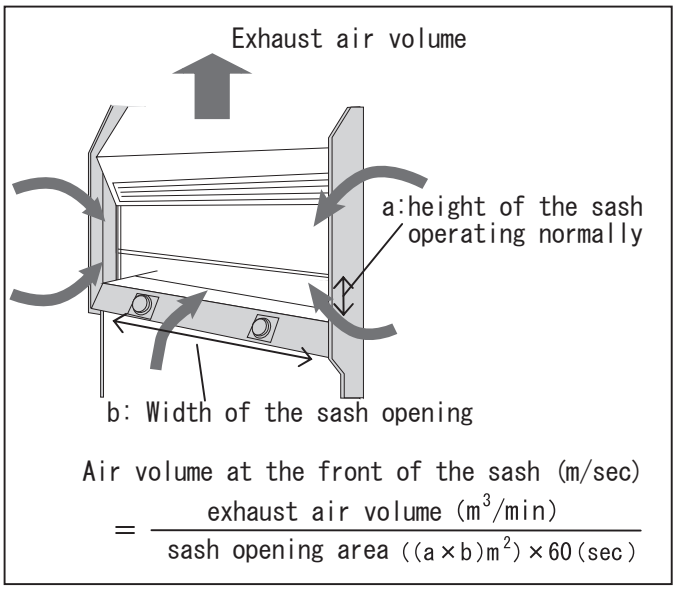


Figure 3-3-8. Face velocity

In order to maintain high face velocity, it is effective to keep the sash opening as small as possible. To do so, the height of the sash opening should be kept below 400 mm (about half open). Minimizing the sash opening, enough for the user to insert his/her hand, will also protect the user from any accidents, such as explosions, occurring during experiments in the fume hood. If in any case a user is required to leave the fume hood unattended, the sash should be completely closed.

② Balance of air supply

The balance between the room interior pressure and air supply also affects the flow of exhaust from the fume hood. Therefore, pay sufficient attention to the air supply by regularly cleaning the ventilation filter.

③ Safety Considerations

- Wear protective glasses during experiments to protect your eyes from sudden dispersal of liquids and other elements.
- Do not insert your face inside the hood.
- Confirm the location of fire extinguishers nearby when handling flammable substances or chemicals within the fume hood.
- Do not use oxidized fluids, such as perchloric acid and nitric acid, with organic solvents within the same fume hood (explosion is possible if they mix within the duct).
- Do not leave unnecessary or non-related items within the fume hood during or after experiments.
- Ensure that the exhaust-gas treatment equipment (scrubber or adsorption type) is regularly cleaned and maintained.

  (Regular maintenance is conducted at TWIns by the assigned technicians)

4 Examples of Chemicals Related Accidents

As clearly indicated, users are required to abide to the laws and ordinances and campus regulations when using chemicals. Nevertheless, accidents still do occur and surveys on the cause of many of these accidents were found not to be due to poor “management” but instead due to poor “handling”.

Accidents ① and ② in the Table 3-3-5 below are not exceptional.

In many cases, small amounts of consideration in daily activities such as those shown in ① and ② will make great improvements. Please pay extra attention to your surroundings and actions.

Table 3-3-5. Examples of Chemical Substance Related Accidents

Overview	① Gallon bottles of organic solvents fell off a trolley during transport onto a concrete way in which they broke and resulted in the spilling of the contents  ② A gallon bottle of organic solvent held with one finger was dropped while pushing an elevator button. The bottle broke and resulted in the spilling of its contents. 
Presumed Causes	① The user did not consider the instability of the trolley during transport. ② The user was careless in handling the gallon bottle.
Countermeasures	① Use a trolley equipped with a basket or have two people transport the bottles after placing them in a large container. ② Do not do other things with the hand in which the reagent bottle is being carried.

3 — 4. Safety Measures for High-Pressure Gases

1 Introduction

Many high-pressure gases are used at TWIns.

When using high-pressure gases, users must be fully aware of their usage and observe the "High-Pressure Gas Safety Act."

Strict management of high-pressure gases is required as information, such as the quantity in hand, must be submitted during emergencies.

Keep in mind of the information described below, and fully observe the rules.

(1) Definition of High-Pressure Gas

High-pressure gas is defined on Article 2 of the High-Pressure Gas Safety Act as shown below.

① Compressed gas, the pressure of which is not less than 1 MPa at its normal operating temperature or at 35℃ (except compressed acetylene gas in both cases)

② Compressed acetylene gas, the pressure of which is not less than 0.2 MPa at its normal operating temperature or at 15℃

③ Liquefied gas, the pressure of which is not less than 0.2 MPa at its normal operating temperature or at 35℃

④ In addition to what is listed in the preceding item, those liquefied gases, the pressure of which exceeds zero Pa at a temperature of 35℃, and which, inclusive of liquefied hydrogen cyanide and liquefied methyl-bromide, are specified by a Cabinet Order

※ 1MPa = 10.2kg•f/cm^2

(2) High-Pressure Gas Classifications

The two types of high-pressure gas classification are as follows.

① Classifications by the gas states in containers

Table 3-4-1. Classifications by the gas states in containers

Classifications	Main Gases
Compressed Gas	Oxygen, hydrogen, argon, helium, methane and other span gases, etc.
Liquefied Gas	Chlorine, ammonia, carbon dioxide gas, liquid petroleum gas, etc.
Dissolved Gas	Acetylene

② Classifications by Danger

Table 3-4-2. Classifications by Danger

Classifications	Characteristics	Main Gases
Flammable Gas	Burns when ignited and forms an explosive mixture when combined with air.	Hydrogen, methane, ethylene, propane, carbon monoxide, etc.
Non-flammable Gas	Does not burn, but induces suffocation due to oxygen deficiency when inhaled.	Nitrogen, helium, neon, Freon, carbon dioxide, etc.
Combustion-supporting Gas	Does not burn or explode, but assists and accelerates burning.	Oxygen, air, nitric monoxide etc.
Poisonous Gas	May induce central nervous system paralysis, convulsion and suffocation when inhaled. Extremely dangerous if high concentrations are inhaled.	Carbon monoxide, nitrogen dioxide, nitric monoxide, etc.

(3) Capacity and Filling Volume of High-pressure Gas Cylinders

Gas cylinders come in a variety of sizes depending on the type of gas. The unit used for filling the gas cylinder is generally "m^3". Gas is injected into high-pressure gas cylinders at a pressure of 14.7 MPa and the volume of gas injected into the container is equal to the volume when the gas filled with high pressure is returned to atmospheric pressure.

Table 3-4-3. Capacity and Filling Volume of High-pressure Gas Cylinders (Fill Pressure 14.7Mpa)

Internal Volume [L]	Filled-gas Volume [m^3]
47.0	7.0 (7,000L)
10.0	1.5 (1,500L)
3.4	0.5 (500L)

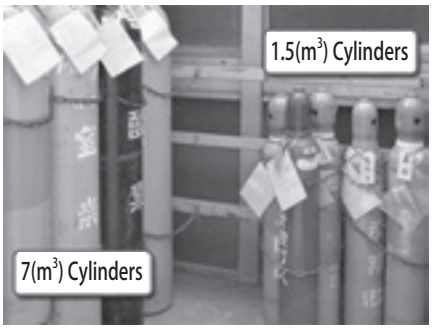


Figure 3-4-1. High-pressure Gas Cylinders

(4) Indicators and Markings on High-Pressure Gas Cylinders

High-pressure gas cylinders are differentiated based on the paint and letter colors as shown in the Table below.

Table 3-4-4. Paint and Letter colors used in the indication of High-Pressure Gases

High-Pressure Gas Type	Container Color	Letter Color	"Gas Characteristics" and the Letter Colors that Indicate Them.
Oxygen Gas	Black	White	
Hydrogen Gas	Red	White	"燃" written in white
Liquefied Carbon Dioxide Gas	Green	White	
Liquefied Ammonia Gas	White	Red	"燃" written in red and "毒" written in black
Liquefied Chlorine Gas	Yellow	White	"毒" written in black
Acetylene Gas	Brown	White	"燃" written in white
Combustible Gas	Grey	Red	"燃" written in red
Combustible, Poisonous Gas	Grey	Red	"燃" written in red and "毒" written in black
Poisonous Gas	Grey	White	"毒" written in black
Other Gases	Grey	White	

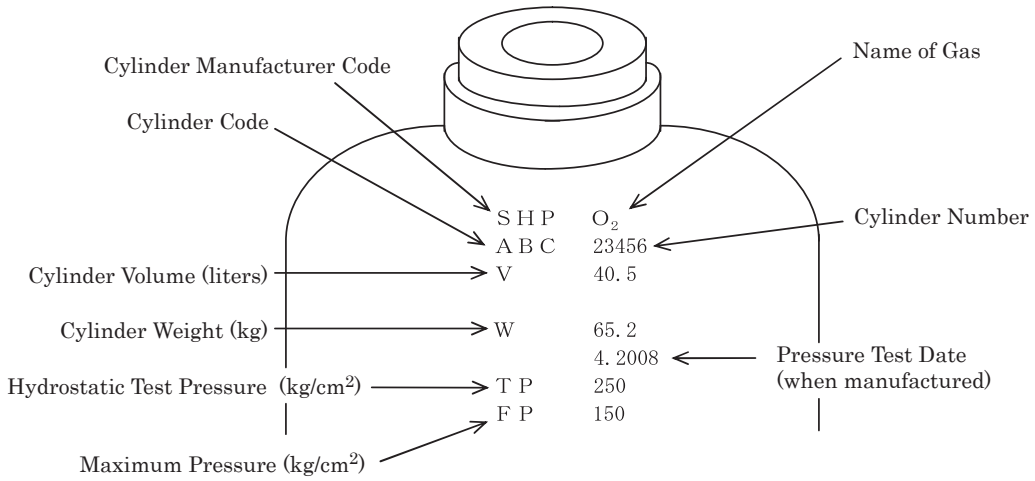


Figure 3-4-2. Markings on high-pressure gas cylinders

2 Managing High-Pressure Gases

(1) Consultation Service For the Use of High-Pressure Gases

At TWIns, you should consult the respective administrative representative at each university.

(2) Purchasing High-Pressure Gases

High-pressure gases are to be ordered directly from gas suppliers by each laboratory.

At Waseda University, the gas will be delivered directly to the user, after undergoing paperwork such as CRIS registration and inspection by the office on the 3rd floor.

Please ensure to return used cylinders to the supplier as soon as possible. The High-Pressure Gas Safety Act limits the amount of gas that can be stored, therefore, storage of spare cylinders is prohibited. Furthermore, in order to minimize the amount of gas storage, gas cylinders are better to be as small as possible.

Below is a flowchart for ordering gases.

Figure 3-4-3. A flowchart of the purchase of high- pressure gasses

(3) Managing High-Pressure Gases at TWIns

1) Piping System

Gas cylinders of the various high-pressure gases as shown below are stored at TWIns in the B2 container storeroom.

Oxygen, argon, helium, carbon dioxide, nitrogen,
95% oxygen + 5% carbon dioxide, vacuum, compressed air.

○ Piping material
- High-pressure gas: SUS304 (however, carbon steel piping [white] is used for vaccum and compressed air).

○ Coupler
- helium: metal touch coupler
- Other high-pressure gases: Swagelok

○ Supply pressure
- The various high-pressure gases are supplied at a pressure of 7 kg/cm^2.

○ Regulator, flow meter
- The various gas regulators and flow meters are installed within the ceiling.
- Call a specialist or the supplier when changing the set pressure.
- Regulator pressure range: 0.2 kg/cm^2 – 7 kg/cm^2
  ※ 0.2 kg/cm^2 graduations.
- There is no regulator for compressed air or vacuum.

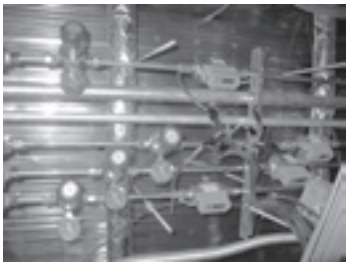
○ Various high-pressure gas valves.

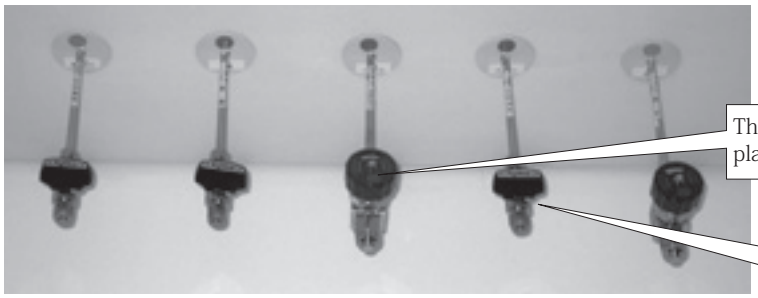
○ Using vacuum and its precautions

- Vacuum is set at a suction pressure of 7 kg/cm^2.
- Be cautious as not to vacuum substances such as organic solvents which may cause damage to the suction device.
- Substances including air, non-corrosive fluids, non-toxic fluids, and fluids that do not crystallized or solidify can be vacuumed.
- If in any cases you accidentally vacuum a solid object, a trap unit protects the vacuum system. (the trap is located in the B2 machine room).
- Please also take extreme care when handling pathogenic or potentially hazardous microorganisms as the exhaust of the vacuum pump is released directly into the atmosphere.

○ Using compressed air and its precautions

- Compressed air is also supplied at a pressure of 7 kg/cm^2.
- The compressor is oil-free, thus, providing clean air.
- The air filter and micro-mist filter also remove particles to provide clean air.





※ When an extension is to be connected to valves on the ceiling, ensure that the open and close angle is set to 90 degrees.

Figure 3-4-4. Regulator (left), flow meter (right)

2) Local Plumbing

Flammable and combustion-supporting gases cannot be set to laboratories. However, it is possible to set up a gas cylinder cabinet, whereby a ventilator fan is required to be installed. Please consult the office.

3) Safety Equipment Measures

○ Sensors

The types of sensors installed in laboratories are shown below.

Carbon dioxide sensor

Hydrogen and acetylene sensor

Oxygen concentration sensor

○ Alarms

When the designated sensor triggers an alarm indicating a gas leak, or a sensor default, quickly evacuate the laboratory and contact the Security/Monitoring Room on the 1st floor.

※ The NMR and liquid nitrogen rooms are equipped with oxygen concentration sensors

Gas alarm

(4) Storage periods for high-pressure gas container

At Waseda University, in order to prevent gas leaks as a result of storing cylinders filled with high-pressure gas for prolonged periods, do not store cylinders for more than one year, regardless of being used or not.

Further, high-pressure gas cylinders for which the expiry date for testing (pressure testing) has elapsed need to be tested. Please contact the supplier and arrange for testing.

3 Precautions for High-Pressure Gas Cylinders

(1) General Precautions

① Exercise extreme caution against impact, temperature, direct sunlight, fire, electricity, etc. when handling high-pressure cylinders.

② Install high-pressure gas cylinders on a safe and stable stand, such as a gas cylinder stand.
Use strong chains to stabilize cylinders at two locations when keeping it upright against a wall.
Securely stabilize stands using anchor bolts (Figure 3-4-5).

③ Use chocks to prevent rolling of cylinders laid horizontally (liquefied gases or acetylene should not be horizontally stored).

④ Do not leave cylinders at passages such as halls or emergency stairways.

⑤ Install the appropriate fire extinguishing equipment nearby.

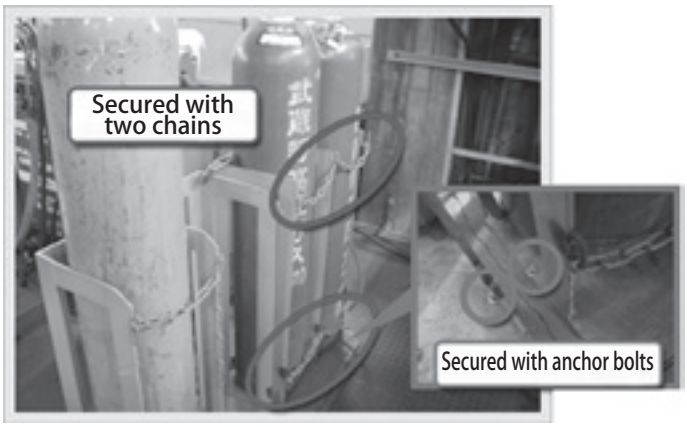


Figure 3-4-5. Securing high-pressure gas cylinders

(2) Precautions during Transport

①Always ensure that cylinders are capped and use the designated trolley when necessary (Figure 3-4-6).

② Slightly tilt cylinders and roll them along their bottom rim if trolleys are not available.
Ensure that the protective caps are secured when doing so.
Do not drag or roll them on their side.

(3) Precautions during Opening Cylinder Valves

① Open or close valves slowly and carefully.
Use the specified handles (i.e. spindle-type valves found on oxygen cylinders) when opening/closing valves.
Keep the handle on during use.

② As the standard screws for the gas slots of cylinder valves are represented by left screws for combustible gases and right screws for other gases (exception: helium gas), pay extreme caution when attaching and detaching them.

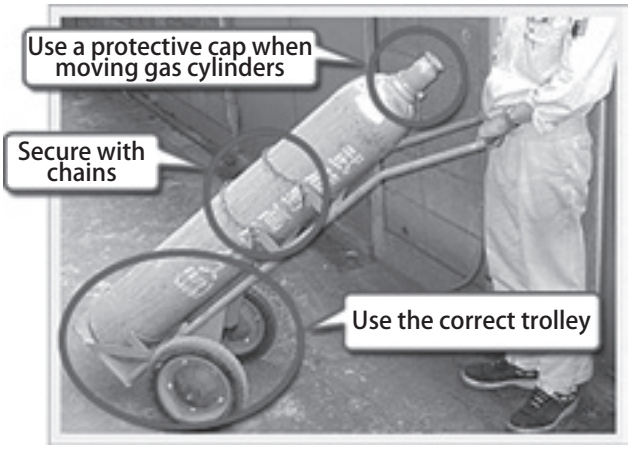


Figure 3-4-6. Transporting high-pressure gas cylinders

(4) Precautions for Pressure Regulators (Decompression Valves)

Pressure regulators, also known as decompression valves, are used to depressurize high-pressure gases to the desired pressure and to keep them constant. Therefore, choose the appropriate pressure regulator type according to the usage, type of gas, etc. Take particular care of the following when using pressure regulators.

① Choose pressure regulators according to their usage, type of gas, etc.

② Do not apply oil to the regulators nor handle them with gloves containing oil.

③ When connecting them to a gas cylinder, completely remove all fluids and dirt from the areas around the gas slot of the cylinder.

④ Examine the size of the mounting screw, specifications and adequacy of the materials before use.
Always use new packing when replacing cylinders.

⑤ Use the appropriate spanner when fastening a pressure regulator.

⑥ After mounting the pressure regulator, turn its handle counterclockwise to loosen it before opening the valve of the high-pressure gas cylinder.
Keep objects and your body away from the direction in which the high-pressure gas will blow when opening the cylinder valve.

⑦ Close the cylinder valve immediately if leakage from the main body or piping system is identified.After completely eliminate gas leakage, check and tighten connections or replace packing.

⑧ A rough standard for the application limit of secondary pressure should be 2/3 the maximum scale value.
Safety valves may blow if the pressure reaches or exceeds this level. The recommended level is ½ or below.

⑨ In the case where the pressure gauge does not return to zero when gas is completely released, or when the secondary pressure rises irrespective of the primary pressure, it is presumed that the pressure regulator is broken.
Stop using it immediately and do not disassemble or adjust the pressure regulator any further.

⑩ When not in use, place a plastic bag or cap over the opening to prevent water or rubbish entering the pipes or internal parts of the pressure regulator.

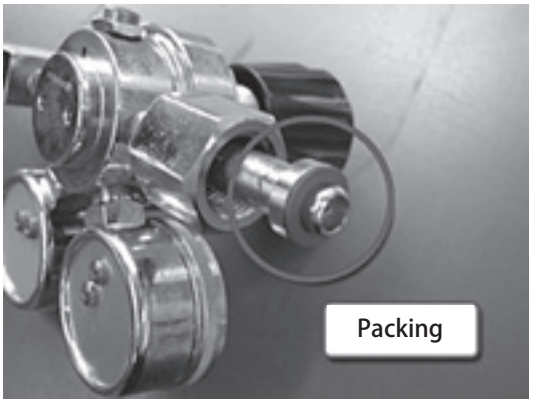


Figure 3-4-7. Pressure regulator packing

Figure 3-4-8. Handling pressure regulators

(5) Procedures for Opening or Closing Cylinders and Pressure Regulators before and after Experiments

[Before Experiments]

① Slightly turn the adjustment handle of the pressure regulator counterclockwise and confirm that it is loose.

② Carefully open the cylinder valve
(When conducting this, keep unnecessary objects and your body away from the direction in which high-pressure gas will blow.)

③ Turn the adjustment handle of the pressure regulator clockwise, and set the secondary pressure to the desired pressure of use.

④ Open the secondary needle valve, and adjust the flow volume accordingly.

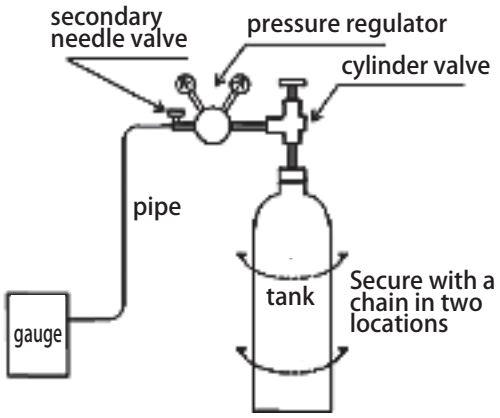


Figure 3-4-9. Cylinder & Pressure Regulator

[After Experiments]

① Close the cylinder valve completely, and bring the pressure of the pressure regulator, piping system and experimental equipment down to zero with a leak valve or a similar device.

② Turn the adjustment handle of the pressure regulator counterclockwise to completely loosen it, and close the secondary needle valve.

③ Close all valves attached to the piping system and equipment.

4 Licensing and application for production of the high-pressure gas

The following actions fall under the production of high-pressure gas and require a license and application under the High-pressure Gas Safety Act.

(1) Changing gas pressure

① Converting a gas to a high-pressure gas
Example) Using a compressor to increase gas at 0.1MPa to high-pressure gas of 20 MPa.

② Converting high-pressure gas to gas of an even higher pressure
Example) Using a compressor to increase high-pressure gas removed from a container at 20 MPa to 40 MPa.

③ Using a pressure reducing valve etc. to lower the pressure of a high-pressure gas to 1 MPa or more
Example) Using a pressure reducing valve to lower the pressure of high-pressure gas removed from a cylinder at 20 MPa to 5 MPa.

④ Increasing the pressure of high-pressure liquefied gas using a pump or other gas
Example) Using a pump to increase the pressure of high-pressure gas at 0.3 MPa to 0.9 MPa.

(2) Changing the state of a gas

① Converting a gas to a high-pressure liquefied gas

Example) Using a condenser in a freezer to convert a compressed gas into a liquefied gas.

② Converting a liquefied gas into a high-pressure gas

Example) Using a gas evaporator to convert liquefied gas to a compressed gas.

(3) Filling a container with high-pressure gas

Example) Transferring high-pressure gas from a large container to a small container.

5 Examples of Accidents when Handling High-pressure Gases

Accidents attributed to high-pressure gases include gas leaks and explosions can be disastrous. Furthermore, they can also occur during transport depending on the cylinder shape.

Table 3-4-5 are some examples of cases or near misses that resulted in minor accidents at the Nishi-Waseda Campus.

Review the safety of daily activities and make an effort to prevent these accidents from occurring.

Table 3-4-5. Accidents When Handling High-Pressure Gases

Overview	A cylinder was about to fall during transport. When the user tried to grab the cylinder, his finger was caught in between the falling cylinder and a wall.
Presumed Cause	It was presumed that the user lost his balance while transporting the cylinder and was unable to regain his balance. In addition, no safety equipment was used to support the cylinder.
Countermeasure	Use safety equipment, such as the specified trolley, even when transporting cylinders within short distances. Also secure the containers with chains to ensure that they do not fall.

Overview	A secondary pressure gauge broke, and gas leaked when the high-pressure gas cylinder valve was opened.
Presumed Cause	The secondary pressure increased rapidly resulting in malfunction of the pressure gauge because the cylinder valve was opened too fast with the pressure regulator open.
Countermeasure	When opening a cylinder valve, always check that the pressure regulator handle has been loosened.

Overview	A cylinder fell over during an earthquake, and because of the impact, gas leaked from the cylinder.
Presumed Cause	Safety measure to prevent the cylinder from falling over were insufficient. Gas leaked because the cylinder valve loosened from the impact of the falling.
Countermeasure	Stabilize cylinder to prevent them from falling over, by securing them with chains at two locations.

3 — 5. Safety Measures for Electricity

1 Introduction

We often use electricity without thinking about its dangers. Therefore, failure in proper utilization often results in accidents to occur.

In order to prevent accidents from occurring, proper preparations and safety measures should be taken into consideration when using electricity.

2 Working with Electricity

Based on the designated laws and ordinances, any modifications to electrical systems installed in laboratories and offices must be conducted by a licensed technician.

At TWIns, if modifications are required, please consult the office of each university.

3 Types of Electrical outlets at TWIns

1) Distribution boards

Distribution boards are locked to prevent from tampering. Do not touch them in any circumstance.

Do not place items that impede opening and closing of distribution boards.

2) Electrical Outlets

All outlets are labeled with circuit numbers and experiment names, and circuits with only one outlet are labeled with a "#" before the circuit number. The pictures below show the general and special outlets respectively.

【Outlet for cleaning】	【Outlet for general experiments】	【Outlet for generator circuit】
This is the outlet for cleaning. It shares the circuit with numerous other outlets, so you will need to take care.	This is the outlet for experiments. The maximum capacity is 20A.	This is the outlet for the generator circuit. Be careful with power strips (there is a limit to the generator capacity).

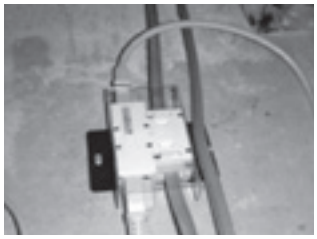
(Attention!) Only machinery set up for the generator outlet, or those with the same electricity consumption may be connected to this outlet for generator circuit. Do not use power strips as overloading the generator will cause it to stop. Also, take note that during blackouts and fires, putting out the fire will be prioritized meaning that, despite being connected to the generator circuit, this outlet will go out of operation.

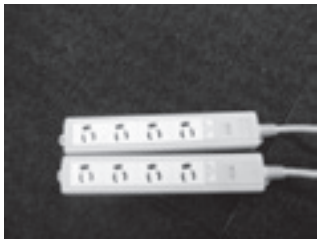
【100 V high-capacity outlet (30 A)】	【200 V outlet】	【200 V outlet】
A high-capacity outlet of 30A. Attach cables of machinery to a special adapter to use.	A special 200V outlet. Attach cables of machinery to a special adapter to use.	Same as left.

【Ceiling nozzle outlet】	【Ceiling outlet】
Inside the box is a VVF2.0-3C cable. It can be used flexibly, becoming an outlet or a power supply for laboratory benches.	This is a ceiling outlet. After a plug has been inserted into the outlet, turn the plug slightly to the right or left, to lock the plug and prevent it from falling off.

Ceiling outlet rails	Ceiling reel outlet	Operating the reel outlet
These are the ceiling outlet rails. The maximum capacity is 20A.	A special extension cord which can be plugged into the ceiling rail.	Pulling down hard on it allows adjustment of its length. To rewind the cable press on the orange button.

Floor outlet	Explosion-proof outlet	Outlet for medical purposes
Inside the case is a 2E outlet.	This is an explosion-proof outlet. Use the special attached plug.	The red outlet is for medical purposes, which is ungrounded. The white outlet is for general purposes.





Block outlet	OA power strips	Isolating switch
This is a block outlet located on the OA floor. It is secured by screws.	These are OA power strips for the block outlet.	This is an isolating switch designated for high-capacity single or three phase loads. Plug in machinery on the secondary side of the breaker (trip-free type) to use.

4 Precautions with Electricity

Caution must be taken when using electricity in order to avoid the risk of electrocution and fire. Be sure to observe the following points from (1) through (5).

(1) General precautions

○ Insert plugs straight and completely into outlets. When removing plugs, do not pull the cord.
○ Do not use a damaged plug or power bar.
○ Remove any moist or dust between an outlet and a plug.
○ Do not step on cords. Also, do not fix cords or use cords bundled together.
○ Do not use a power bar with exceeded capacity.
○ Do not plug too many cords into a single electrical outlet. This is extremely dangerous.
○ Do not touch electrical wires and equipment with wet hands.
○ Ensure to properly ground equipment to prevent danger from leakages.

(2) Preventing electrical leakage and shocks

Although electrical wiring or equipment is normally insulated, electrical leakage to the wiring exterior or the casing of the electrical equipment (chassis) is possible due to aging and damage.

Touching electrical equipment that is leaking electricity will result in current passing through your body to the earth. Strong currents can be fatal.

Installing a ground wire or ground-fault interrupter is necessary if there is a danger of electrical leakage.

(3) High voltage

Resistance of the human body comprises of the skin and internal resistances. As high voltage destroys the skin and a large current flows, do not touch anything connected to a high-voltage source. As approaching a high-voltage source can produce a faradic current, be careful not to approach too closely to high-voltage devices or equipment.

(4) Steps to take in the event of an emergency

① Cut off electricity to the equipment causing the problem.
② If the electricity cannot be cut off, dial the emergency number and follow the instructions provided.

(5) Modifying personal and lab equipment

Obtain guidance and permission from the responsible faculty before modifying your own equipment or retail electrical appliances (refrigerators, microwaves, etc.), engines, vacuums, analysis equipment, etc.

Observe the following safety measures during design, production and experiments.

【Design and Production】

① Consider intensity, pressure, electrical system, heat generation and chemical reactions.
② Consider operating environment and conditions.
③ In production work, ensure that the work conforms to technical standards for electrical installations and internal wiring standards.
④ Obtain permission from the responsible faculty member and follow his/her instructions.
⑤ Have safety devices in place to minimize damage from any problems that might occur.

【Operation】

① Conduct test operations in the presence of the responsible faculty.
② Take safety measures against anticipated problems that might occur when power is on or when an equipment is working.

5 Examples of Accidents Caused by Electricity

Various regulations and codes have been established for users to utilize electricity safely and effectively.

Not following them is extremely dangerous and may lead to the occurrence of accidents. As accidents are not only dangerous to the people involved but also disruptive to others, precautions need to be taken.

Recent examples of actual accidents are shown to prevent accidents and increase the importance of constantly confirming proper use of electricity.

Table 3-5-1. Examples of accidents caused by electricity (over-heating)

Overview	① Examples of over-heating (1) 
Presumed cause	① Hand wired connections that do not conform to the technical standards for electrical installations performed by an unqualified person, resulted in the cable covering being torn by burrs on the box. As a result, a wiring short circuit occurred and the cable burned. ② Many electrical devices were plugged onto a single power bar, causing it to overload and melt.
Countermeasures	① Hand wired connections should not be handled by an unqualified person. Please consult the office of the Center for Advanced Biomedical Sciences. ② Consider the capacity of the power bar in use and avoid too many connections. (Octopus wiring is prohibited)

Table 3-5-2. Examples of accidents caused by electricity (fire)

Overview	① Fire accident (1)  ② Fire accident (2)  ③ Fire accident (3) 
Presumed causes	① Abnormally large amount of current passed through a ground cable wire (non-insulated) causing a spark between the ground cable and metal in contact with it. The spark ignited flammable material in the vicinity, causing a fire. ② Unusually high gas pressure in the heat-generating part of an electric furnace created flames that ignited nearby flammable materials (cardboard). ③ A refrigerator was modified for experimental purposes. However, due to poor modifications, a hole left burrs wore away a wire casing. As a result, a short circuit occurred.
Countermeasures	① Always use the green (No.4) cable to ground equipment. ② Keep flammable materials away from heat sources such as electric furnaces. ③ Take extreme caution with isolation when modifying electrical equipment.

6 Octopus Wiring (Multiple Connection)

At TWIns, the basic understanding for the utilization of electrical outlets is to use only one outlet for a single machine or equipment. However, in laboratories or common rooms, you will generally face a situation where you will require more outlets than those that are available. Although solving the problem by increasing the number of outlets by using a tap while keeping the amount of electricity used below the specified current load is highly common, this situation is still considered as octopus wiring.

Octopus wiring is not recommended as multiple connections increases the possibility of a fire to occur. Nevertheless, if the use of a tap is necessary, the following points need to be considered.

○ Do not use a tap that is directly connected to the wall outlet.

Multiple connections to a wall tap can result in occurrence of vibrations between the tap and the wall outlet, which will eventually lead to electrical arcing.

Figure 3-5-1. Octopus wiring caused by directly connecting a tap to the wall outlet

○ Do not use additional taps to connect to an extension cord (OA tap).

Increasing the amount of outlets will result in

- The number of machines or equipment to increase. You will exceed the nominal current capacity and the circuit breaker will trip.
- A fire to occur due to electrical overload
- Dust and waste to easily collect between nearby cables, therefore, increasing the possibility of electrical arcing to occur.

Considering of the above points, it is recommended that you take extreme caution in using the wall outlets and also use an OA tap instead of a wall tap.

○ Remove all equipment you have finished using from the outlet.

○ Regularly check the outlet, plug and cord of equipment being used for prolonged periods.

"Exceeding the nominal current capacity" mean.....

For example, a wall outlet (2-outlet type) has a nominal current capacity of 20A. It would not be a problem if only a PC (5A) and an electrical pot (3A) were connected to the outlet. However, when a wall tap is used and the number of outlets were increased to 5, and 3 additional PCs were connected to it, this situation is described as exceeding the nominal current capacity of the wall outlet. In addition, please also take note that when using extension cords (OA taps etc.), they too have a nominal current capacity. This information is usually stated on the extension cord.

3 — 6. Safety Measures for the Use of Radioisotopes and X-ray Equipment

1 Introduction

When using radio isotopes ("RI") and X-ray equipment, users must familiarize themselves with the properties of the RI and the emitted radiation and safe handling procedures and make every possible effort to ensure that not only the user, but also those around them are not affected by the radiation.

(1) Types of Radiation

Types of radiation include particle beams such as α rays, β rays, and neutron rays, and photons in the form of gamma rays and X-rays and the energy from radiation is expressed as electron volts (eV) based on the elementary charge of the radiation. Depending on the type of radiation used, energy and strength it is necessary to take the appropriate protective measures, such as the use of radiation shields etc.

(2) Radiation Generation

In the X-ray tubes, thermal electrons emitted from the cathode filament accelerated by a voltage of several 10kV–several 100kV (tube voltage) are made to collide with the anode (target) made from metals such as copper, molybdenum, and tungsten etc. to generate X-rays.

On the other hand, radioisotopes are elements that emit radiation. The rate of radioactive decay occurring in 1 second (disintegration rate) expresses the strength of radiation and is measured in units of Bq (Becquerel). In addition, the time it takes for the number of atoms of an RI to fall to half its original value is called the half-life, and this time varies depending on the type of isotope. When conducting experiments, it is necessary to know the tube voltage, type of anode, conditions for the tube current etc., and the disintegration rate and half-life of the isotope being used.

(3) Effects on the Human Body

The effects of radiation on the human body consist of physical effects to the individual exposed or genetic effects to their progeny. The physical effects of radiation are classified into acute manifestation (Table 3-6-1), occurring immediately after exposure and late manifestation (in the form of cataracts and cancer etc.), occurring several months or years after exposure. Further, depending on the form of manifestation, these effects are divided into deterministic effects and stochastic effects.

Table 3-6-1. Acute Effects of Radiation on the Human Body

Acute effects at the various amounts of radiation in a single exposure.	
Radiation dose (Gy)	Symptoms at whole-body exposures.
0.5	Decrease in white blood cells
1	Nausea, vomiting, fatigue
1.5	Pyrexia
2	Long-term decrease in white blood cells; 5% mortality rate
3	Impaired consciousness and body hair loss
4	50% mortality rate within 1 to 2 months
7	100% mortality within 1 month

Gy (gray) : absorbed dose [J/kg]

2 Radioisotopes (including accelerators)

(1) Before Handling Radioisotopes

RI can only be used by facilities that have received the proper authorization from the Japanese government or have filed the necessary applications etc. (facilities licenced to handle RI). Under the Radiation Hazard Prevention Act of Japan, before using RI in a controlled area, it is necessary to undergo a special health examination (ionizing radiation), participate in radiation safety training courses and submit the necessary application forms.

① Undergoing a Special health examinations (ionizing radiation)

Experimenters cannot handle RI unless they have undergone a special health examination (ionizing radiation). Experimenters handling RI etc. must have undergone this examination prior to handling RI and at six-month intervals thereafter. Waseda University provides these examinations in April and October each year at the Nishiwaseda Campus and experimenters are requested to receive their examinations during these periods as much as possible. TWIns researchers are also requested to take these examinations at the Nishiwaseda Campus.

② Participation in training courses

Experimenters cannot handle RI etc. unless they have undertaken training courses that satisfy the relevant laws and regulations in terms of content and training hours (radiation safety training courses). These courses are held at TWIns each year from April through June.

③ Submission of registration application forms

After approval of the RI Safety Officer, experimenters can only enter a controlled area and handle RI etc. once they have received the above health examination and training and submitted the necessary application forms (Radiation Worker Registration/Cancellation Form) to the RI Safety Officer (RI administrative Office, Basement level 1, Extension 2302) or the radiation protection supervisor.

(2) Precautions when Using Radioisotopes

① Using Glass Badges (personal exposure management)

Fluorescent glass dosimeters (glass badges) that are compatible with the type of radiation they are using will be distributed to everyone working with radiation. This must be worn on the designated location on the body (chest for males and abdomen for females) whenever using RI etc. This is not only to ensure that exposure does not exceed the limit prescribed by the relevant laws and regulations, but also to control exposure in order to reduce it as much as possible.

(refer to Table 4-3-4, Table 4-3-5 and Table 4-3-9)

② Protection from External Exposure

Exposure to external radiation is referred to as external exposure. Three important factors, shielding, distance and time, should be considered for sufficient self-protection.

○ Shielding

Relatively high energy β -emitting ^{32}P (1.711 MeV) can be shielded using an approx. 1 cm acrylic plate or approx. 4 mm aluminum plate. β rays are shielded with light elements and inhibit the emission of X-rays (bremsstrahlung X rays) from breaking radiation.

On the other hand, for shielding against γ rays, lead with a large atomic number elements are often used, as well as iron and concrete.

When the emitted γ ray energy is larger, thicker shielding materials need to be used.

Table 3-6-2. γ Ray Shield Thickness (cm)

γ ray energy (MeV)	Lead		Iron	
	Half value layer	Tenth value layer	Half value layer	Tenth value layer
0.5	0.5	1.6	2.6	6.4
1.0	1.2	3.9	3.5	8.6
1.5	1.7	5.1	4.0	9.9
2.0	2.1	6.0	4.2	11

※ Half value layer: Shield thickness required to reduce radiation exposure dose to 1/2; Tenth value layer: Shield thickness required to reduce radiation exposure dose to 1/10

○ Distance

When the radiation source is considered a point source, the radiation dosage (rate) is inversely proportional to the square of the distance. As necessary, tweezers or tongs should be used to achieve the appropriate distance from the radiation source rather than directly handling the material by hand.

○ Time

Reducing exposure time means reducing the exposure dose. It is important to make the work plan and simulate the work to be done in the form of a cold run etc. in order to reduce exposure. However, rushing experiments more than necessary will lead to accidents therefore the appropriate care should be taken.

③ Protection from Internal Exposure

When handling unsealed RI there is the potential for the RI to enter the body, causing internal exposure. In this case, the body is exposed to the RI for long periods until the material is expelled from the body therefore it is important to prevent internal exposure as much as possible. As opposed to external exposure, particular care should be taken with isotopes that emit α rays and β rays that have a lower radiation penetrating power.

Protective measures are shown below in Table 3-6-3. Keep in mind to observe these measures when using radioisotopes or X-rays.

Table 3-6-3. Protective measures against radiation or X-rays

Type of exposure	Countermeasures		Specific examples
External	Shielding	Place a protective shield between your body and a source of radiation.	○ α-rays: Low penetration power and therefore not a concern.
			○ β-rays: Acrylic, plastic, glass, etc. are adequate for shielding. Care should be taken to prevent emission of bremsstrahlung X-rays when shielding against high-energy β -rays.
			○ γ-rays and X-rays: Shield using materials with a high atomic number (lead, tungsten, etc.).
			○Neutron rays: Shield using materials with a low atomic number (paraffin, polyethylene, etc.). Avoid emission of unnecessary radioactive nuclides resulting from nuclear reactions in the radiation source or surrounding materials.
	Distance	Remain in an adequate distance from a radiation source (radiation dose rate is inversely proportional to the square of the distance).	Do not handle directly. Use tweezers or tongs.
	Time	Minimize handling time.	Conduct a cold run※ without the use of radioactive materials, and keep operations short.
Internal (unsealed radioactive materials only)	Skin	Do not expose to skin, particularly cuts	Do not expose any part of your body. Always wear rubber or plastic gloves when handling materials. Wear a lab coat or plastic protector.
	Respiratory apparatus	Do not inhale.	Use a fan hood or glove box to avoid contamination of room air. Wear a mask.
	Mouth	Do not ingest.※※	Use a pipetter or safety pipetter when fractionating a fixed quantity of unsealed liquid radioactive material.

※RI experiments, without introducing radioactive materials, are priorly conducted to master the flow of the necessary technqiue. This is called a 'cold run.'
※※ When conducting experiments in area with radioactive materials, avoid eating candies, chewing gums etc.

④ Prevention and measurement of surface contamination

When handling a liquid radioisotope, lay down a filter paper, and handle the liquid on top of the filter paper so as not to contaminate the surroundings. Also prepare a radiation survey meter for contamination monitoring.

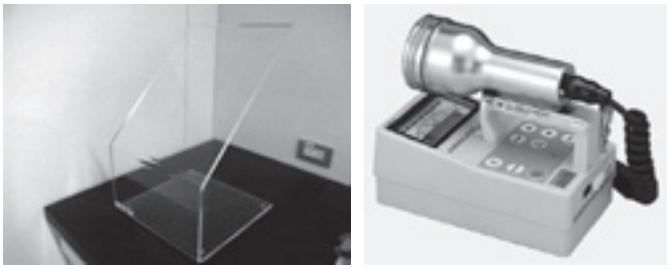


Figure 3-6-1. Equipment and instrument to prevent exposure to radiation
Left: Acrylic shield Right: GM survey meter

(3) RI Management (sealed, unsealed)

It is necessary that RI be strictly managed to prevent loss or theft from occurring. Observe the management methods prescribed by each facility. In addition, be cautious as not to carry RI and objects contaminated by RI outside of the radiation facility.

(4) Radiation Measurement

Monitoring of RI contamination is performed using radiation-measuring equipment (survey meter) suited for the purpose. When handling unsealed RI, it is important to understand how to use GM tube (β rays) or NaI (T1) scintillation survey meters (γ rays) based on the type of radiation and application. Other survey meters include the ionization chamber type and the neutron radiation type (refer to Table 4-3-10). These survey meters (except for the neutron radiation type) can be found in the control area for radiation.

3 X-ray Equipment

(1) Before Handling X-ray Equipment

Before setting up and using X-ray equipment at the university, experimenters must complete registration procedures for use of the equipment and participate in the necessary X-ray safety training courses.

① Submission of registration application forms

Application forms for the use of X-ray equipment differ depending on the management classification of the equipment, which are divided into three classes: A, B and C.

(refer to Table 3-6-4)

Contact the Radiation Management office to proceed

Radiation Safety Management Office：https://www.tps.sci.waseda.ac.jp/others-radiation/

② Undergoing a Special Health Examination (ionizing radiation)

Experimenters using X-ray equipment under management class B and C must undergo special health examinations (ionizing radiation) implemented by the University each year in April and October. These health examinations are required before the use of equipment and at six-month intervals thereafter. You can apply to receive these health examinations at your respective laboratories. Experimenters using X-ray equipment under management class A do not require health examinations.

③ Participation in an X-ray Safety Training course

Participation in an X-ray safety training course is mandatory for all X-ray equipment users.

Table 3-6-4. Management Classification According to the X-ray Equipment Safety

Class	Decision criteria	Safety during use	X-ray operating environment measurement or leakage inspection	Safety education	Measurement of individual exposure	Special health examination	Examples of equipment
A	Configured such that X-rays are not emitted without safety equipment, such as shields etc. during normal use.	Unable to open a shutter when a protective cover is open (during normal use).	○ (Annual)	○	× (When necessary, after disassembly or adjustment of equipment)	×	・Stationary fluorescent X-ray equipment ・Rigaku RINT type equipment ・Rigaku MiniFlex type equipment
B	Configured such that X-rays are emitted without safety equipment, such as shields etc. during normal use.	Shutter can be opened easily by using a cut-off switch etc. even when the protective cover is open.	○ (Biannual)	○	○	○※	・Rigaku RAD type equipment
C	Requires a controlled area that users can access. (equipment subject to laws and ordinances)	Shutter can be opened even when the protective cover is open or there is no protective cover.	○ (Working environment measurement biannual or more)	○	○	○※※	・CT scanner ・Bone density measurement equipment ・Ion-beam accelerator

※ Except when X-ray equipment is used for educational experiments.
※※To be conducted biannually.

(2) Precautions when Using X-ray Equipment

① Using Glass Badges (Personal exposure management)

Experimenters using X-ray equipment under management class B and C must wear fluorescent glass dosimeters (glass badges) distributed by the university on the designated location on the body (chest area for males and abdomen area for females). Measurement results are reported monthly. This is to

control personal exposure in order to reduce it as much as possible.
(refer to Table 4-3-4, Table 4-3-5 and Table 4-3-10)

② Safety devices for X-ray equipment and periodic inspections

X-ray equipment is equipped with safety devices, including indicator lights, protective covers and interlocks etc. Experimenters using X-ray equipment should periodically check that the X-ray equipment and these safety devices are working properly. It is important to read the operation manuals and have a thorough understanding of the equipment operation method etc.

③ Others

If you have any questions or concerns when using the equipment, please do not hesitate to ask the radiation safety support team.

4 Safe Management of Radioisotopes and X-ray Equipment

(1) X-ray Protection Supervisor and Radiation Protection Supervisor

The safe management of radiation facilities and X-ray equipment set up in controlled areas is performed by a radiation protection supervisor and X-ray protection supervisor appointed from faculty staff with the respective qualifications in each facility. For inquiries regarding the management of RI and X-ray equipment, please contact the Radiation Safety Management Office in Nishi-Waseda campus and TWIns–RI Administrative Office.

(2) Procedures when purchasing and installing radiation sources, radiation generators and X-ray equipment

① Radiation

○ When using or installing a new sealed or unsealed radiation source or radiation generator that exceeds the specified standards, notification/permission must be obtained from the Nuclear Regulation Authority.

○ Internationally controlled materials (uranium compounds and thorium compounds etc. such as uranyl acetate) are designated based on the Nuclear Nonproliferation Treaty, and must be strictly stored and managed. When purchasing new materials or upon discovering old materials, please contact/consult with the Radiation Safety Management Office in Nishi-Waseda campus and TWIns–RI Administrative Office.

② X-ray Equipment

When installing new X-ray equipment or relocating existing X-ray equipment, the head of the relevant labor standards supervision office must be notified by submitting the “Equipment installation, relocation, or change notification” and the “Radiation Equipment Brief Document”.

In the event of any of the above, please consult with the Radiation Safety Management Office and TWIns–RI Administrative Office.

5 Laws and Ordinances, and Campus Regulations Relating to Radioisotopes and X-ray Equipment

(1) Related Laws and Ordinances

Users should keep in mind and have good understanding of related laws such as “Emission Regulation Law, former Radiation Hazard Prevention Law” and “Occupational Health and Safety Law, Regulations for Prevention of Ionizing Radiation Hazards”.

(2) Campus Regulations

Regulations for the prevention of radiation hazards are prescribed for each radiation facility and are submitted to the Nuclear Regulation Authority. Regulations for the prevention of radiation hazards for each facility are distributed by the heads of each facility during the safety training courses. These can also be downloaded from the Radiation Safety Management Office website. Regulations for the prevention of radiation hazards also exist for radiation facilities outside the university. Please confirm these regulations when necessary.

3 — 7. Safety Measures for Animal Experiments

1 Introduction

Animal experiments play an extremely important role to human health and welfare by enhancing and supporting life science research.

In the commencement of such experiments however, it is necessary for researchers to abide to the designated laws and ordinances as set by the life science and medical fields. These restrictions are designed to allow researchers to conduct "reproducible research" while abiding to laws and ordinances related to animal welfare and rights.

Use of animals in experiments should be based on the "basic 3R principles" for animal welfare.

① **R**efinement

Improve animal facilities and experimental procedures and develop technology to establish refined experimental systems that minimize animal pain and stress.

② **R**eplacement

Actively design and develop experiments that can substitute experimental animals with lower order organisms

③ **R**eduction

Researchers should aim to reduce as much as possible the number of animals provided for use in experimentation to achieve the objective of their scientific research.

Researchers should always consider these "basic 3R principles" when planning experiments.

2 Management of Animal Experiments

Waseda University has its own internal "Safety Management Rules for Biological Experiment" and "Detailed Regulations for Enforcement of Safety Management Rules for Biological Experiment (Animal Experiment)", while Tokyo Women's Medical University has its own "Tokyo Women's Medical University Operating Provisions for Animal Experiments" and "Provisions of the Committee for the Safety of Genetic recombination Experiments". Each researcher must follow them when performing experiments, involving animals.

The required notifications must be submitted prior to performing any experiment involving animals, and the experiments may only conduct after approval by the Institutional Animal Experiment Committee (Tokyo Women's Medical University) and/or by the Ethics Review Committee for animal Experiment (Waseda University).

(1) Management System

The management scheme for animal experiments in each university is outlined below.

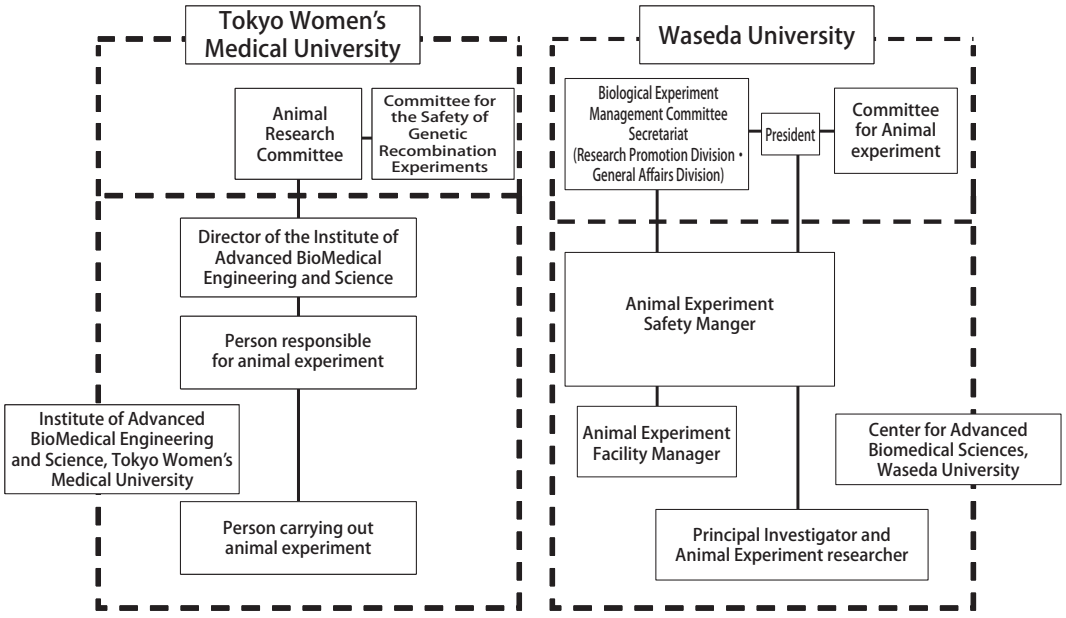


Figure 3-7-1. The management systems of the two universities

(2) Notification of Animal Experiments

1) The following forms should be submitted prior to the start of experiments involving animals at Waseda University.

○ Application/Report Form for Setting Up an Animal Experiment

- Application Form for Setting Up an Animal Experimentation Laboratory/an Animal Breeding Room
- Report on the Management of Experimentation Facilities (the same form is used for Genetic Recombination Experiments and Animal Experiments)
- Application for Animal Experiment (Includes whether the research is new or ongoing, where the experiment will be conducted, title of experiment, name of the person in charge and a representative for those involved in the research etc. State on a separate document a specific research plan for the animal experiments, methods used, personnel involved in the experiment and your own personal assessment of the ethics involved.)
- Report on the Completion of Animal Experimentation (Includes the name of the person in charge, the title of experiment and experiment status etc. This should be submitted with each experiment plan application form.)
- Report on the Achievements of Animal Experimentation (to be submitted by each person in charge)

※ Appropriate forms can be found and download at the following website: ※ https://waseda-research-portal.jp/research-ethics/bio/

2) The following forms should be submitted prior to the start of experiments involving animals at Tokyo Women's Medical University.

○ Forms required to be submitted:

- Animal Experiment Plan

○ These forms are available for download at
http://houjin.int.twmu.ac.jp/intra/kenkyu_shien/index.html
(On-Campus Intranet)

○ How to submit animal experiment plans
Submit the forms by e-mail to the animal experiment secretariat listed below.
The file name should contain the following; [(year of submittal) (laboratory/department name) ANI]
(Example: 2021 Center for Advanced Biomedical Sciences ANI).
Please include your department, the name of the person in charge of the experiment and the phone number in the body of the e-mail.
Animal Experiment Secretariat e-mail address: k.dna-and-a.bm@twmu.ac.jp

3 Precautions for Conducting Animal Experiments

When performing animal related experiments, safety management is important from the perspective of both the user and the animals. Always consider the aspects related to animal rights and welfare.

(1) Experimental Animals

○ Ensure that experimental animals have been acquired via the right channels and that import and handling of these animals are in accordance to the relevant laws and ordinances.

○ Perform ongoing checks to confirm that experimental animals are free of pathogenic infection. If abnormalities are found, ask for advice from a specialist and provide appropriate treatment.

○ When breeding experimental animals, ensure that appropriate facilities are in place for their respective physiologic, ecologic and behavioral conditions, and provide sufficient food and water to the extent that they do not interfere with the goals of actual experiments.

○ Ensure that you fully consider and provide for hygienic disposal of experimental animal waste.

(2) Experimenters

Due to the possibility of experimental animals bearing pathogenic infections with a high degree of risk to human, experimenters should keep the following in mind.

○ Prior to the handling or conducting animal related experiments, ensure that the necessary seminars and training are taken.

Waseda Moodle「動物実験講習会および実験等申請様式」＞「動物実験講習」or Workshop on Animal Experiments_slide_English

○ Take sufficient measures against oral infection. Do not allow food or drink in areas in which

experiments are being conducted.

○ Endeavor to prevent injuries from mishandling of experimental equipment or bites by experimental animals. If in any case an accident occurs, immediately report to the administrative office.

○ Prior to conducting laboratory work, researchers should attend seminars that provide basic information on how to dispose surgical knifes, needles, syringes, wastes and dissected animal corpses.

(3) Experimental Areas

At Waseda University, animal experiment facility manager is appointed and ensures the autonomous management of each animal room and animal experimentation laboratory. Before using each of these facilities users must take the necessary lectures and receive the proper guidance and training.

At TWIns, there are 3 animal room for breeding of animals. Again, prior to use discuss with the respective Facility Manager and abide to the rules and regulations set for each room. If experiments need to be conducted outside these animal rooms, submit application to ethics review committee for animal experiment. Animal experiments should be conducted at the authorised animal room.

○ SPF (Specific Pathogen Free) animal breeding area

○ Aquatic/Marine animal breeding area

○ Small animal breeding area

In the case of the Tokyo Women's Medical University, animal experiment supervisors are assigned to each experimental area. Prior to use, ensure that users obtain the proper guidance and training from these supervisors. At TWIns, the areas for animal experiments and animal breeding are as stated below:

○ Large animals: B1 C202 Animal Operation Area

○ Small animals: B1 C701 Small Animal Area

(4) Animal allergy

Animal may cause an allergy, and it can be Life-threatening. If you feel the accident to the body, you had better consult your physician.

3 — 8. Safety Measures for Gene Recombination Experiments

1 Introduction

In addition to its role in basic research aimed at unraveling the structure and mechanism of living organisms, recombinant DNA technology is also applied in the manufacture of pharmaceuticals and improvement of agricultural products. Gene recombination technology has become an indispensable component of the life-science toolkit.

Nevertheless, despite these advantages, researchers are required to understand the potential risks of using genetically modified organisms.

(1) The Cartagena Protocol on Biosafety

The Cartagena Protocol on Biosafety Supplement to the Convention on Biological Diversity (the "Cartagena Protocol on Biosafety") was adopted in 2000 and came into force in 2003, and we are a ratifier of this treaty.

In an attempt to fulfill its obligations according to the Biosafety Protocol, the government of Japan passed the Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms in June 2003, and the Act was subsequently implemented in February 2004.

Researchers performing Genetic Recombination Experiment must follow the Act. Failure to do so will result in criminal charges therefore researchers supervising or involved in experiments should ensure they have a thorough understanding of these provisions.

(2) Definition of "Living Organism" and "Living Modified Organisms"

The following are specific definitions of terms provided in the Cartagena Protocol on Biosafety.

A "Living Organism" is a cell, group of cells, or viruses etc. possessing the ability to transfer or replicate nucleic acid.

"Living Modified Organisms" are defined as any living organism that possesses a novel combination of nucleic acid or replications of nucleic acid obtained by (1) the application of in vitro nucleic acid techniques, or (2) cell fusion technology from organisms belonging to different taxonomic families.

2 Management of Experiments using Living Modified Organisms

Waseda University has established "Safety Management Rules for Biological Experiment" and "Detailed Regulations for Enforcement of Safety Management Rules for Biological Experiment (Genetic Recombination Experiment)". Researchers should ensure that they follow them at all times.

Researchers must obtain approval of committee for genetic recombination experiment in each university. Experiments using living modified organisms may only conduct after approval by the committee for the safety of genetic recombination experiments.

(1) Management System

The management scheme for experiments using genetically modified organisms in each univerisity is outlined below. Applications and notifications are to be submitted to the university where the genetic recombination

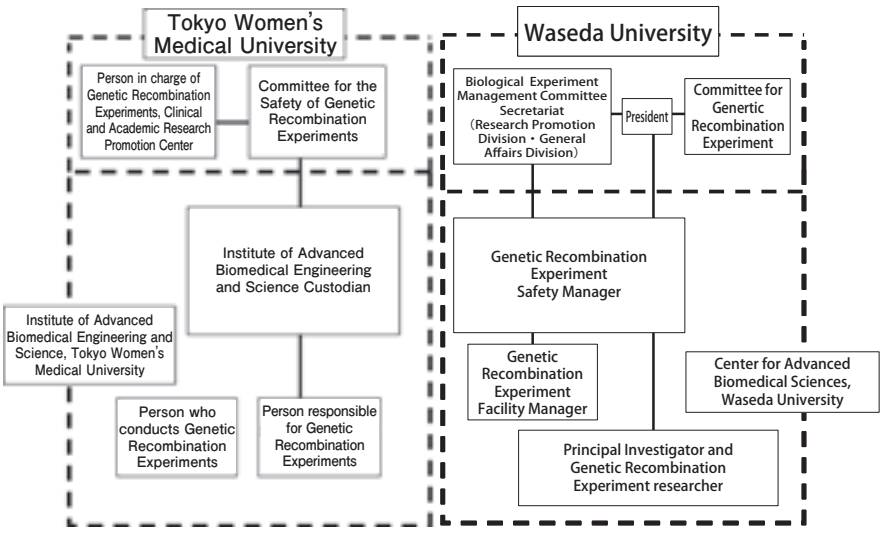


Figure 3-8-1. The genetic recombination experiment management system of the two universities

experiment is planned to be implemented.

(2) Notification of Application

The following forms should be submitted when conducting Genetic Recombination Experiments at Waseda University

○ Application/Report Forms

- Application Form for Setting up facilities for genetic recombination experiments (including the location of the experimental facilities, containment level, equipment to be used and facility floor plans etc.)
- Report on the Management of Genetic Recombination Experimental Facilities (The same form is used for genetic recombination experiments and animal experiments)
- Genetic recombination experiment proposal application form (includes details such as the location of the experiment, title of experiment, whether the research is new or ongoing, combination of donors, vectors and hosts, name of the person in charge and those involved in the research)
- Report on the Completion of Genetic Recombination Experiment (including the name of the person in charge, the title of experiment and experiment status etc. This should be submitted with each experiment plan application form.)

※ Appropriate forms can be found and download at the following website: ※ https://waseda-research-portal.jp/research-ethics/bio/

The following forms should be submitted prior to the start of experiments involving genetically recombined organisms at the Tokyo Women's Medical University.

○ Forms required to be submitted (English forms not available):

- Application for Approval of Facilities for Experiments using Genetically Recombined Organisms (including the location of installation of experimental facilities, physical containment level, core equipment and facilities and facility layout)
- Proposal for Use of Genetically Recombined Organisms (including details such as the location of experiment, project name, combination of donors, vectors and hosts, names of experimenters, and names of researchers involved in the project)

○ These forms are available for download at:
http://houjin.int.twmu.ac.jp/intra/kenkyu_shien/index.html

○ How to submit genetic recombination experiment plans
Submit the forms by e-mail to Genetic Recombination Experiment Secretariat.
Genetic Recombination Experiment Secretariat e-mail address:k.dna-and-a.bm@twmu.ac.jp

(3) Experimental Facilities

When conducting genetic recombination experiment researchers must not only obtain approval for their experiment proposal, but also for facilities they intend to use for the experiments from the Committee for the Safety of Genetic Recombination Experiments. Experiments cannot be conducted at facilities other than those approved for genetic recombination experiments.

Refer to the "Bioethics and Safety Measures" website on the "Life Science Portal Site" (http://www.lifescience.mext.go.jp/bioethics/index.html) on the MEXT website for more information on containment measures to take the appropriate steps before submitting your application. As facility requirements that are more stringent than laws and ordinances may be imposed from the perspective of intramural management, if need more information, please contact the committee beforehand.

At Waseda University, a facility manager should perform regular maintenance and health management for the facility, and is also required to submit a "Report on the Management of Genetic Recombination

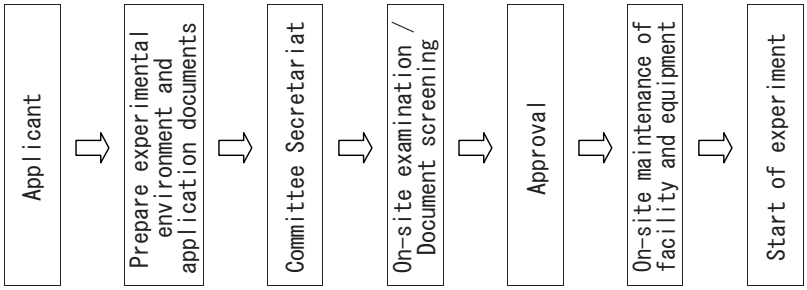


Figure 3-8-2. Flow chart of the process required for handling genetically modified organisms

Experimental Facilities" to the Committee for the Management of Biological Experiment once a year.

An outline of the steps from initial application to start of experiments is shown in the Figure below.

3 Precautions for Conducting Gene Recombination Experiments

Researchers should consider safety measurements from the perspectives of preventing uncontrolled or over breeding of genetically modified organisms and also the safety of the researcher and other personnel related to the specified experiment.

(1) Prevention of Uncontrolled and Over breeding of Living Modified Organisms

The most important factor to consider when conducting experiments using Living Modified Organisms is the prevention of the wide spread of any such organisms from the designated facilities.

The specific measures for prevention of proliferation stipulated in the Cartagena Protocol on Biosafety differ by the types of experiments and pathogenicity and contagiosity of the organism. Researchers wishing to learn more about this should attend the seminars held by each laboratory that have implemented measures based on the Protocol on Biosafety. Refer also to "Regulations on Prevention of Proliferation in Type-2 Use of Genetically Recombined Organisms in Research and Development" on MEXT's "Life Science Portal site."

(2) Experimenters

○ Experimenters must take the experiment lecture prior to conducting genetic recombination experiments.

Waseda Moodle「遺伝子組換え実験講習会および実験等申請様式」＞「遺伝子組換え講習」or Workshop on Genetic Recombination Experiments_slide_English

(3) Ensuring the Safety of Researchers and Other Researchers

For secure self-safety and the safety of other researchers involved in the experiment, the researcher should pay particular attention to the following when performing experiments.

These are the most basic standards in the regulations for these types of experiments; stricter rules may be applied depending on the experiment being performed for research safety.

① Things to beware during experiments

- Wear a lab coat (and mask and gloves if necessary).
- Do not exit the laboratory with the coat, gloves or mask on.
- Maintain the laboratory neat, tidy and hygienic at all times.
- Immediately sterilize or cleanse living Modified organisms and contaminated equipment.

② Prevention of Oral Infection

- Ensure that sufficient measures are taken against oral infection. Food and drinks are prohibited in the designated areas.
- Wash and disinfect hands, experimental equipment and experimental areas before and after use.
- Minimize the danger of aerosol infection. Ensure that you do not inhale any potentially dangerous experimental substance.

③ Notifying Others

Close all windows and doors when conducting an experiment using living modified organisms. Be sure to notify all relevant persons that the experiment is being conducted.

④ Disposal of Experimental Waste

Equipment or materials contaminated with living modified organisms should be sterilized within the experimental facility and disposed according to the specified waste classification.

⑤ Storage and Transport of Living Modified Organisms

- Students and researchers need to follow the necessary procedures before transporting living modified organisms ; Refer to "Guidelines for Genomic Recombination Experiment"
- When transferring living modified organisms etc. to an institution outside the University, you must submit the "Information Sheet" carrying the stamp of the Safety Officer to the receiving institution.
- To prevent the escape or spread of living modified organisms while storing or during transport, you must keep them in durable container.
- You must label the transportation container and storage area.
- It shall be indicated in easily visible spot of the container of preceding subparagraph in which the living modified organism is contained that care should be taken in handling.

3 － 9. Safety measures for pathogen

1 Introduction

As the regulation of infectious disease, “Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases (the Infectious Diseases Control Law)” was subsequently implemented in April 1999. We need to manage pathogen for research use, and have to warn unexpected risks such as the leakage of pathogen or spread of infection. In Waseda University, infective microorganisms under biosafety level 2(BSL2) can be used for experiment.

2 Management of Experimental using Pathogen

It is necessary to take permission of president after reviewing biosafety committee, when researchers start to examine pathogen in Waseda University.

(1) Management System

Waseda University has established rules for using pathogen in experiment, and applying procedures. Researchers must obtain approval of committee before acceptance of pathogen.(Figure 3-9-1)

(2) Notification of Application

All of microorganisms classified in BSL2, even they do not classified at risk group pathogen, need to submit notification or application. Before accepting the pathogen at laboratory, researcher must obtain approval from biosafety committee. Before submitting application, researcher should to refer to information of containment measures and need to prepare laboratory. Microorganisms classified by risk group need to submit application, other microorganisms classified in BSL2 need to submit notification.

Please refer to guidelines of using pathogen, and make a decision using the flowchart described at the guidelines.(https://waseda-reseach-portal.jp/wp/wp-content/uploads/2017/03/byougentai_tebiki.pdf)

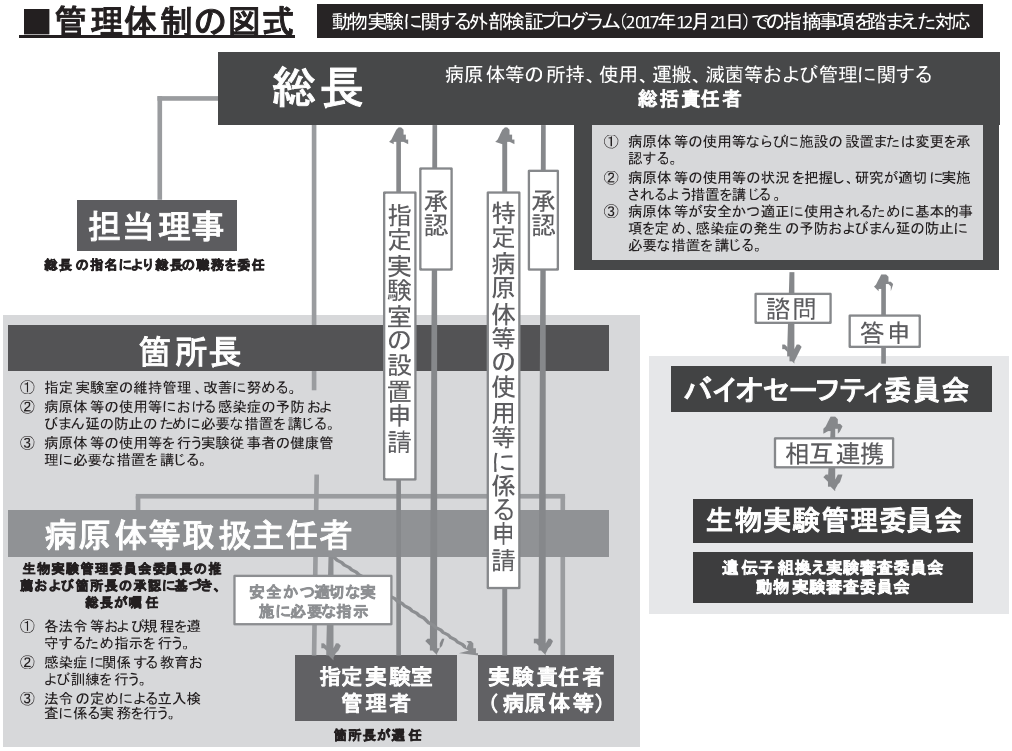


Figure 3-9-1. Management System of Experimental using Pathogen in Waseda Univercity

3 — 10. Safety Measures for Laser Beams

1 Introduction

A laser beam is a high-density energy used in cutting, welding and structuring numerous materials. It is comprised of homogeneous electromagnetic waves that makes it applicable in measurement, communication, information processing as well as in the medicinal field.

It also has excellent directive or convergent properties enabling it to focus high-density energy against small surface areas. These characteristics, however, are potentially dangerous to the eyes and skin of users if misused.

(1) Potential dangers to the eye

Ultraviolet and far-infrared laser beams can cause damage to the cornea while visible and near-infrared laser beams can affect the retina. Visible and near-infrared beams in particular are extremely dangerous to the eyes since their beams converge at a spot above the retina.

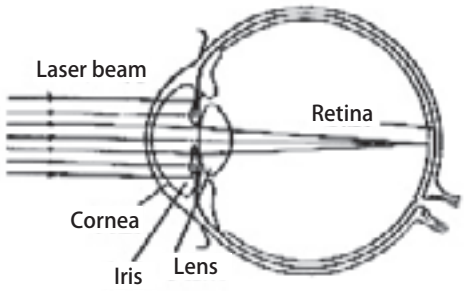


Figure 3-10-1. Eye and laser beam

〈For Reference〉

Body parts exposed to a laser beam can suffer protein degeneration due to heat and tissue destruction resulting from interaction between cellular structures and photochemical reactions or shock waves (plasma flow and resultant pressure waves).

The specific biological effects depend upon the wavelength, output strength and output waveform (serial or pulse). In general, the eyes are more susceptible to serious and irreversible damage than skin.

Table 3-10-1. Summary of pathological effects of excessive exposure to laser beams

CIE Wavelength Range*	Eyes	Skin	
Ultraviolet C (180 nm–280 nm)	Photochemical inflammation of the cornea	Redness (sunburn), acceleration of the skin's aging process, and an increase in pigmentation	
Ultraviolet B (280 nm–315 nm)			
Ultraviolet A (315 nm–400 nm)	Photochemically-induced cataracts	Darkening of pigmentation and reaction to light	Burning of the skin
Visible (400 nm–780 nm)	Heat and retinal damage from photochemical reaction		
Infrared A (780 nm–1400 nm)	Cataracts and retinal damage		
Infrared B (1.4 μm–3.0 μm)	Anterior chamber flare, cataracts, and inflammation of the cornea		
Infrared C (3.0 μ m–1.0 mm)	Inflammation of the cornea only		
Note*: CIE (International Commission on Illumination: website http://cie.co.at/) definitions of wavelength ranges are simple descriptors of the biological effects and do not conform completely with the wavelength cutoffs found in the table of maximum permissible exposure (MPE).			

＊ From appendix B of JIS C 6802: 2005

(2) Classification of laser equipment

Laser equipment is classified according to the energy output and wavelength of the beams they produce. Therefore, safety measures must be established for each class particularly for those classified in Class 3B and Class 4.

Table 3-10-2. Classification of laser equipment

Class	Output	Definition
Class 1	0.39 μ W or less	Low output not capable of causing any physical harm.
Class 2	1mW or less	Level of output from a visible beam (wavelength of 400 nm-700 nm) in which physical harm might not occur due to natural immune response.
Class 1M 2M 3R	5mW or less	Dangerous when viewing beams with an optical instrument. With emission level no more than 5 times as class 2.
Class 3B	0.5W or less	Direct or reflected laser beam can cause damage to the eye, but the output is too low to cause eye damage from exposure to a diffused reflection.
Class 4	over 0.5W	High level of output that can cause eye damage even from diffused reflection.

N.B. The classification of lasers, JIS C 6802 (January 2005), was revised from 5 classes (1, 2, 3A, 3B, and 4) to 7 (1, 1M, 2, 2M, 3R, 3B, and 4).

2 Precautions for Laser Beams (Important)

(1) Basic laser safety

Most countries have established and periodically update standards, laws and ordinances or guidelines for laser safety. These were referred to in order to establish two basic Japanese standards.

- "Safety standards for laser products" JIS C 6802: 2005 (IEC 60825-1: 2001)
- "Principles for the prevention of injury from the use of laser Beam"

Directive No. 0325002 from the Director of the Labour Standards Bureau,
Ministry of Health, Labour and Welfare, March 25, 2005

(2) Ministry of Health, Labour and Welfare Principles for the Prevention of Injury

The Ministry of Health, Labour and Welfare has created a set of Principles for the Prevention of Injury for operations that involve the use of lasers or that may involve the exposure to lasers (Excluding Classes 1 and 2).

The specific standards for each class of laser are laid out on Appendix (Table 4-4-2) of this document. Please make every effort to abide to them.

(3) General precautions (important)

It is strongly recommended that everyone abide to the Principles for the Prevention of Injury set forth by the Ministry of Health, Labour and Welfare. The followings are general safety precautions that everyone should follow closely, particularly when using high-output lasers of class 3B and above.

① Wear the right protective glasses based on the wavelength of the laser in use.

Figure 3-10-2. Protective glasses for use with lasers (lens color differs depending on laser wavelength)

② Do not look directly at a laser beam.

③ Avoid coming in contact with reflected or diffused laser beams.
Related items:
- To prevent reflection and diffusion, do not wear a wristwatch or ring that might reflect laser beams.
- Work in a well-lit environment as possible (minimize pupil size).
- Do not set eyes at the path of a laser beam or vice versa.

④ Do not stand in the path of a laser beam or in an extension of the path.

⑤ Place an absorbent, inflammable cover at the terminal point of a laser beam.

⑥ Set the laser output and repetition as low as possible when making adjustments to the laser beam or its path.

⑦ Do not directly expose skin to a laser beam.

⑧ Only turn on laser equipment or connect its power source in the presence of a faculty or a person-in-charge (prevent electric shocks).

⑨ Be aware of the hazardous substances that may be generated upon exposure to a laser beam and take the necessary preventive measures.

⑩ Establish a specified area for the use of lasers and post signs clearly indicating that laser related operations are in progress. Forbid entry into the specified area during these operations.

⑪ Carefully read manuals and observe the guidelines for proper operation.

3 Example of a Laser Related Accident

To date, accidents associated with lasers have not occurred at TWIns. However, the following accident occurred at another university in 2004. This example illustrates how carelessness resulted in a serious injury in which the user loss his/her vision. Therefore, please take special cares in handling laser beams or laser equipment.

Table 3-10-3. Example of a laser-related accident

Overview	An experiment using an Nd-YAG laser was being conducted under the supervision of a faculty member responsible for laser beam experiments. The faculty member switched the apparatus on, which generated a series of oscillating pulses. In order to explain the inner structure of the apparatus, the faculty member removed a portion of the apparatus' cover while the laser was oscillating. The faculty member directed students to check the condition of a flash lamp that pumps the YAG crystal, so the students moved into a position where he/she could see the flash lamp and looked at the inner structure of the apparatus. The next day the student reported that he/she had experienced eye problems since the experiment. An examination revealed that a laser beam had struck the macula in the fundus of the eye, resulting in a 0.75 mm tear and the reduction of eyesight from 1.5 (self-reported) to 0.1. Some of the student's vision loss was restored (now in the range of 0.5 to 0.7) by surgery, but it is unclear whether full vision can be restored.
Presumed cause	It is possible that a laser beam reflected from the interior structure of the apparatus and entered the students' eyes when the faculty member removed the apparatus' cover and directed the student to check the position of the flash lamp.
Countermeasures	Wear protective glasses appropriate to the wavelength of the laser in use. Be careful not to allow a reflected or diffused laser beam to enter your eyes.

3 — 11. Safety Measures for Machine Tools

1 Introduction

The machine operating and processing room in B1 of TWIns has a lathe, a milling machine, a drilling machine, a tool grinder, a band sawing machine, a 3D printer and numerous other machinery.

The equipment inside the machine operating room has blades, and parts that spin and cut work pieces. Improper use of the equipment may result in accidents such as entanglement and finger amputation. Therefore, it is mandatory to wear the appropriate clothing and practice the necessary safety precautions.

Organic solvents and strong alkaline chemicals are also handled in the machine operating and processing room. Ensure that the specified rules and regulations are obeyed accordingly.

2 Precautions for Machine Tools

Please use the machine tools properly and safely according to the "Usage Rules of the Machine Operating and Processing Room" posted on the TWIns website.

URL https://www.waseda.jp/inst/twins/current/research

(1) Qualification to use machine tools

To obtain qualification to use the machine tools, you must attend the designated seminars, and only those who have been approved as being able to use the machinery safely will be qualified. A "TWIns License to Use Machine Tools" will be issued to those qualified. The license must be carried at all times when using the equipment. Users will be required to show the license when requested.

(2) Physical protection

Users must protect themselves from flying fragments, chips, or chemicals when working with a machine. To prevent accidents from occurring, strictly observe the following points.

① Wear a cap with a visor (such as a baseball cap).
② Tuck long hair into your cap.
③ Wear protective glasses.
④ Wear long sleeve shirts and pants, and button them up. Ensure that shirts are tucked in (do not wear lab coats, shorts or skirts).
⑤ Tuck neckties, hanging badges, etc. inside outer garments.
⑥ Wear socks and shoes (no sandals).

(3) Precautions when using machine tools

When using machine tools, the following precautions should be observed.

① Never operate machinery while blades or other parts are being attached or removed.
② Firmly attach blades and samples.
Secure the samples well with a vice or clamp to prevent it from coming loose.
③ Do not apply sudden pressure on blades or samples.
④ Do not touch rotating blades or samples in any circumstance.
⑤ Be extremely careful of airborne chips or fragments when machinery is in operation.
⑥ Do not wear cotton or other similar types of gloves.

(4) Time, and number of people using the machine tools.

Usage time is according to opening hours of TWIns office, Monday to Friday from 9:00 to 17:00. In order to cope with the accident happening by any chance, please use it when two or more people are always staying in the machine operating room.

3 Safety Points to Remember When Operating Machine Tools

(1) Lathe EGURO (GL-120)

① Turning on the lathe switch with the chuck handle attached to the chuck will spin it and cause it fly off. Therefore, place the handle in the designated spot before turning on the switch.

② The lathe have a chip guard installed. When operating the machine, stand slightly to the right to avoid the flying chips.

③ Do not wear gloves and do not wipe away chips with a rag while the machine is turned on.

④ Ensure that the nob used for adjusting rotation speed is set at OFF (Neutral) during setup or after using the machine.

(2) Milling machine (Shizuoka Machine Tool Co., Ltd. VHR-SD)

① Check the points below before turning on switch.

1. Check that the levers for moving the table back and forth, and left and right are in the central position.
2. Check to make sure that the lever to control the spindle rotation and direction is in the central position.
3. Check to make sure that the main spindle lever switch is in the central position.

② When stopping the rise of the Z-axis fast forward, keep a safe distance.

③ When tightening the vice, hold spanner in left hand and tighten with right hand.

④ Likewise, hold with one hand while attaching tools.

⑤ Be sure to insert the end of the mill deep into the collet (failure to do so may result in a chipped blade flying off or a damaged collet).

⑥ Do not wipe away chips with a rag or wear gloves while the machine is on. It may get caught in the moving parts.

(3) Band sawing machine (NIHON KOKI LUXO LE500)

① Clamp materials well with the vice and G clamp before sawing them.

② Avoid using the automatic feeding system as much as possible.

③ Do not wear gloves, and do not leave rags on the table as they may get dragged into the machine.

④ Do not hold objects close to the blade. Use a suitable board to hold objects in place.

(4) Drilling machine (Hitachi Koki Co., Ltd. B23RL: Rikizan Nihon RDM-30A)

① When drilling holes into small work pieces, do not hold them with you bare hands. Always use a vice.

② Do not wear gloves.

4 Safety Points to Remember When Using Processing Room

The processing room has ① EDEN 260 ② CONNEX 500, etc., which uses chemicals and organic solvents. Be sure to take care in handling and disposing chemicals in the room.

① Do not handle chemicals with bare hands.

② Dispose dirty solvents in the designated containers.

③ Do not use fire inside room.

④ Paper, gloves, plastic, etc., contaminated with solvents should be disposed of in the designated box.

⑤ Clean the room regularly to keep it neat, tidy and clean at all times.

3 — 12. Safety Measures for Liquid Nitrogen

1 Introduction

When handling liquid nitrogen, users must be aware of the following: 1) frostbite 2) suffocation, and 3) explosions. This is not restricted to liquid nitrogen, but also applies to liquid oxygen, liquid helium, and other substances contained at extremely low temperatures. Therefore, take note of the following points when handling these substances.

These dangers have the potential to lead to serious accidents, endangering the lives of people, and there have been many actual cases resulting in death at universities and other institutions. Be well informed and well prepared before handling these substances.

2 Frostbite

The first fundamental rule is never to handle these substances with your bare hands nor when they are wet.

The boiling point of liquid nitrogen is -196°C. Minute quantities of liquid nitrogen may evaporate before touching the skin causing little harm, but larger quantities will cause frostbite. First, take great care as not to come into direct contact with liquid nitrogen.

It is also necessary to realize that metal which has been cooled with liquid nitrogen is at the temperature of — 196°C. It is therefore necessary to wear gloves made of leather for example, those that can handle extreme low temperatures. Ordinary latex gloves, cotton work gloves or woolen gloves must never be used.

Liquid nitrogen may also disperse and land on bare skin. Therefore, avoid wearing short sleeve shirts, shorts or sandals. Also use safety goggles to avoid liquid nitrogen from entering eyes, which may result in blindness.

Figure 3-12-1. You should wear gloves, goggles and long-sleeved lab coat when handling liquid nitrogen

In the Case of Frostbites

◎ If the frostbite is localized, soak the area in warm water. Do not use a dryer.

◎ If you spilled the substance all over your body or over a large area, soak in a hot bath and attained medical attention immediately. In such a situation, body temperature may drop rapidly resulting in the body to suffer from shock, possibly leading to death (extreme case).

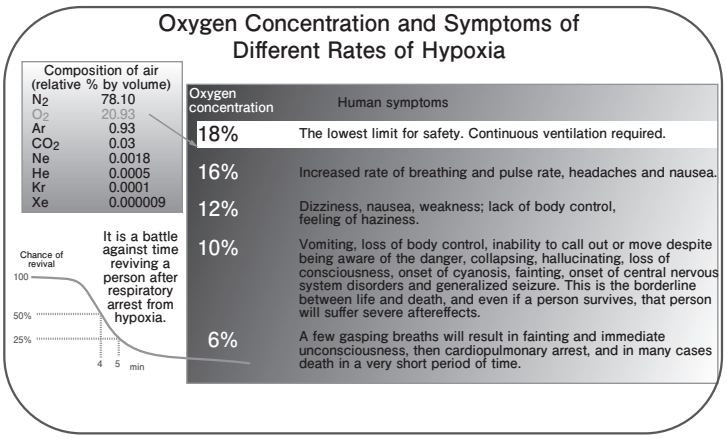
◎ Coming into contact with metal cooled to extremely low temperatures may result in the skin to adhere to the metal due to skin moisture. In such a situation, warm the metal to near-body-temperature, slowly remove the contact area and seek medical attention.

◎ If low-temperature substances get into your eyes, wash them with clean water. Go to the hospital immediately to avoid further damage to the eyes.

3 Suffocation

Breathing low oxygen air is totally different from holding your breath. Hypoxia, or unconsciousness (acute hypoxia) occurs when one enters a room with an oxygen concentration of 0% or close-to-zero percent. In the case of gradual decline in the oxygen concentration, there is a chance you will realize from headaches, dizziness, etc., but when there are large quantities of low-temperature gases involved, you may end up with hypoxia before you have time to react. Nitrogen is colorless, transparent, tasteless and odorless making it difficult to detect even when the room is filled with the gas.

When liquid nitrogen is spilled in large quantities inside a closed room, the liquid will evaporate quickly and push out the air, lowering the oxygen concentration (it will expand to approximately 700 times of its liquid volume). By the time you realize your state of hypoxia, it is often too late.



To Avoid Accidental Suffocation while Handling Liquid Nitrogen

◎ First, confirm the oxygen concentration within the liquid nitrogen storeroom or collection facility. Consider working in closed spaces to be dangerous, ensure adequate ventilation by opening windows and doors.

◎ Use refrigerants like liquid nitrogen only with a thorough understanding of its properties.

◎ Avoid working alone. Work hastily.

In the Case of an Accident

◎ If you see a person collapsed near the liquid nitrogen handling area, there is the danger of a rescuer also collapsing with hypoxia upon entering the room (secondary danger). Make rational judgments. Do not act alone. Call for help.

◎ When there is abnormality with the facility, contact the person-in-charge and act according to instructions given.

Suffocation Accident
Hokkaido University School of Engineering, August 1992

Outline: Researchers tried lowering the temperature inside low-temperature experiment room by spraying liquid nitrogen. Resulted in the death of two people, an assistant and a postgraduate student, from respiratory failure.

Cause: The temperature inside the low-temperature experiment room rose as the result of a freezing machine breakdown. It is thought that they tried to maintain the temperature below 0℃ by evaporating large quantities of liquid nitrogen, lowering the oxygen concentration and leading to hypoxia.

4 Explosions

Sealing the tank used for holding liquid nitrogen may lead to evaporating gas to increase the pressure within the container, eventually leading to an explosion. Liquid nitrogen must not be kept in an airtight container. Although a container with a lid is normally used, moisture in the air may freeze around the lid making it airtight. Rough handling of the container may also damage the insulation and cause the container to freeze. Therefore, extreme caution should be taken when handling containers.

Leaving the container with the lid off sometimes causes oxygen in the air to liquefy on the surface of the liquid nitrogen. Liquid oxygen is highly unstable and may cause an explosion upon contact with organic substances.

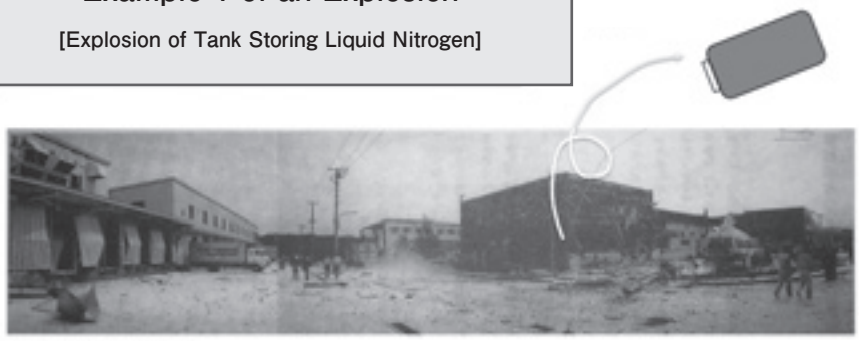
How to Avoid Explosion Accidents while Handling Liquid Nitrogen

◎ Do not put liquid nitrogen into airtight containers.
◎ Handle containers with care.
◎ While kept inside containers, minimize the surface area of contact with the air, and keep covered with a loose lid.

Example 1 of an Explosion

[Explosion of Tank Storing Liquid Nitrogen]

A valve to release built-up pressure was closed leading to an 8 MPa rise in pressure and causing an explosion.



Hokkaido, August 1992

Outline: Sudden explosion of a liquid nitrogen storage tank at a food processing factory, scattering parts of the tank and its contents. The factory was partially destroyed, nearby factories were damaged, and there was a blackout affecting 1,800 houses. Chunks of metal up to 380 kg were blown 350 m by the explosion.

Cause: A spring-operated valve as well as all other valves were closed making the tank completely airtight. It was also left unused for approximately two months. The pressure exceeded the pressure limit of the inner tank causing it to explode.

Example 2 of an Explosion

[Liquid Nitrogen was Replaced by Liquid Oxygen Causing Explosion]

Gifu Prefecture, January 1991

Outline: Ceramic powder containing benzene was cooled with liquid nitrogen, resulting in a powerful explosion killing two employees.

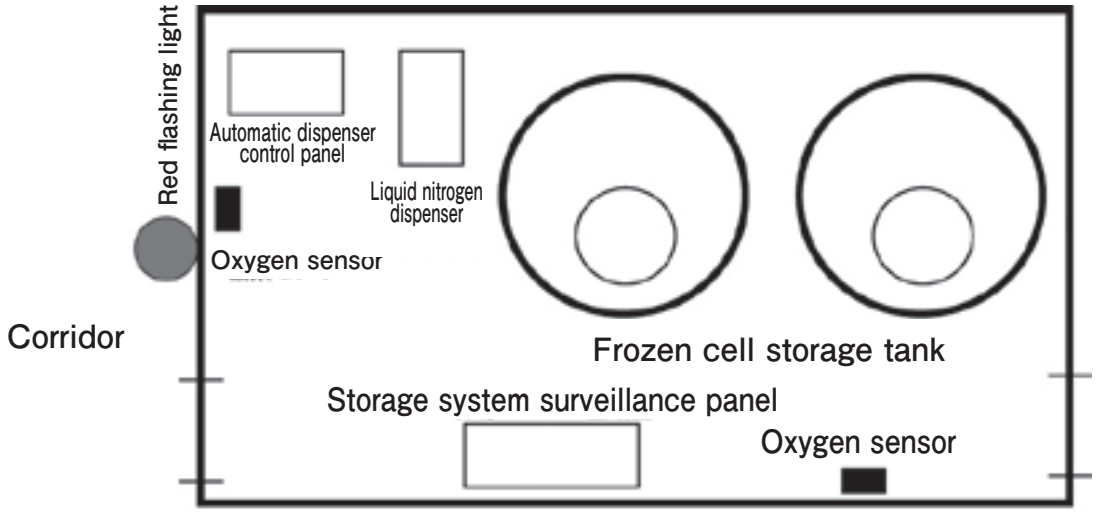
Cause: It is thought that oxygen dissolved in liquid nitrogen over time, which reacted with benzene (organic matter) to cause an explosion.

5 Using the Cell Storage Room (B1 C605) at the Basement of TWIns

The liquid nitrogen dispenser and the liquid nitrogen tank for storing frozen cells are both in the "Cell Storage Room" of TWIns.

The entrance is opened with a security card.

When low oxygen concentration is detected by the gas sensors inside the room, the red light in the corridor will begin to flash, and an alarm will go off. If you notice such a situation, stay calm, take a look inside through the window, and if you see any accident victims, think of what needs to be done to save them. However, in order to avoid secondary accidents, you must call for help first, and adequately ventilate the room to allow the oxygen level to recover before going to their aid.



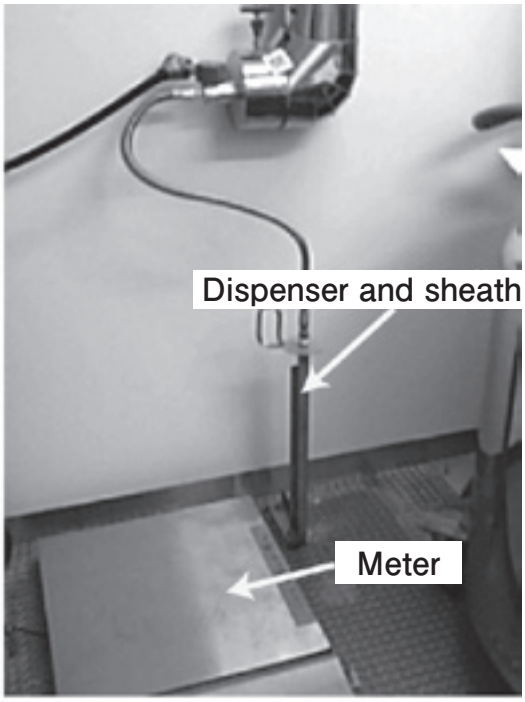
Schematic Drawing of Cell Storage Room (B1 C605)

Make sure that there are two or more people present while dispensing liquid nitrogen, and prohibit doing it alone. The rapid evaporation of liquid nitrogen is likely to lower the oxygen concentration, so leave the door open and ensure adequate ventilation. If the alarm goes off, immediately stop dispensing and leave the room. Ventilate room and wait for the oxygen level to recover before resuming.

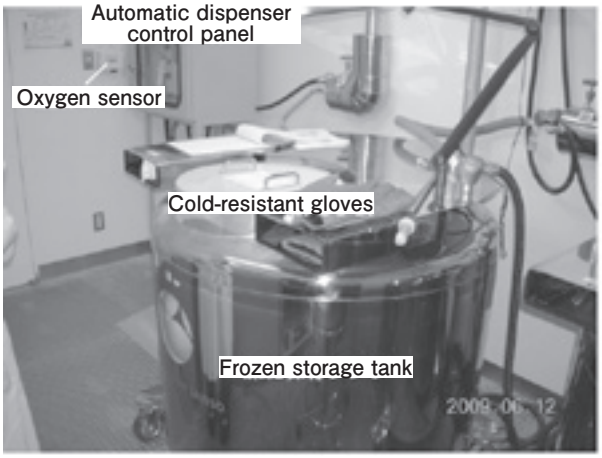
Cell storage room (B1C605) usage times

8：30 ～ 17：30

Automatic dispenser control panel



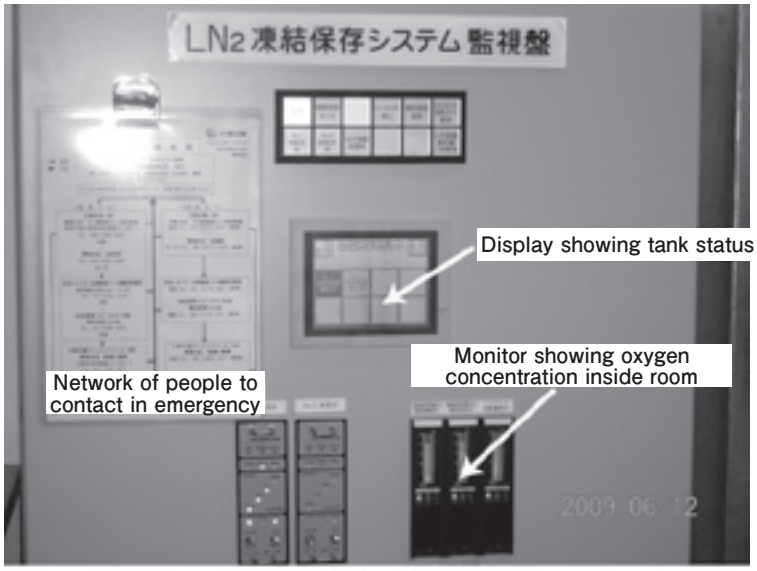
Liquid nitrogen dispenser



Overall appearance of frozen storage tank

Oxygen sensor
Set on wall in two locations

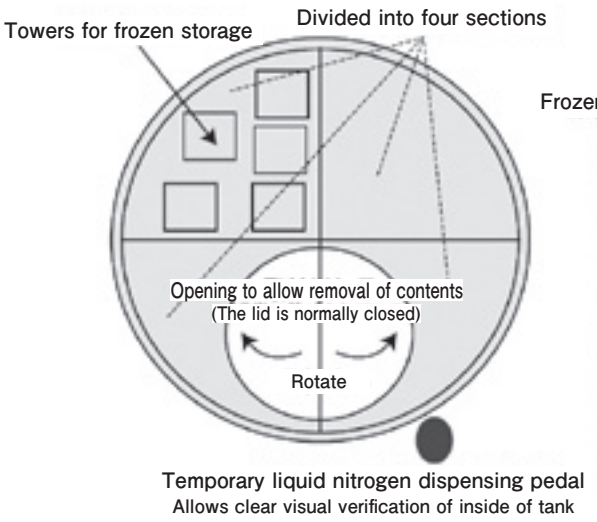
The liquid nitrogen level inside the frozen cell storage tank is being automatically and constantly monitored. If there is an abnormality, it gets displayed on the frozen liquid nitrogen storage system surveillance panel on the wall opposite the tank. If you discover an abnormality, follow emergency procedures to contact Security Guard/Monitoring Room in the network, and act according to instructions given.



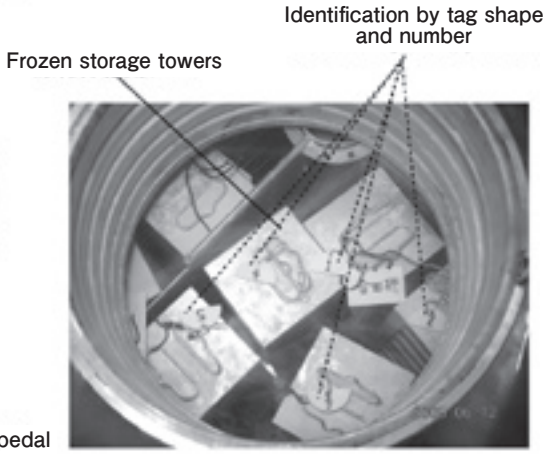
Frozen liquid nitrogen storage system surveillance panel

Each of the two tanks contains 20 towers for freeze-storing cells, and each tower holds seven freeze-storing boxes (10 x 10). The towers have unique plastic tags, so you should check the tower that your laboratory members are using. Management of each tower is conducted directly by the designated laboratory. Take note that only the freezing of cells and embryos is currently allowed.

When changing the usage status (new use, stop using etc), contact person in charge (Common Equipment Management Office, Room B1S609)



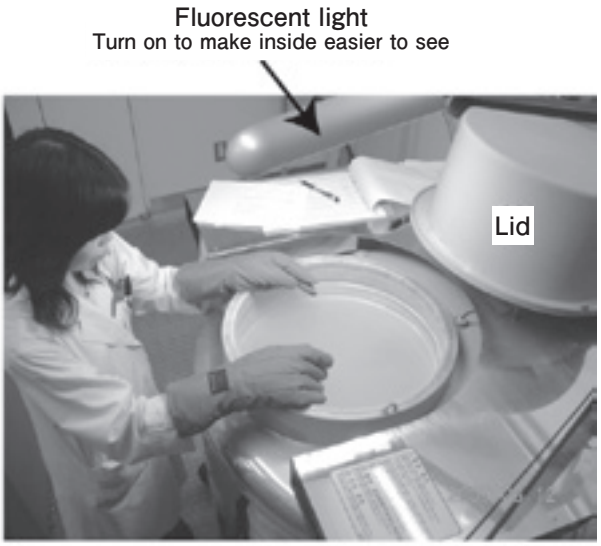
Schematic diagram of frozen storage tank



Inside of frozen storage tank

Open the lid on the top of the tank. Stepping on the black pedal at the bottom temporarily releases liquid nitrogen into the tank clearing up the air around the mouth of the tank and giving a clear view inside. The mouth of the tank is big enough to fit a person's head, so be careful not to get too close. Looking inside, you will see that the tank is divided into four compartments, and each compartment contains five towers. The inside of the tank can be turned manually, allowing you to identify your own tower.

Overall appearance of frozen storage tank



When you use the storage tank, you can turn on the light to see its inside more easily

6 Care in Carrying Liquid Nitrogen (Especially inside Elevators)

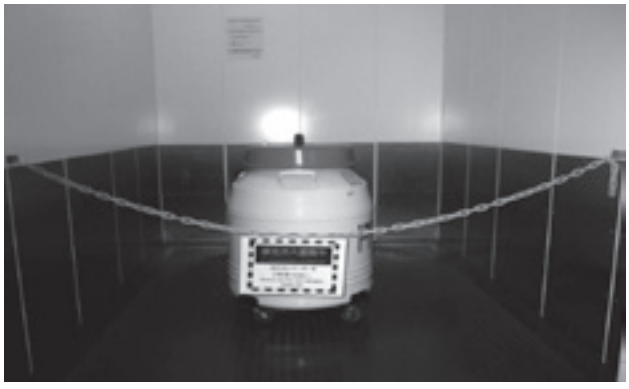
It is likely that when transporting liquid nitrogen from the store room you will use an elevator. Spilling liquid nitrogen in a normal passenger elevator can lead to serious, life threatening accidents, such as suffocation.

In order to prevent accidents in elevators caused by liquid nitrogen at TWIns it is prohibited for people to ride in an elevator together with transportation containers filled with liquid nitrogen. Further, when transporting liquid nitrogen, do not use passenger elevators. Only use the freight elevator (western side of the building).

To users of the freight elevator

Do not ride during transportation containers filled with liquid nitrogen.

※ This elevator is for freight use only.



3 — 13. Sorted Collection and Disposal of Experimental Waste

1 Tokyo Women's Medical University Regulations Regarding Waste Disposal

Regarding the disposal of hazardous waste requiring care in handling due to research in a special field or the nature of the research, please fill out the "Hazardous Waste Disposal Request Form" and send it by e-mail to the "Environment Division Shared Address (kankyoka.bm@twmu.ac.jp)" at least one day before the day of disposal.

On the day of disposal, please contact the "Environment Section of the Construction and Design Department (ext. 21061-21063 or PHS26518)" in advance before bringing in the waste.

If you have any questions regarding handling, please contact Environment Section of the Construction and Design Department and be sure to collect and dispose of the waste in a safe manner.

The Hazardous Waste Disposal Request Form can be downloaded from the URL below.

http://houjin.int.twmu.ac.jp/intra/shisetsu/format/haieki_iraisho20190214.xls

2 Waseda University Regulations Regarding Waste Disposal

The Environmental Safety Center is responsible for treatment and disposal of experimental waste from research and teaching activities at the university.

It publishes an annual "Environmental Safety Center Guide" (see P.87) containing easy-to-understand information concerning the University's rules regarding laboratory waste. Please refer to this guide.

You can dispose of almost all types of laboratory waste in TWIns. Please use the Disposal-Request（実験系廃棄物処理依頼伝票）(Figure 3-13-1) and transport the waste to Waste Storage Room (2) (B1C602).

Please download the disposal request form（処理依頼書）(Figure 3-13-2) from the Environmental Safety Center website if you want to dispose of special waste that does not belong to the specified categories or unnecessary chemicals etc.

http://www.waseda.jp/environm/wesc-naibu.html

Please consult to the TWIns Waste Disposal staffs before disposing large quantity of unnecessary chemicals.

In some cases, it is difficult to determine the correct category for laboratory waste. The following pages show flow charts (Figure 3-13-3) to help determine the correct category for laboratory waste. Please refer to these carefully in order to dispose of waste material properly. If you cannot determine the correct category, contact the TWIns Waste Disposal staffs for advice.

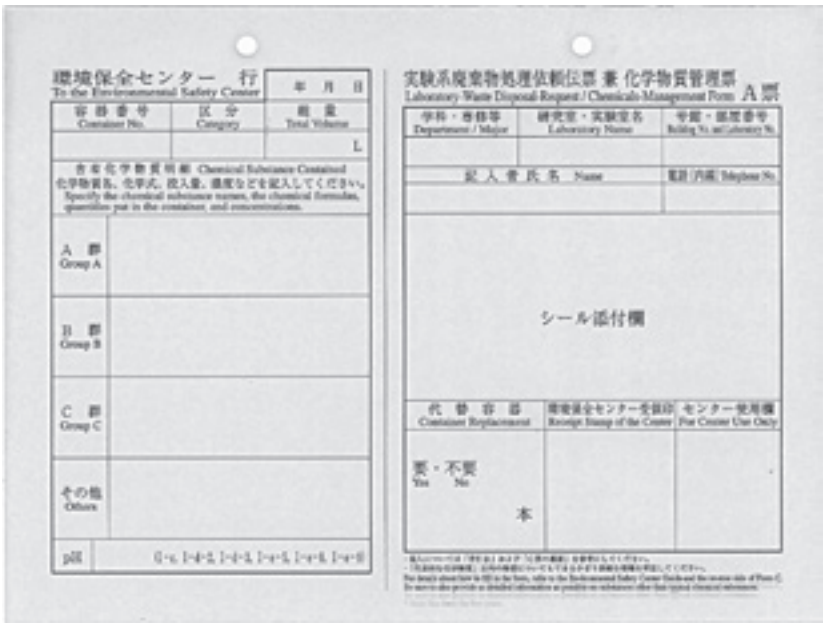


Figure 3-13-1. Environmental Safety Center Disposal-Request (for applicable categories)

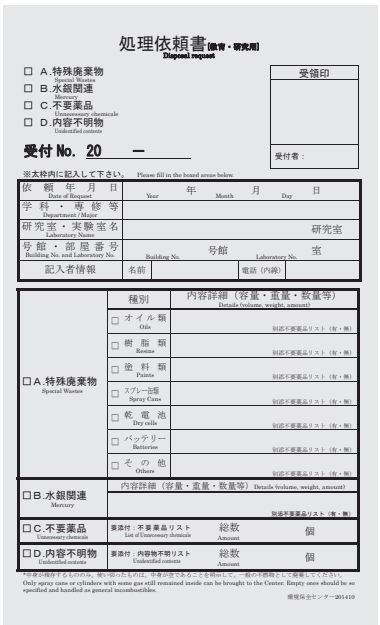


Figure 3-13-2. Disposal request

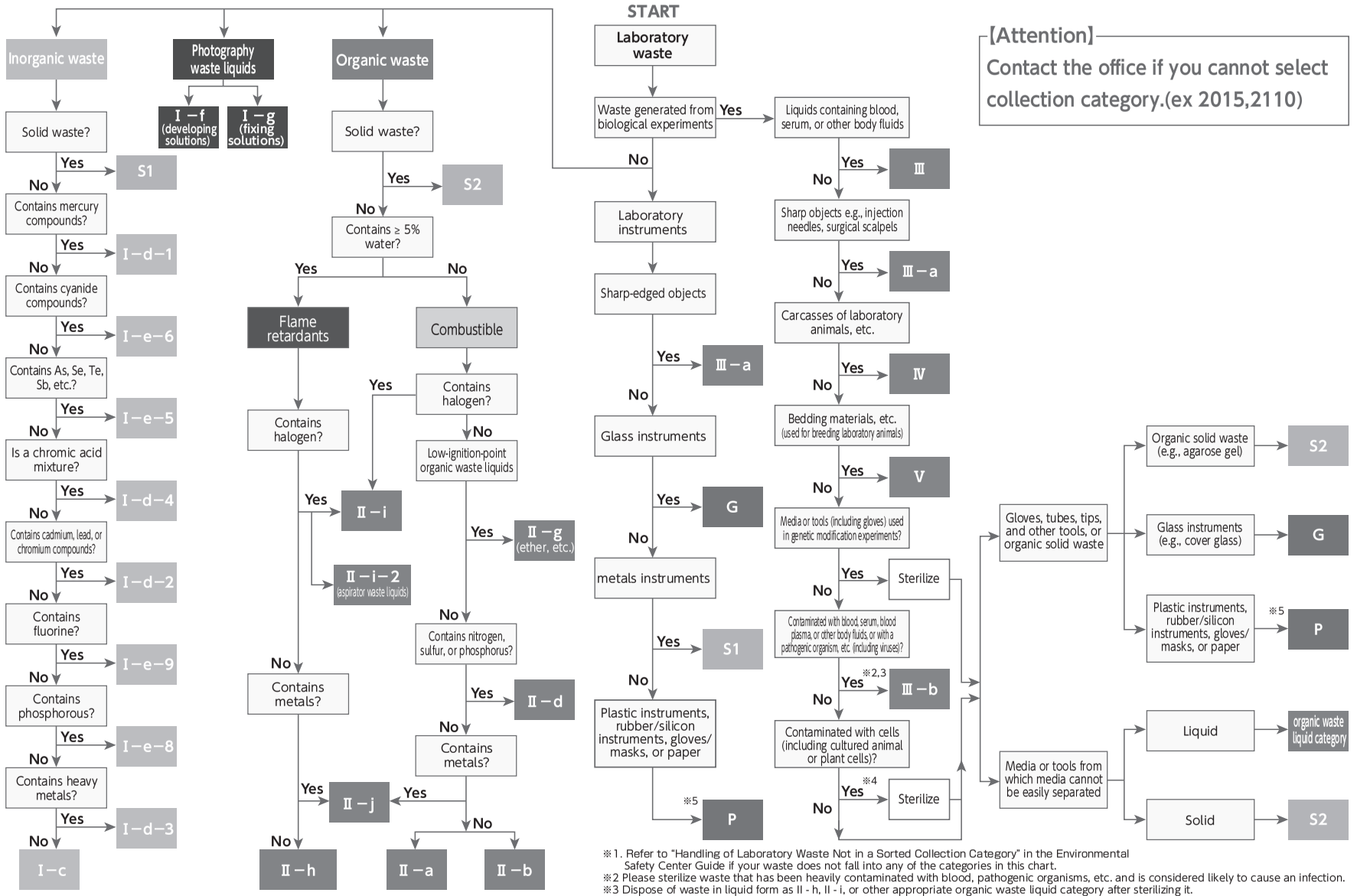


Figure 3-13-3. Laboratory Waste Sorted Collection Processes※1

※1. Refer to "Handling of Laboratory Waste Not in a Sorted Collection Category" in the Environmental Safety Center Guide if your waste does not fall into any of the categories in this chart.
※2 Please sterilize waste that has been heavily contaminated with blood, pathogenic organisms, etc. and is considered likely to cause an infection.
※3 Dispose of waste in liquid form as II - h, II - i, or other appropriate organic waste liquid category after sterilizing it.
※4 Dispose of waste as III-b if it is hard to sterilize.
※5 If the waste smells bad, put it in the S1 or S2.

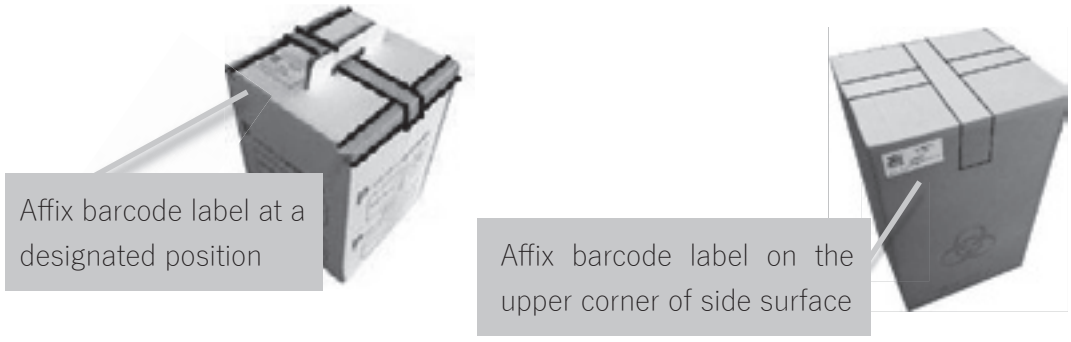
Fig. 3－1 3－4　How to use container

◎Less than 80% of capacity and less than 15Kg if it is solid waste
◎Affix category label and barcode label in proper position（refer below）
◎Confirm the seal of container (cap, tape and lid) before bringing in（refer below）
◎If the container is dirty, wipe the dirt off

Polyethylene container

Cardboard box

※Put waste after sufficiently removing moisture, tie the plastic bag then seal the box with tape



Pail

※Affix labels on the side. Scan QR code for how to seal the case.

3 — 14. Disposal of Other Items

To dispose of furniture, machinery, etc., which are past their service life or have become difficult to use, you will need to follow set procedures.

Furthermore, disposal of PCs (cases, displays or laptops), printers, or household appliances (TVs, refrigerators, freezers, air conditioners or washing machines) as garbage is against the law.

The detailed procedures required for disposal of these items are outlined below.

In the Case of the Tokyo Women's Medical University

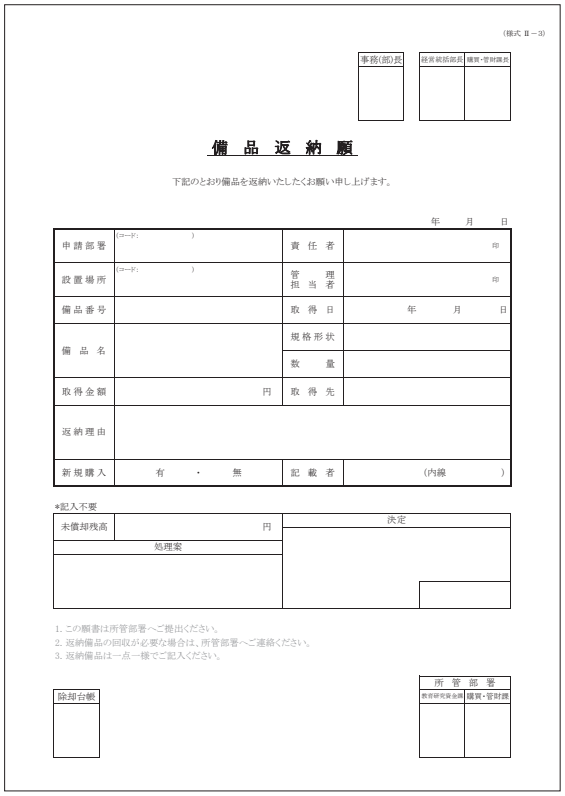
1 Waste for Disposal (Furniture and Machinery)

Follow the procedures outlined below to dispose of these items.

① In the case of buying furniture or machinery under the management of our university, a prior submission of a Request for Return of Equipment Form (Figure 3-14-1) to the Purchasing and the Property Management Section (Head Office 3F) will be required. Obtain a disposal permit after discussing the time and date for moving the items to the waste dumping site located outside the B1 floor of the East Ward of Tokyo Women's Medical University.

② Please also discuss the dumping of furniture and machinery under the management of individual researchers with the Purchasing and the Property Management Section. In this situation, prior submission of a Request for Return of Equipment Form will not be necessary.

③ Disposing of large or heavy items will require negotiation with a waste disposal company, so discuss it with the Property Management Section.



(様式 Ⅱ－3)

事務(部)長	経営統括部長	購買・管財課長

備 品 返 納 願

下記のとおり備品を返納いたしたくお願い申し上げます。

年　月　日

申請部署	(コード:　)	責任者	印
設置場所	(コード:　)	管理担当者	印
備品番号		取得日	年　月　日
備品名		規格形状	
		数量	
取得金額	円	取得先	
返納理由			
新規購入	有　・　無	記載者	(内線　)

*記入不要

未償却残高	円	決定
処理案		

1. この願書は所管部署へご提出ください。
2. 返納備品の回収が必要な場合は、所管部署へご連絡ください。
3. 返納備品は一点一様でご記入ください。

除却台帳

所管部署	
教育研究事業課	購買・管財課

Figure 3-14-1. Request for Return of Equipment Form

2 Items Subject to PC and Home Appliance Recycling Laws

Items subject to PC (disk drives, displays, laptops) and home appliance recycling laws (TVs, refrigerators, freezers, air conditioners, washing machines, clothes dryer) that are under management of the university, will require the submission of a Request for Return of Equipment Form to the Purchasing and the Property Management Section in order to obtain the permission for the disposal. For the disposal of other items, please consult the Purchasing and the Property Management Section of the Supplies Department. Furthermore, be sure to erase all data on hard disks before disposing of PCs.

In the Case of Waseda University

1 Large Items (furniture, equipment, etc.)

Please follow the procedures outlined bellow to dispose of these items.

① By the day before the designated disposal date, download the disposal request (Fig. 3-14-2), fill in the necessary information, and email it to the office. Later, please receive a disposal request PDF with a serial number from the office.

Between10:00 and 15:00 on the day of disposal, move the wastes to the designated location, print out one copy of the disposal request PDF, and attach it to one of the wastes.

先端生命医科学センター HP ＞在学生・教職員の方へ＞問い合わせカウンター＞各種申請書類 (Japanese version only)

E-mail address : twins-kt@list.waseda.jp　subject : 粗大ゴミ廃棄願 (○○○ lab)

② Remove any “property labels” (Figure 3-14-3) from equipment and machinery and complete the property disposal procedures..

Figure 3-14-2.　Disposal Application Form

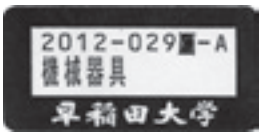


Figure 3-14-3.　Property label

Fig 3-14-4. Exclusive Waste Boxes in Waste Storage Room.
Do not use boxes for TWMU(東京女子医科大).

2 Personal Computers (disk drives, displays, laptops)

Personal computers without recycling marks are subject to a disposal fee.

However, for the time being, the university covers the cost, only if they are collected by the university in the specified collection periods. Specific information such as collection period will be notified through the office in the 3rd floor.

3 Household Appliances Subject to the Home Appliance Recycling Law (TVs, Refrigerators, Freezers, Air Conditioners, Washing Machines, Clothes dryer)

Please ask the person in charge at the office located on the 3rd floor. (A fee is charged for disposal)

4 Dry-Cell Batteries and Other Batteries, Spray Can, Lighter and Fluorescent Lamp

(1) Dry-Cell Batteries and Other Batteries

Bring these items to Waste Storage Room (2) (B1C602) at the same time as Experimental Waste.

Tape both sides of Button Cell Batteries. Just fold a piece of tape around it to sandwich it.

Wrap tape around the exposed conductor cable.

(2) Spray Can

Empty …… Place these items in a designated box (see Fig 3-14-4.) in Waste Storage Room (廃棄物保管室).

Non-Empty … Treat these items as unnecessary chemicals. (see P.76)

(3) Lighter and Fluorescent Lamp

Place these items in a designated box (see Fig 3-14-4.) in Waste Storage Room (廃棄物保管室).

3 — 15. Care Needed in Using a Box Cutters

1 Introduction

The box cutter is one of the most common cutting tools, and it has a variety of uses.

On the other hand, the box cutter blade is extremely sharp, so failing to use properly may result in injury. In this section, it covers safety measures to be taken during general use of box cutters.

2 Examples of Dangerous Methods of Use

https://www.youtube.com/watch?v=UWzYzLpRsgM&feature=youtube

Using a box cutter with its flat blade to cut a hard three-dimensional object may result in the blade snapping and causing injury. It is recommended to use a different kind of knife such as a pocketknife.

Never Use Box Cutters for These Kinds of Purposes

Figure 3-15-1. Examples of dangerous use (reference: NT Cutter website)

3 Precautions and Safety Measures

1) Things to do before beginning use

- Tidy up the workspace: An untidy workspace is unstable and dangerous.
- Check the sharpness of the blade: Chipped blades do not cut smoothly and are dangerous.
- Check the ruler: There is the danger of cutters going over the edge of thin or metallic rulers injuring the hand holding the ruler.

2) Points to remember when using a cutter

- Choose the right type of cutter to suit your needs: Choose from the types mentioned above.
- Tip of the blade: Do not let out too much of the blade. Let out one section only as a standard rule.
- Stopper: A screw-type stopper should be screwed tightly.
- Posture and position of the hand: A twisted posture, or placing the hand in the path of the cutter may lead to injuries.

3) Points to remember after use.

- Retracting the blade: Retract the blade quickly after use, and never leave it sticking out.
- Breaking off pieces of the blade: Do not point blade toward yourself as you break off the tip. Be sure the break-off line is facing down and the blade is pointing away from you.
- Storage: Store in a safe place.

HP for reference: http://www.ntcutter.co.jp/en

3 — 16. Handling Needles

Needles may not only cause puncture wounds, but needles used in medical treatment of people may also cause "accidental stabbing," and there are many cases of people contracting infectious diseases through such accidents. Ironically, "stabbing accidents" have been statistically reported to occur frequently while covering the needle with a cap to prevent accidental stabbing. For this reason, many hospitals, clinics, etc., have "banned recapping of needles," and are aiming to bolster measures against "stabbing accidents" by instructing on-site medical staff to seek medical treatment within 30 minutes of infectious disease accidents.

At our university too, needles are being used for biological sampling and injection of drugs in biological and medical experiments, and they are disposed of in containers (Figure 3-16-1) designated for "infectious wastes (III-a)." Any needles are to be disposed of in the following manner.

1 Recapping ban

Used syringes with needles are to be discarded in the collection boxes without recapping.

2 Disposal of liquid medicines and sample solutions

Purge all liquid medicine or sample solution remaining within the syringe into a designated container without detaching the needle. Beware of airborne infection while detaching the needle.

3 Disposal of needles after detachment

Waseda University uses the collection boxes shown in Figure 3-16-1 for the disposal of syringe needles. Hold the syringe against the frame of the disposal box made of resin (Figure 3-15-1) to detach and dispose of the needle only, by letting it drop into the box. **When it is difficult to remove the needles from the syringe, drop the whole syringe into the collection box.**

Figure 3-16-1.
You can use the plastic reinforced disposal holes found in the top of the III-a collection boxes to detach the needle from the syringe

If "recapping" of the needle is deemed appropriate depending on the characteristics or conditions of the experiment, avoid "recapping" using both hands and follow the procedures below.

A) Place the cap onto the working table.
B) Insert the used needle into the cap on the working table. (Do not use your hand to insert the needle into the cap. Instead scoop up the cap with the needle.)
C) When the needle has been fully inserted into the cap, press the cap down onto a table for example, to ensure it becomes firmly attached.

○ Handling of human samples

Human samples can contain viruses etc. that can spread from person to person and particular care should be taken when handling them. (In particular, needle stick injury with the Hepatitis B virus, Hepatitis C virus, Human Immunodeficiency Virus, can result in death. We recommend getting vaccinated if you are handling a lot of human materials.)

○ In the case of a stabbing accident

・Emergency measures

If you stick yourself by accident, bleed the wound in running water as soon as possible, then sterilize the wound with ethanol or iodine for disinfection. Do this even if you are unable to see the actual wound.

・What to do after taking emergency measures

After taking emergency measures, if there is a possibility of the accident being related to animals with infectious diseases leading to zoonosis, promptly report the accident to your supervisor and consult a medical specialist to receive medical treatment.

In the case of SPF animals too, be sure to receive medical treatment by a medical specialist depending on conditions, after taking emergency measures.

How to cover the a yellow 3-liter box
(presented by Environmental Safety Center)

Chapter 4

Appendix

4 — 1. Websites that List Related Laws and Ordinances, and Safety and Health Information

Please refer to the following websites for information regarding laws, and safety and health regulations.

1 Laws and Ordinances (General)

(1) Database of Laws and Ordinances
(Gateway for the Japanese e-Gov website/search for applicable laws)
https://elaws.e-gov.go.jp/search/elawsSearch/elaws_search/lsg0100/

2 Industrial Safety and Health Law

(1) A database system of laws and ordinances
Ministry of Health, Labour and Welfare
https://www.mhlw.go.jp/hourei/

(2) Occupational Safety and Health Laws and other related laws and ordinances
Japan Advanced Information Center of Safety and Health
http://www.jaish.gr.jp/index.html

Several of easy-to-understand information is also available on individual websites of the government departments and agencies responsible for each area of administration. Please consult them as necessary. The following is a list of websites for the principal Japanese regulatory and responsible bodies.

3 Fire and Disaster Prevention

(1) Information about the Fire Defense Law and Tokyo Fire Prevention Ordinance
(Fire and Disaster Management Agency)
http://www.fdma.go.jp/

(Tokyo Fire Department)
https://www.tfd.metro.tokyo.lg.jp/

4 Chemical Substances

(1) Poisonous and Deleterious Substances Control Law
(Bureau of Public Health, Tokyo Metropolitan Government)
https://www.hokeniryo.metro.tokyo.lg.jp/anzen/iyaku/sonota/d_g

5 Radiation and X-Rays

(1) Nuclear Regulation Authority website Laws/Standards
Nuclear Regulation Authority
https://www.nsr.go.jp/

6 Animal Experiments

(1) Fundamental Guidelines for Proper Conduct of Animal Experiment and Related Activities in Academic Research Institutions.
Ministry of Education, Culture, Sports, Science and Technology
http://www.mext.go.jp/b_menu/hakusho/nc/06060904.htm

(2) Standards for breeding, keeping and alleviating the suffering of animals used in experiments.
Ministry of the Environment
http://www.env.go.jp/nature/dobutsu/aigo/2_data/nt_h180428_88.html

7 Gene Recombination Experiments

(1) Safety measure of life Science (Gene Recombination Experiments)
(Related to the Cartagena Act.)
https://www.mext.go.jp/a_menu/lifescience/bioethics/mext_02721.html

8 Biosafety Experiments

(1) Act on the Prevention of Infectious Diseases and Medical Care for Patients with Infectious Diseases (the Infectious Diseases Control Law)
https://www.mhlw.go.jp/web/t_doc?dataId=79998826&dataType=0&pageNo=1

9 Laser Beams

(1) Preventive Measures against Damage from Laser Beams
Ministry of Health, Labour and Welfare
(Labor Standards Information/Safety and Health)
https://www.mhlw.go.jp/web/t_doc?dataId=00tc0756&dataType=1&pageNo=1

(2) Outline of Preventative Measures against Damage from Laser Beams
Ministry of Health, Labour and Welfare
(Labor Standards Information/Safety and Health)
https://www.mhlw.go.jp/file/06-Seisakujouhou-11200000-Roudoukijunkyoku/0000184700.pdf

10 Disposal of Experimental Waste

(1) Water Pollution Prevention Law, Water Emission Standards
Bureau of Environment, Tokyo Metropolitan Government
https://www.kankyo.metro.tokyo.lg.jp/water/pollution/regulation/emission_standard

(2) Sewage Exclusion Criteria (23 Special Wards of Tokyo)
Bureau of Sewage, Tokyo Metropolitan Government
(Water quality regulations information)
http://www.gesui.metro.tokyo.jp/contractor/regulation/information/

(3) Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof
Chemical Management Section, Manufacturing Industries Bureau,
Ministry of Economy, Trade and Industry
http://www.meti.go.jp/policy/chemical_management/law/index.html

11 Others

(1) Failure Knowledge Database
Failure Knowledge Database
http://www.shippai.org/fkd/index.html

12 Waseda University Safety Information

Please consult the following websites for information regarding safety-related issues within Waseda University.

(1) General Affairs Department

https://www.waseda.jp/top/en/about/work/organizations/general-affairs

This website contains information regarding safety activities, management systems and a summary of activities for overall safety-related issues at Waseda University.

The following website has various manuals, including the **Waseda University Earthquake Response Manual (student version)** and other instruction manuals for fire-extinguishing and life-saving devices.

https://www.waseda.jp/top/en/about/work/organizations/general-affairs/earthquake

(2) Environmental Safety Center

https://www.waseda.jp/inst/esc/en/

This website contains much of the information found within this guide.

The Waseda University Environmental Protection Center Guide was used extensively in production of this booklet and can be downloaded from the following website.

https://www.waseda.jp/inst/esc/guide/

4 — 2. Supplementary Information on Chemicals

1 Categories of Hazardous Materials

Category	Properties	Characteristics	Product Name	Classification and Examples	Designated Quantity
Category 1	Oxidizing Solids	Solids with potential to release oxygen, react with combustible material, and cause an explosion.	1. Chlorate 2. Perchlorate 3. Inorganic peroxide 4. Chlorite 5. Bromate 6. Nitrate 7. Iodate 8. Permanganate 9. Bichromate 10. Other chemicals stipulated by law 11. Any other material containing any of the chemicals listed herein	Class 1 Oxidizing Solids Sodium chlorate Sodium chlorite Sodium bromate Sodium permanganate	50kg
				Class 2 Oxidizing Solids Ammonium nitrate (granular) Bleaching powder	300kg
				Class 3 Oxidizing Solids Ammonium phosphate potassium (fertilizer) Sodium bichromate Sodium nitrate	1000kg
Category 2	Combustible Solids	Solids that easily combust or ignite in low temperatures.	1. Phosphorus sulfide 2. Red phosphorus 3. Sulfur	Phosphorus sulfide Red phosphorus Sulfur	100kg
			4. Iron powder	Iron powder	500kg
			5. Metallic powder 6. Magnesium 7. Other chemicals stipulated by law 8. Any other material containing any of the chemicals listed herein	Class 1 Combustible Solids Aluminum (under 200 mesh) Zinc (under 200 mesh) Magnesium (between 80 to 120 mesh)	100kg
				Class 2 Combustible Solids	500kg
			9. Flammable solid	Solid alcohol	1000kg
Category 3	Spontaneous combustible materials and substances which, on contact with water, emit flammable gases	Substances that ignite upon contact with air or water.	1. Potassium 2. Sodium 3. Alkylaluminum 4. Alkyllithium		10kg
			5. Yellow phosphorus		20kg
			6. Alkali metal (excluding K,Na) and alkali earth metal 7. Organic metallic compound (excluding Alkylaluminum and Alkyllithium) 8. Metallic hydride 9. Metallic phosphide 10. Calcium or aluminum carbide 11. Other chemicals stipulated by law 12. Any other material containing any of the chemicals listed herein	Class 1 Spontaneous combustible materials and substances which, on contact with water, emit flammable gases Lithium (granular)	10kg
				Class 2 Spontaneous combustible materials and substances which, on contact with water, emit flammable gases Lithium hydride Sodium hydride	50kg
				Class 3 Spontaneous combustible materials and substances which, on contact with water, emit flammable gases Sodium boron hydride	300kg
Category 4	Flammable Liquids	Liquids that ignite easily	Special flammable substances	Diethyl ether	50 ℓ
			Class 1 petroleum	Non-aqueous liquid Gasoline Toluene Ethyl acetate	200 ℓ
				Water soluble liquid Acetone	400 ℓ
			Alcohol substances	Ethanol	400 ℓ
			Class 2 petroleum	Non-aqueous liquid Xylene Kerosene Light oil	1000 ℓ
				Water soluble liquid Acetic acid	2000 ℓ
			Class 3 petroleum	Non-aqueous liquid Aniline Heavy oil	2000 ℓ
				Water soluble liquid Ethylene glycol	4000 ℓ
			Class 4 petroleum	Gear oil	6000 ℓ
			Animal and plant oil	Olive oil	10000 ℓ
Category 5	Self Reactive Substances	Substance that may ignite, combust, or explode on exposure to heat or shock	1. Organic peroxide 2. Nitrate esters 3. Nitro compound 4. Nitroso compound 5. Azo compound 6. Diazo compound 7. Hydrazine derivative 8. Hydroxylamine 9. Hydroxylamine salt 10. Other chemicals stipulated by law 11. Any other material containing any of the chemicals listed herein	Class 1 Self-Reactive Substances Picric acid Nitroglycerine Trinitrotoluene	10kg
				Class 2 Self Reactive Substances Hydroxylamine sulfate 2, 4-Dinitrophenol	100kg
Category 6	Oxidizing Liquids	Liquids that react with flammable material and promote its ignition	1. Perchloric acid 2. Hydrogen peroxide 3. Nitric acid 4. Other chemicals stipulated by law 5. Any other material containing any of the chemicals listed herein	Perchloric acid (60%) Hydrogen peroxide (60%) Nitric acid	300kg

2 List of Organic Solvents Stipulated in the Ordinance on Prevention of Organix Solvent Poisoning

(Note: For handling compounds, this Ordinance includes substances with a concentration exceeding 5wt%)

Class	Name of substance
Class 1	1,2-Dichloroethylene
	Carbon disulfide
Class 2	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
	o-Dichlorobenzene
	Xylene
	Cresol
	Chlorobenzene
	Isobutyl acetate
	Isopropyl acetate
	Isopentyl acetate
	Ethyl acetate
	n-Butyl acetate
	n-Propyl acetate
	n-Pentyl acetate
	Methyl acetate
	Cyclohexanol
	Cyclohexanone
	N,N-Dimethylformamide
	Tetrahydrofuran
	1,1,1-Trichloroethane
	Toluene
	Normal hexane
	1-Butanol
	2-Butanol
	Methanol
	Methyl ethyl ketone
	Methylcyclohexanol
	Methylcyclohexanone
	Methyl-*n*-butyl ketone
Class 3	Gasoline
	Coal tar naphtha
	Petroleum ether
	Petroleum naphtha
	Petroleum benzine
	Turpentine
	Mineral spirit

3 List of Specified Chemical Substances Stipulated in the Ordinance on Prevention of Hazards Due to Specified Chemical Substances

"Specified chemical substances" are those that have been identified to be the cause of (high risk) a range of health problems and can be largely divided into substances that cause chronic or delayed disorders, such as cancer etc. with exposure to minute amounts (class 1 substances and class 2 substances) and substances that cause acute disorders as a result of large-scale leaks (class 3 substances and special class 2 substances).

Class		Name of substance
Class 1		Dichlorobenzidine and its salts
		Alpha-naphthylamine and its salts
		Polychlorinated biphenyls (PCB)
		Ortho-tolidine and its salts
		Dianisidine and its salts
		Helium and its compounds
		Benzotrichloride
Class 2		Alkyl mercury compounds
		Indium compound
		Auramine
		o-Phthalodinitrile
		Cadmium and its compounds
		Chromic acid and its salts
		Vanadium pentoxide
		Cobalt and its inorganic compounds
		Coal tar
		Potassium cyanide
		Sodium cyanide
		Dichromic acid and its salts
		Mercury and its inorganic compounds (excluding HgS)
		Nickel compounds (limited to compounds in powder form except for nickel carbonyl)
		Nitroglycol
		Arsenic and its compounds (excluding arsine and gallium arsenide)
		Pentachlorophenol (PCP) and its sodium salts
		Magenta
		Manganese and its compounds (excluding MnO and Mn_2O_3)
		Refractory ceramic fibers
	Class 2 Specified Chemical Substances	Acrylamide
		Acrylonitrile
		Ethyleneimine
		Ethylene oxide
		Vinyl chloride
		Chlorine
		Methyl chloromethyl ether
		Propylene oxide
		Hydrogen cyanide

Class		Name of substance
Class 2	Class 2 Specified Chemical Substances	3,3'-Dichloro-4,4'-diaminodiphenylmethane
		Dimethyl 2,2-dichlorovinyl phosphate (DDVP)
		1,1-Dimethylhydrazine
		Methyl bromide
		Tolylene diisocyanate
		Naphthalene
		Nickel carbonyl
		P-Dimethylaminoazobenzenen
		p-Nitrochlorobenzene
		Hydrogen fluoride (hydrofluoric acid)
		β-Propiolactone
		Benzene
		Formaldehyde
		Methyl iodide
		Hydrogen sulfide
		Dimethyl sulfate
	Special organic solvent	Ethylbenzene
		Chloroform
		Carbon tetrachloride
		1,4-Dioxane
		1,2-Dichloroethane
		1,2-Dichloropropane
		Dichloromethane
		Styrene
		1,1,2,2-Tetrachloroethane
		Tetrachloroethylene
		Trichloroethylene
		Methyl isobutyl ketone
Class 3		Ammonia
		Carbon monoxide
		Hydrogen chloride
		Nitric acid
		Sulfur dioxide
		Phenol
		Phosgene
		Sulfuric acid

4 List of Narcotics, Psychotropic Drugs, Stimulants and Specified Poisonous Substances

【Narcotics】

1. 3-Acetoxy-6-dimethylamino-4, 4-diphenylheptane (commonly known as acetylmethadol) and its salts.
2. Alpha-3-acetoxy-6-dimethylamino-4, 4-diphenylheptane (commonly known as alphacetylmethadol) and its salts.
3. Beta-3-acetoxy-6-dimethylamino-4, 4-diphenylheptane (commonly known as betaacetylmethadol) and its salts.
4. Alpha-3-Acetoxy-6-methylamino-4, 4-diphenylheptane (commonly known as noracynethadol) and its salts.
5. Ethyl1- [2- (4-aminophenyl) ethyl] -4-phenylpiperidine-4-carboxylate (commonly known as anileridine) and its salts.
6. N-allylnormorphine (commonly known as Nalorphine) and its ester,and their salts.
7. 3-Allyl-1-methyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as allylprodine) and its salts.
8. Ecgonine and its salts.
9. 3- (N-ethyl-N-methylamino) -1, 1-di- (2-thienyl) -1-butene (commonly known as Ethylmethylthiambutene) and its salts.
10. Alpha-3-ethyl-1-methyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as alphameprodine) and its salts.
11. Beta-3-ethyl-1-methyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as betameprodine) and its salts.
12. 2- (4-Chlorobenzyl) -1- (diethylamino) ethyl-5-nitrobenzimidazole (commonly known as clonitazene) and its salts.
13. Cocaine and other esters of ecgonine and their salts.
14. Coca leaf.
15. Codeine, ethylmorphine and other ethers of morphine, and their salts.
16. Diacetylmorphine (commonly known as heroin), other ethers of morphine, and their salts.
17. Ethyl 1- (3-cyano-3,3-diphenylpropyl) -4-phenylpiperidine-4-carboxylate (commonly known as diphenoxylate) and its salts.
18. 4-Cyano-2-dimethylamino-4,4-diphenylbutane (commonly known as methadone intermediate) and its salts.
19. 4-Cyano-1-methyl-4-phenylpiperidine (commonly known as pethidine-intermediate-A) and its salts.
20. 1- (Diethylamino) ethyl-2- (4-ethoxybenzyl) -5-nitrobenzimidazole (commonly known as etonitazene) and its salts.
21. 3-Diethylamino-1, 1-di- (2-thienyl) -1-butene (commonly known as diethylthiambutene) and its salts.
22. Dihydrocodeinone (commonly known as hydrocodone), its ester, and their salts.
23. Dihydrocodein, its ester, and their salts.
24. Dihydrodeoxymorphine (commonly known as desomorphine), its ester, and their salts.
25. Dihydrohydroxycodeinone (commonly known as oxycodone), its ester, and their salts.
26. Dihydrohydroxymorphinone (commonly known as oxymorphone) and its salts.
27. Dihydromorphine, its ester, and their salts.
28. Dihydromorphinone (commonly known as hydromorphinone), its ester, and their salts.
29. 4, 4-Diphenyl-6-piperidino-3-heptanone (commonly known as dipipanone) and its salts.
30. (2-Dimethylamino) ethyl-1-etoxy-1, 1-diphenylacetate (commonly known as dimenoxadol) and its salts.
31. 3-Dimethylamino-1, 1-di- (2-thienyl) -1-butene (commonly known as dimethylthiambutene) and its salts.
32. 6-Dimethylamino-4, 4-diphenyl-3-hexanone (commonly known as normethadone) and its salts.
33. 6-Dimethylamino-4, 4-diphenyl-3-heptanol (commonly known as dimepheptanol) and its salts.
34. Alpha-6-dimethylamino-4, 4-diphenyl-3-heptanol (commonly known as alphamethadol) and its salts.
35. Beta-6-dimethylamino-4, 4-diphenyl-3-heptanol (commonly known as betamethadol) and its salts.
36. 6-Dimethylamino-4, 4-diphenyl-3-heptanone (commonly known as methadone) and its salts.
37. 4-Dimethylamino-3-methyl-1, 2-diphenyl-2-(propionyloxy) butane (commonly known as propoxyphene) and its salts.
38. 6-Dimethylamino-5-methyl-4, 4-diphenyl-3-hexanone (commonly known as isomethadone) and its salts.
39. 1, 3-Dimethyl-4-phenyl-4- (propionyloxy) azacycloheptane (commonly known as proheptazine) and its salts.

40. Alpha-1, 3-dimethyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as alphaprodine) and its salts.
41. Beta-1,3-dimethyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as betaprodine) and its salts.
42. Thebaine and its salts.
43. 1, 2, 5-Trimethyl-4-phenyl-4- (propionyloxy) piperidine (commonly known as trimeperidine) and its salts.
44. 6-Nicotinylcodeine (commonly known as nicocodine) and its salts.
45. Normorphine (demethylmorphine), its ether, and their salts.
46. Ethyl 1- [2- (2-hydroxyethoxy) ethyl] -4-phenylpiperidine-4-carboxylate (commonly known as ethoxeridine) and its salts.
47. 14-Hydroxydihydromorphine (hydromorphinol) and its salts.
48. 3-Hydroxy-N-phenacylmorphinan (excluding those which are dextrorotatory) and its salts.
49. Ethyl 1- (3-hydroxy-3-phenylpropyl) -4-phenylpiperidine-4-carboxylate (commonly known as phenoperidine) and its salts.
50. 4- (3-Hydroxyphenyl) -1-methyl-4-piperidylethylketone (commonly known as ketobemidone) and its salts.
51. Ethyl 4- (3-Hydroxyphenyl)-1-Methylpiperidine-4-carboxylate (commonly known as hydroxypethidine) and its salts.
52. 3-Hydroxy-N-phenethylmorphinan (commonly known as phenomorphan) and its salts.
53. 3-Hydroxy-N-methylmorphinan (excluding that which is dextrorotatory) and its salts.
54. 3-Hydroxymorphinan (excluding those which are dextrorotatory) and its salts.
55. Ethyl 4-phenyl-1- [2- (tetrahydrofurfuryloxy) ethyl] piperidine-4-carboxylate (commonly known as furethidine) and its salts.
56. Ethyl 4-phenylpiperidine-4-carboxylate (commonly known as pethidine-Intermediate-B) and its salts.
57. Ethyl 4-phenyl-1- (3-phenylaminopropyl) piperidine-4-carboxylate (commonly known as piminodine) and its salts.
58. 1, 2, 3, 4, 5, 6-Hexahydro-8-hydroxy-6, 11-dimethyl-3-phenethyl-2, 6-methano-3-benzazocin (commonly known as phenazocine) and its salts.
59. 1, 2, 3, 4, 5, 6-Hexahydro-8-hydroxy-3, 6, 11-trimetyl-2, 6-methano-3-benzazocin (commonly known as metazocine) and its salts.
60. Ethyl 1- [2- (benzyloxy) ethyl] -4-phenylpiperidine-4-carboxylate (commonly known as benzethidine) and its salts.
61. 6-Methyldihydromorphine (commonly known as methyldihydromorphine) and its salts.
62. Methyldihydromorphinone (commonly known as metopon), its ester, and their salts.
63. 6-Methyl-delta-6-deoxymorphine (commonly known as methyldesorphine) and its salts.
64. N- (1-methyl-2-piperidinoethyl) propionanilide (commonly known as phenampromide) and its salts.
65. 1-Methyl-4-phenylpiperidine-4-carboxylate and its salts.
66. N-"(2-Methylphenethylamino) propyl" propionanilide (commonly known as diampromide) and its salts.
67. [(3-methyl-4-morpholino-2, 2-diphenyl) buthylyl] pyrroridine and its salts.
68. 2-Methyl-3-morpholino-1, 1-diphenyl (commonly known as moramide intermediates) and its salts.
69. 3-Methoxy-N-methylmorphinan (excluding those which are dextrorotatory) and its salts.
70. Morphine and its salts.
71. Morphine-N-oxide and other pentavalent nitrogen morphine derivatives.
72. Ethyl 1- (2-morphorinoethyl) -4-phenylpiperidine-4-carboxylate (commonly known as morpheridine) and its salts.
73. 6-morpholino-4, 4-diphenyl-3-heptanone (commonly known as phenadoxone) and its salts.
74. Ethyl 4-morphorino-2, 2-diphenylbutylate (commonly known as dioxaphetyl butyrate) and its salts.
75. Substances which are designated by government ordinances to have the potential for abuse, and harmful effects of the same level as any of the substances listed above.
76. Substances which contain any of the substances listed above, with the exception of opium. However the following substances are excluded.
    A) Codeine or dihydrocodeine in concentrations of 10 parts per 1,000 or less, or substances which contain these salts but not any of the other substances listed above.
    B) Plants other than those which are raw ingredients of narcotic drugs (including plant parts).

【Psychotropic Drugs】

1. 5-Ethyl-5-phenylbarbituric acid (commonly known as Phenobarbital) and its salts.
2. 5-Ethyl-5-(1-methylbutyl) barbituric acid (commonly known as pentobarbital) and its salts.
3. 7-Chloro-1,3-dihydro-1-methyl-5-phenyl-2H-1,4-benzodiazepin-2-one (commonly known as diazepam) and its salts.
4. 10-Chloro-2,3,7,11b-tetrahydro-2-methyl-11b-phenyl-oxazolo[3,2-d][1,4]benzodiazepin-6(5H)-one (commonly known as oxazolam) and its salts.
5. 5-(2-Chlorophenyl)-7-ethyl-1,3-dihydro-1-methyl-2H-thieno(2,3-e)-1,4-diazepin-2-one (commonly known as clotiazepam) and its salts.
6. 7-Chloro-2-(methyl-amino)- 5-phenyl-3H-1,4- benzodiazepine 4-oxide (commonly known as chlordiazepoxide) and its salts.
7. 5,5-Diethyl-Barbituric acid (commonly known as barbital) and its salts.
8. 1, 3-Dihydro-7-nitro-5-phenyl-2H-1,4- benzodiazepin-2-one (commonly known as nitrazepam) and its salts.
9. 2-Phenyl-2-(2-piperidyl) acetic acid, methyl ester (commonly known as methylphenidate) and its salts.
10. 1,2,3,4,5,6-Hexahydro-6,11-dimethyl-3-(3-methyl-2-butenyl)-2,6- methano-3-benzazocin-8-ol (commonly known as pentazocine) and its salts.
11. Substances which are designated by government ordinances to have the potential for abuse, and harmful effects of the same level as any of the substances listed above.
12. Substance which contain any of the substances listed above.

【Stimulants】

1. 1-Phenyl-2-aminopropane (amphetamine), 1-Phenyl-2-methylamino-propan (methamphetamine) and their salts.
2. Substances which are designated by government ordinances to have harmful effects of the same level as substances mentioned above.
3. Substance which contain any of the substances mentioned in 1 and 2 above.

【Raw Ingredients of Stimulants】

1. 1-Phenyl-2-methylamino-propanol-1, its salts, and substances which contain any of these. However, substances which contain 10% or less of 1-phenyl-2-methylamino-propanol-1 are excluded.
2. 1-Phenyl-1-chloro-2-methylamino-propan, its salts, and substances which contain any of these.
3. 1-Phenyl-2-dimethylamino-propanol-1, its salts, and substances which contain any of these. However, substances which contain 10% or less of 1-phenyl-2-dimethylamino-propanol-1 are excluded.
4. 1-Phenyl-1-chloro-2-dimethylamino-propan, its salts, and substances which contain any of these.
5. 1-Phenyl-2-dimethylamino-propan, its salts, and substances which contain any of these.
6. Phenylacetic acid, its salts, and substances which contain any of these. However, substances which contain 10% or less of phenylacetic acid are excluded.
7. 2-Phenylacetoacetonitrile or substances which contain it.
8. Phenylacetone or substances which contain it.
9. Substances which are raw ingredients of stimulants and have been designated as so by government ordinances.

【Specified Poisonous Substances】

1. Octamethyl pyrophosphoramide (commonly known as schradan).
2. Tetraalkyl lead.
3. Diethyl-paranitrophenyl- thiophosphate (commonly known as parathion).
4. Dimethylethyl mercaptoethyl triphosphate (commonly known as methyl demeton).
5. Dimethyl-(diethylamido-1- chlorocrotonyl)-phosphate (commonly known as phosphamidon).
6. Dimethyl p-nitrophenyl thiophosphate (commonly known as methyl parathion).
7. Tetraethyl pyrophosphate (commonly known as TEPP).
8. Monofluoroacetic acid (also called fluoroacetic acid).
9. Monofluoroacetamide (also called fluoroacetamide).
10. Other than the specified poisonous substances listed above, substances which contain any of the above, or other extremely toxic substances which have been designated as so by government ordinances.

4 — 3. Supplementary Information on Radiation and X-rays

1 Laws and Ordinances Concerning Prevention of Radiation Hazards

(1) Laws and Ordinances

Materials that may result in a radiation hazard are subject to the laws and ordinances outlined below.

When conducting work involving radiation, researchers should fully read and understand the relevant laws governing the prevention of radiation hazards generated by materials such as radioisotopes.

Table 4-3-1. Main Laws

Materials Emitting Radiation	Main Laws and Ordinances
Nuclear fuel / nuclear source materials	Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Nuclear Reactor Regulation Law, Act No. 166 of June 10, 1957)
Radioisotopes / radiation generators	Act on Regulation of Radioisotopes (No. 167, June 10, 1957)
Radiopharmaceuticals	Medical Care Act (No. 205, July 30, 1948); Pharmaceutical Affairs Act (No. 145, August 10, 1960)

Table 4-3-2. Main Laws Affecting Researchers

Work-related Items	Main Laws and Ordinances
Protection of worker safety and health	Industrial Safety and Health Act (No. 57, June 8, 1972)
Maintaining an appropriate healthy and secure working environment	Working Environment Measurement Act (No. 28, May 1, 1975)

The following regulations are intended to further govern the use and handling of radioisotopes or radiation generators.

Table 4-3-3. Main Ordinances

Regulation/Ordinance	Aims
Ordinance on Prevention of Ionizing Radiation Hazards	Enacted to prevent radiation hazards affecting operators and workers. This Ordinance also applies to students at Waseda University.
Prevention of Radiation Hazards for Employees	Stipulates measures to protect government employees from the harmful effects of radiation.
Ordinance on Prevention of Ionizing Radiation Hazards for Sailors	Stipulates measures to protect sailors from the harmful effects of radiation.
Ordinance on Transport by Vehicle of Radioisotopes etc.	Stipulates measures governing transport of radioisotopes, etc outside of designated facilities based on the Law Concerning Prevention of Radiation Hazards due to Radioisotopes, etc.
Notification of Standards for Transport of Radioactive Materials, etc. by Air	Stipulates standards for transporting radioactive materials by air.
Ordinance on Shipping and Storage of Hazardous Materials	Stipulates measures to regulate proper storage and transport of radioactive materials onboard ships.

(2) Compliance Rules for Conducting Radiation Work

① Effective dose limits

Experimenters who use radioisotopes and radiation generators in their work should undergo routine measurements of degree of exposure using a radiation dosimeter. The effective dose limits for such operators are stipulated in the table below. Experimenters should ensure that their exposure levels do not exceed these limits.

Table 4-3-4. Effective Dose Limits for Researchers Involved in Radiation Work

Effective dose limits	100 mSv/5 years and 50 mSv/year
Females	5 mSv/3 months
Pregnant females	Internal exposure is limited to 1 mSv from when the operator learns of pregnancy until she informs her supervisor of the date of delivery.

"Effective dose" indicates the degree of exposure of the body to radiation and is usually obtained by applying a radiation dosimeter to the chest area for males and abdominal area for females.

Waseda University, however, requires Experimenters to wear a glass badge dosimeter to measure exposure dose. The Radiation Safety Liaison Officer will provide each individual with the results obtained from these devices.

"Equivalent dose" indicates the degree of localized radiation dosage. A radiation dosimeter is used to measure exposure in areas affected by radiation.

Table 4-3-5. Equivalent Dose Limits for Researchers Involved in Radiation Work

Eye lens	150 mSv/year
Skin	500 mSv/year
Abdominal surface for pregnant females	Internal exposure is limited to 2 mSv from when the operator learns of pregnancy until she informs her supervisor of the date of delivery.

② Radiation Education and Training

Waseda University provides training and education for Experimenters who must enter radiation controlled areas and handlers and operators of radioactive materials and radiation generators. The Radiation Safety Management Office at the Nishi-Waseda Campus runs training and education seminars a number of times each May.

Researchers must undergo this training and education before or within one year of entering a radiation controlled area.

Table 4-3-6. Radiation Education and Training Seminars and Their Durations

Topic	Physical Effects of Radiation	Handling of Radioisotopes	Laws and Ordinances Concerning Prevention of Radiation Hazards and Ordinances Concerning Prevention of Radiation Hazards
New Researcher	30 minutes	1 hours	30 minutes
Renewing Researcher	Approx. 2 hours		

③ Medical Examinations

Experimenters engaged in work involving radioactive materials or radiation generators must undergo an ionizing radiation medical examination.

This examination is offered at the Nishi-Waseda Campus each year in April and October by the Nishi-Waseda campus of the Health Support Center.

2 Safe Handling of Radioisotopes and Radiation Generators

(1) Materials and Machine Usage

Ensure that you follow the basic standards outlined below.

Table 4-3-7. Basic Standards for Use of Radioisotopes and Radiation Generators

1	Wear the required protective clothing and radiation dosimeter when entering a radiation controlled area.
2	Use materials only in the designated facilities.
3	Use of unsealed radioactive materials should be done in a designated workroom.
4	In order to prevent exposure exceeding the dose limit from a source of radiation, (i) install a screening device; (ii) establish a safe distance; and (iii) take measures to limit the time of exposure.
5	Do not eat, drink, smoke or makeup in workrooms.
6	Refer to the precautions for prevention of radiation hazards indicated on a controlled area of facility to be used.
7	Refrain from unnecessary entry in a radiation controlled area.
8	Monitor for contamination of protective clothing and any removed materials when leaving a radiation controlled area.

(2) Storing Materials

The following storage standards must be completely followed when storing radioactively contaminated materials.

Table 4-3-8. Basic Storage Standards for Radioisotopes

1	When storing radioisotopes, place them in a container and securely store in a storeroom or safe.
2	Do not exceed the storage capacity when storing radioisotopes.
3	Do not eat, drink, smoke or makeup in storage facilities.

(3) Labels

A radiation controlled area must be established if there is risk of the effective radiation dose of Experimenters handling radioisotopes or radiation generators exceeding the standards for radiation controlled areas.

A radiation warning symbol (as shown in Figure 4-3-1) must be placed at the entrance of a radiation controlled area.

A notice indicating "Radiation Controlled Area" may also be placed.

Ensure that radiation warning symbols are also placed on samples containing radioisotopes, surfaces of sources of radiation or areas contaminated with radiation.

When entering a radiation controlled area or when handling radioisotopes or X-ray equipment, be sure to follow the instructions of the radiation protection supervisor or chief X-ray inspection engineer.

Figure 4-3-1. Radiation warning symbol
(The mark: Red
Background: Yellow)

(4) Precautions

At the entrance to a radiation controlled area, the results of working environment measurement indicating the radiation environment and a list of precautions (as shown in Figure 4-3-2) should be listed up.

Radiation Controlled Areas:

① Effective external dose exceeding 1.3 mSv as the 1-cm dose equivalent over a three-month period,

② Average aerial concentration of radioisotopes exceeding 1/10 the aerial concentration limit over a three-month period, and

③ Density of radioisotopes on the surface of a material contaminated by radioactive materials exceeding 1/10 the surface concentration limit.

注 意 事 項

この施設では、先端生命医科学センター放射線取扱主任者の承認のもとに放射線業務従事者として登録された者以外はRI管理区域に入室することはできません。従事者は管理区域への入室から退室までの間、下記の事項を必ず守って下さい。

1. 管理区域内では飲食、喫煙、化粧行為を行わないこと。
2. RI実験専用の防護衣(黄衣)、スリッパ、その他の保護具を着用すること、またそれらを着用したまま管理区域の外へみだりに出ないこと。
3. 管理区域内の物品を管理区域の外にみだりに持ち出さないこと。なお、RIは管理区域の外には持ち出せません。
4. 危険時、および放射能汚染が生じたおそれのある場合は、適切な処理を行なった上、速やかに放射線取扱主任者に連絡すること。
5. 放射線障害を防止するため、放射線取扱主任者及び管理区域責任者、安全管理責任者等の指示に従うこと。
6. その他、放射線障害予防規程を遵守すること。

＜入室時＞

1. 入室用カードリーダーでカードを読み取らせ、定められた出入口から入ること。
2. 所定のスリッパにはきかえること。
3. 個人被ばく線量計(ガラスバッジ等)を確認すること。
4. 所定の防護衣(黄衣)に着替え、個人被ばく線量計を指定された位置に着用すること。
5. 排気設備が稼働しているかどうか必ず確認すること。
6. 不要な物品を持ち込まないこと。

＜退室時＞

1. 手、指等をよく洗うこと。
2. ハンドフットクロスモニタで汚染がないことを確認すること。汚染が発見されたら、放射線取扱主任者に連絡するとともに、直ちに汚染除去のための措置を講ずること。
3. ガラスバッジを所定の場所に戻すこと。
4. 防護衣(黄衣)を元の位置に戻すこと。
5. スリッパをはきかえること。
6. 退室用カードリーダーでカードを読み取らせること。
7. 管理区域から物品を持ち出す場合は、その物品に汚染がないことを必ず確認し、所定の帳簿に記帳すること。

以上

放射線取扱主任者

Figure 4-3-2. List of Precautions

3 Physical Effects

(1) Acute Effects

Acute effects refer to the physical consequences of temporary exposure of the body to high doses of radiation.

The exposure dose for radiation during work or experiments at TWIns is limited to a detection limit of 0.1 mSv/month.

(2) Late Effects

Late effects of exposure to radiation can manifest after several decades.

These effects can be represented by illnesses such as cancer or cataracts.

(3) Genetic Effects

The genetic effects of exposure to radiation can manifest as abnormalities among the affected subject's children and even affect future generations depending on the level of exposure of the sex glands.

These changes, however, are similar to naturally-occurring mutations. Thus, despite studies attempting to classify the effects of radiation exposure, the effects of radiation are only understood at the level of animal experiments, and there is no clear evidence of genetic effects in humans at present.

4 Radiation Units

(1) Absorbed Dose D【Unit: Gy (gray)】

This indicates the extent to which radiation energy has been absorbed by a matter, with 1 Gy equivalent to 1 J of energy being deposited per 1 kg of a matter. This is used in evaluating the degree of acute effect.

(2) Equivalent Dose HT【Units: Sv (Sievert)】

This value is calculated by multiplying the average absorbed dose of radiation (R) in an organ or tissue (D_{TR}) by the radiation weighting factor (w_R), which corrects for differences in biological effect based on types of radiation or energy.

$$H_T = w_R \times D_{TR}$$

(3) Effective Dose E【Units: Sv (Sievert)】

This value provides a general idea of dose with the aim of risk assessment for the whole body following exposure to radiation.

This is calculated by multiplying the equivalent dose (H_T) of each organ (T) by the tissue weighting factor (w_T), and adding them altogether.

$$E = \Sigma \ (w_T \times H_T)$$

(4) Individual Dose Equivalent【Units: Sv (Sievert)】

The International Commission on Radiation Units and Measurements (ICRU) defines the individual dose equivalent measured by personal radiation exposure to be the dose equivalent to that depth (d) in soft tissue below a specified point on the body.

Specifically, this is recommended to be measured at a depth of 10 mm below the middle surface of the deep slab phantom, 3 mm for the eye lens, and 70 μ m for exposed dose for surface tissue.

Dose equivalent (H) is determined by multiplying absorbed dose(D) and quality factor(Q), which depends on types of radiation or energy.

The result is a correction of the absorbed dose(D) from the effects of types of radiation or energy.

$$H = D \times Q$$

5 Exposure Dose

In principal, Waseda University uses Fluorescent glass dosimeters (Glass Badge) as radiation dosimeters for measuring gamma-rays, X-rays, beta-rays and neutrons.

Experimenters are notified of the results of measurements approximately every one to two months in the form of exposure results and individual reports.

Table 4-3-9. Precautions when Using and Handling Radiation Dosimeters

Types of Radiation Dosimeter	Precautions for Use
 Glass Badge	○ The type of glass badge differs based on the type of radiation. Be sure to confirm the type when registering. ○ The standard period of use is one month. Be sure to exchange your badge for a new one at the end of each month. You will not receive any measurement results if you fail to submit your badge. ○ Men should wear their badge on the chest area, and women should wear theirs on the abdomen. Your badge may also be placed on your fingertips or head when necessary. ○ Do not open glass badges. ○ Do not peel off the monitoring label or glass ring label. ○ Labels may peel off when exposed to water. ○ The objective of the badge is to measure the contamination, and therefore is should not be covered. ○ 1 free size glass ring (ring size No.7 to No.30).
 Glass Ring	

6 Measuring Radiation

Table 4-3-10. General Survey Meters

	Ionization Chamber-type	G-M Tube-type	NaI (TI) Scintillation-type	Proportional couter-type
Type of Radiation Measured	Gamma ray / X-ray/ Beta ray	Beta ray/ Gamma ray	Gamma ray / X-ray	Neutron ray
Energy Range	30 keV ~ 1 MeV	30 keV ~ 1.5 MeV	50 keV ~ 1.5 MeV	0.025eV ~ 15 MeV
Range of Measurement	1 μ Sv/h —	–1000s counts/min	0.05 to 10s μ Sv/h	0.1 μ Sv/h –10mSv/h
Features	• Measures extremely minute electrical currents of 10^{-13}A. Take the necessary precautions when using this device.	• This device cannot function if subjected to a high radiation dose due to choking phenomenon. • Measures the amount of radioactivity by conversion coefficient.	• Can measure low radiation doses. • Poor energy characteristics. • Cannot measure Gamma or X-rays of less than 50 KeV. Gas proportional counter.	Deploys a paraffin moderator around the $^{10}BF_3$ gas proportional counter.
Use	Measures dosage rate	Measures surface contamination density	Measures dosage rate	Measures dosage rate
Appearance				
Notes	Often used for measuring 1-cm dose equivalent			

< Reference >

The smear test can be used for radiation contamination measurements in locations with high levels of background radiation.

Smear test method: Wipe a surface area of 100 cm^2 to be tested with a dry filter paper of 2 cm-diameter spoon or butterfly shape.
If you already know the smear or geometric efficiency, then you can calculate the surface contamination density (Bq/cm^2).

4 — 4. Supplementary Information on Laser Beams

1 Table of Standard Measures by Classification of Laser

Table 4-4-1. Table of standard measures by classification of laser (from the appendix to the Ministry of Health, Labour and Welfare, Director of Labor Standards Bureau Directive No. 0325002, March 25, 2005)

Measures to be taken			Class. of laser			
			4	3B	3R	2M 1M
[Selection of laser manager] ・To be selected from among persons with sufficient knowledge and experience in laser use and accident prevention and who meet the following criteria. (1) Experience in planning or carrying out laser-accident-prevention measures (2) Experience in establishing or managing a laser controlled-access area (an area in which exposure to laser beams might occur) (3) Controls the key that activates a laser (4) Inspects and adjusts lasers and maintains the relevant records (5) Inspects and adjusts safety equipment and monitors use (6) Conducts health and safety training and keeps records (7) Takes whatever other measures might be necessary to prevent accidents associated with laser use			○	○	○*1	
[Controlled-access area (signage and unauthorized access)] ・Clearly separate the laser controlled-access area from other areas and the post necessary signage. ・Prohibit entry to the laser-controlled access area by unauthorized personnel and install a self-locking door at the entrance to the area, etc., as necessary. ・If unauthorized personnel are required to enter the laser-controlled access area, ensure that each follows the directions of the laser-equipment manager.			○	○		
Laser	Path of the laser beam	[Position of the laser beam path] ・Do no set the path of the laser beam at operator eye level.	○	○	○	○
		[Appropriate layout and shielding of laser beam path] ・The path of the laser beam should be as short as possible with the smallest possible number of bends, and it should not intersect any locations where people walk. It should also be shielded to the greatest extent possible.	○	○	○*1	
		[Appropriate terminus] ・The terminus of the laser beam path must be a diffusive or absorbent substance with the appropriate degree of reflective or heat-resistant properties.	○	○	○*1	○*2
	[Key control] ・The laser must be configured to require a key, etc., for operation.		○	○		
	Emergency cut off	[Emergency cut-off switch] ・The operational controller of the laser must be equipped with an emergency cut-off switch that immediately shuts off the laser beam.	○	○		
		[Alarm] ・The laser must be equipped with an automatic light or other warning device that makes it easy to determine when it is in operation.	○	○	○*1	
		[Shutter] ・A shutter must be affixed to the laser's aperture to prevent accidental emission of laser beams.	○	○		
	[Interlock system, etc.] ・An interlock system must be in place to prevent emission of laser beams if the entrance to the laser controlled-access area is open or the shielding has been removed from the laser beam path.		○	○		
	[Aperture indicator] ・The laser aperture must be clearly labeled as such.		○	○	○	
Operation and health management, etc.	[Position of the operator] ・The controls of the laser should be as far as possible from the laser beam path.		○			
	[Measures to be taken during laser beam adjustments] ・When adjustments are made to the laser beam, the beam with the lowest possible power output should be used.		○	○	○	○
	Safety equipment	[Safety eyewear] ・Laser operators must wear safety eyewear appropriate to the type of laser they are working with. This is not limited to situations in which measures have been taken to prevent eye injury. (N.B.) Laser safety eyewear (either eyeglass or goggle type) must be worn.	○	○	○*1	
		[Work clothes to minimize skin exposure] ・Operators must wear work clothes that minimize skin exposure to the greatest extent possible.	○	○		
		[Use of inflammable materials] ・Operators must wear flame-retardant clothing. Clothing made of synthetic materials prone to melting should not be worn.	○			

Measures to be taken			Class. of laser			
			4	3B	3R	2M 1M
Operation and health management, etc. (continued)	[Inspection and adjustments] ・Before operating a laser, the laser manager (if one has been selected) or operator (if a laser manager has not been selected) must inspect the laser beam path, interlock functionality, and the laser and safety equipment. ・A laser specialist must inspect the laser equipment on a regular basis for the presence of irregularities in the following items and make adjustments as necessary. (1) Laser beam power output, mode, beam radius, angle of expansion, oscillating wavelength, etc. (2) Input power, electric voltage, electric current, insulation, and grounding. (3) Operation status of safety equipment, automatic indicator lights, shutters, interlock functionality, etc. (4) Power meters, power monitors, etc. (5) Moving parts such as fans, shutters, etc. (6) Cooling systems, gas feeder systems, toxic gas removal equipment, dust filtering systems, etc. (classes 4 and 3B only)		○	○	○	○
	[Health and safety education] ・Laser operators must be provided with health and safety education in the event of changes in operating procedures or changes in the laser equipment in use prior to operating the laser equipment. Particular attention should be paid to the following items. (1) Characteristics, dangerousness, or harmfulness of the laser (2) The laser's principles and structure (3) The laser's operating procedures (4) Safety equipment and their operating procedures (5) Emergency and evacuation procedures		○	○	○	○
	Health management	[Examination of the anterior eye (cornea, crystalline lens)] ・Operators will undergo an anterior eye examination (cornea, crystalline lens) before being permitted to begin working with a laser.	○	○	○ *1	
		[Examination of the back of the eye] ・Operators will undergo an examination of the backs of their eye before being permitted to begin working with a laser.	○			
Miscellaneous	Signage	[Laser Manager] ・The name of the laser manager must be clearly displayed at the entrance to the laser controlled-access area (classes 4 and 3B) or on the laser itself (class 3R).	○	○	○	
		[Dangers, warnings, and cautions during use] ・Warnings and cautions for use must be clearly displayed at the entrance to the laser controlled-access area (classes 4 and 3B) or on the laser itself (class 3R, 2M, 1M).	○	○	○	○
		[Signage indicating the presence of laser equipment] ・Signs indicating the presence of laser equipment must be clearly displayed at the entrance to the laser controlled-access area.	○	○		
	[Labeling of the high-voltage parts of laser equipment] ・High-voltage parts of laser equipment must be clearly labeled and measures must be taken to prevent electric shock from touching those parts.		○	○	○	○
	[Prohibition of dangerous materials] ・Explosive or flammable materials must not be brought into the laser controlled-access area (class 4) or near the laser beam path (class 3B).		○	○		
	[Measures regarding toxic gases and dust] ・When the laser is in operation, measures, including airtight equipment, local exhaust systems, gas masks, dust masks, etc., must be in place to prevent health risks associated with toxic gases and dust.		○	○		
	[Medical examinations and treatment of persons with possible laser-related injuries] ・Anyone possibly suffering from a laser-related injury must be examined or treated by a doctor as quickly as possible.		○	○	○	○

○ : Indicates that measures are necessary.

＊1　Measures necessary for lasers with an wavelength output outside the range of 400 nm − 700 nm.

＊2　Measures necessary for the termini of the laser beams of laser equipment included under JIS standard 10.6.

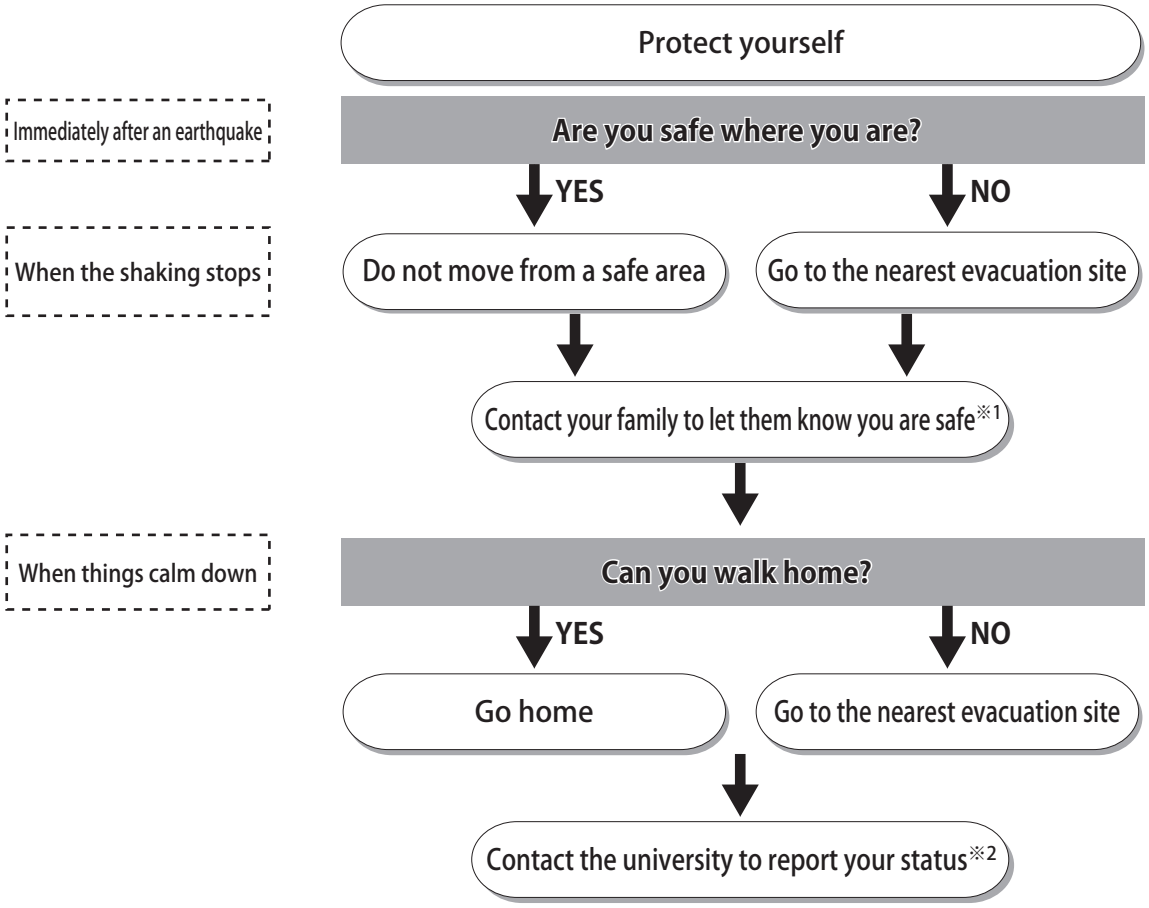
4 — 5. Responding to Major Earthquakes

It is important to remain calm in the event of a major earthquake. While TWIns is open 24hrs a day, in a lot of cases, there are no faculty staff in the facility in the evening and on holidays. Please familiarize yourself with chapter 1 of this guide so that you know what to do in the case of an emergency.

Let's keep the following in mind beforehand so that we can act calmly in case of emergency.

1 From earthquakes strikes to evacuation

☆ It is important to collect accurate information in any case.



※ 1 How to contact family

［Internet］ NTT Disaster Message Board

Post and Read Message

[1] Go to https:/www.web171.jp/(web171)

[2] Enter the phone number you would like to post. *Enter only numbers, no "-".

[3] Post Message:Enter "name", "situation" and "message" and click "Post".

Read Message:Click "Read"

［Phone］ NTT Disaster Emergency Message Dial

Record and Retrieve Message

[1] Call 171 and listen to the guidance.

[2] Retrieve Message: Dial "2"　Record Message: Dial "1"

[3] Enter the telephone number (landline) of the person in disaster-stricken area.

※ 2 How to contact the university (avoid using the telephone where possible)

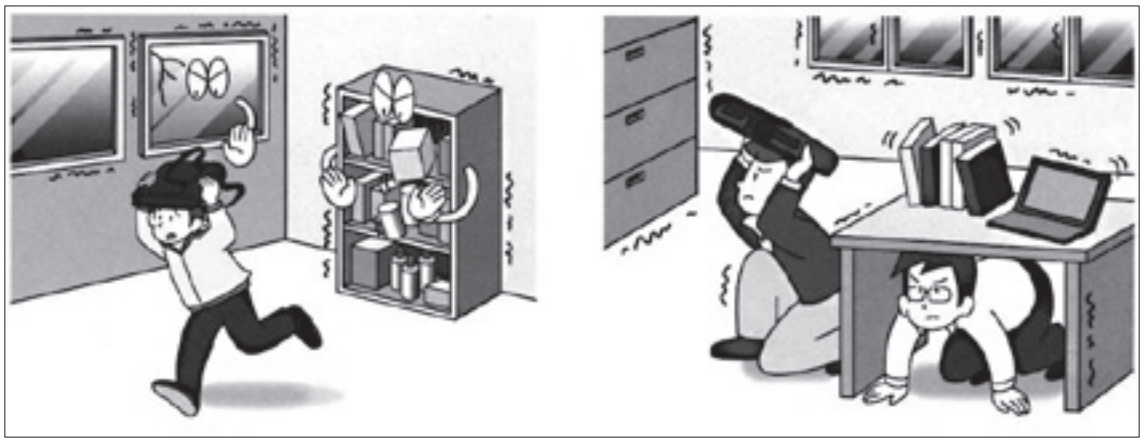
［Internet］ Access the following URL, and inform the university of your situation.
URL:http://www.emg.waseda.jp/

［Post card］Write “Report of Status”, name, student number, personal and family status, address, problems, status of home or evacuation site, etc., and send to the following address.
Office of the (Graduate) School of ( ), Waseda University 1-6-1 Nishi-Waseda, Shinjiku-ku, Tokyo 169-8050

2 What to do immediately after an earthquake

- Stay away from windows and racks to protect your body from falling objects such as glass.
- Crouch under a solid table or cover your head with your bag or clothing and protect your head, hands and feet from falling objects such as glass, white boards, television monitors and fluorescent light tubes etc.
- Open the door to secure an exit if possible.
- Ensure your own safety first if you are handling a naked flame etc. when the earthquake strikes and move away from the hazard. Also move away from any chemicals you may have been using.
- Continue to sit until the shaking stops at a park or ground where there is no danger of falling objects.

Stay away from window and rack　　Protect your body from falling objects



3 What to do after the end of a tremor

(1) Rules to remember

・Stay calm.
Check for building damage, fire outbreaks, and so on.
In the event of a fire or injuries, contact the Security/Monitoring room (extension 2000) and ensure your own safety while extinguishing fires and administering first-aid where possible.
Remember, it is possible for aftershocks to occur. Remain calm and access the situation.

(2) Deciding to evacuate and actions

① Points to consider for making a decision

・Check the condition indoors.
Check for falling equipment, leaking and running chemicals, etc.

・Check the condition of other classrooms.
Check the situation of other classrooms and rooms. Follow the direction of emergency announcements.

・Check the condition of buildings.
Check for cracks and fallen walls.

・Check for fires.
In the event of a fire, contact the Security/Monitoring room (extension 2000).

Even if you confirm all the above items and safety of surrounding area, don't move until the next instructions.

② Points to consider for taking action

If your safety cannot be ascertained, take the following actions.

・In the event of a fire, protect your head, stay close to the ground and cover your mouth with a towel or handkerchief.

・Check the safest route for evacuation.

・Use stairs, not elevators.

・Pay attention to the safety of others, and never push them.

Use stairs, not elevators

Don't push others

(3) When it is safe

① Preparation for aftershock

・Secure the route for evacuation.
There is an aftershock after a big earthquake. Open doors and windows to secure a route for the evacuation.

② Fire Prevention

・Prevent gas leaks.
Shut off the main gas cock to prevent a secondary disaster.

・Electrical Fire
Turn off the breaker in the laboratory/research center if there is distribution board.
Unplug and turn off electrical equipment.

4 Evacuation

The evacuation area must be an open space where fire will not spread.

Although the university has set the following places as evacuation areas, evacuate to a safe place depending on the situation. The evacuation area for TWIns is on the North side of the Tokyo Women's Medical University Hospital Ambulatory Care Center. (refer to P.20)

Table 4-5-1. List of Evacuation Areas

Campus	Evacuation Area
Waseda University Center for Advanced Biomedical Sciences	North side area of Tokyo Women's Medical University Hospital Ambulatory Care Center
Waseda	Waseda Campus
Toyama	Toyama Park zone
Nishi-Waseda	Courtyard
Tokorozawa・Higashifushimi・Kikuicho	Each ground
The Kagami Memorial Research Institute for Materials Science and Technology (Zaiken)	Front entrance before
Honjo	93 - 94 Building before Square Honjo Senior High School Ground

5 Materials Stockpiled at TWIns

In preparation for disasters, such as earthquakes etc. at TWIns, there is emergency food and water, blankets and portable toilets stored in the storage areas on basement level 1 & 2. There are also emergency generators and emergency toilets in the pipe space in front of the security/monitoring room and radios and loudspeakers in the Waseda University office on the 3rd floor.

The automatic vending machines on the eastern side of the 2nd and 3rd floors will also dispense drinks for free at times of disasters, emergency vending machines.

TWIns Safety Guide

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Secretariat:
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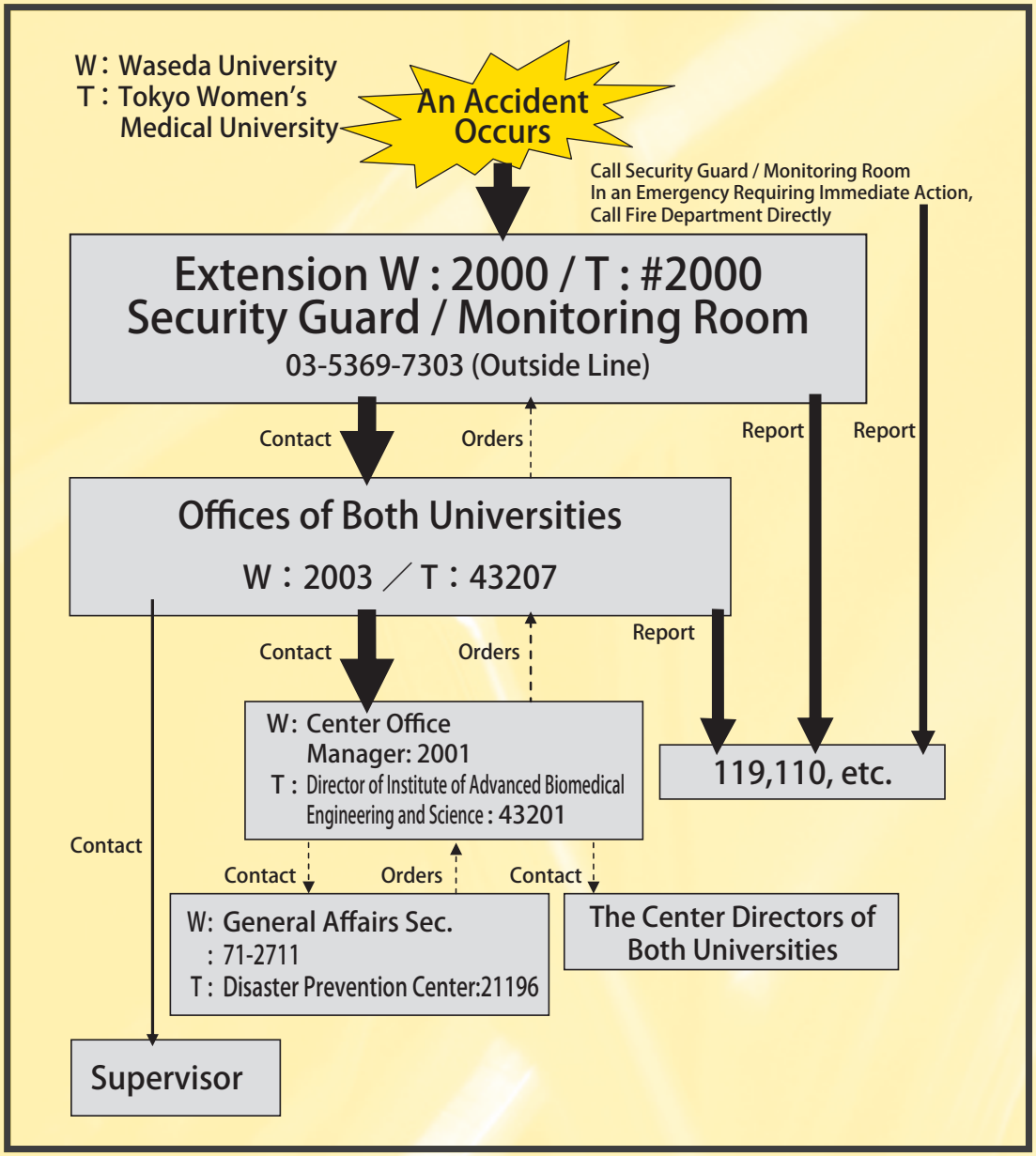

《Method of Contact》	From TWIns Extension Telephone	Direct Call (e.g. from Cell Phone)
Security Guard / Monitoring Room	(#)2000	03-5369-7303
Office of Center for Advanced Biomedical Sciences, Waseda University 3F	(#)2003	03-5369-7300
Advanced Biomedical engineering and Science Tokyo Women's Medical University 2F	43207	03-3353-8112
Supervisor (Dr. or Prof.)		Laboratory Home Cell Phone
Police	0-110	110
Fire Department	0-119	119
Tokyo Women's Medical University Hospital		03-3353-8111

TWIns Tokyo Women's Medical University - Waseda University
Joint Institution for Advanced Biomedical Sciences
2-2 Wakamatsu-cho, Shinjuku-ku, Tokyo 162-8480