MALT SAFETY GUIDE

— 2022 —

Micro Analysis Laboratory, Tandem accelerator

The University of Tokyo

Contents

1. Purpose of This Safety Guide

The purpose of this Guide is to prevent accidents, fires, and other incidents; define a code of conduct; and maintain the health of all persons using MALT, so that educational and research activities are executed safely and smoothly. All MALT users are required to be educated on the general matters stated in this Guide.

2. Things to Remember in an Emergency

- ☐ Contact information: Inform MALT manager of contact information for homes and other contact persons; and confirm MALT staff's phone number in case of sudden illness, accident, or other emergency.
- ☐ Evacuation routes: Confirm evacuation routes and sites, and emergency exits.
- ☐ Disaster prevention equipment: Confirm locations of fire extinguishers, fire alarms, fire hydrants, emergency showers, etc.
- ☐ Emergency bell or broadcast: Evacuate immediately.

3. General Safety Practices

- ☐ Always remember to keep the laboratories neat and organized.
- ☐ Secure two evacuation routes, and do not block these routes with boxes or other objects. Prevent items in the room from falling down, avoid storing cardboard boxes and other burnable items in common corridor spaces and in front of the fire shutters, and make sure the evacuation route indicators are clearly visible.
- ☐ Install electrical wiring only after thorough examination of the amount of power to be used and the electrical capacity of wires and outlets, and ensure that wires and connections do not overheat or short-circuit
- ☐ When leaving the workplace, turn off power to all devices not intended to run through the night.
- ☐ Appropriate measures against earthquakes should be taken for the furniture and equipment, etc. Use only heating appliances that have sufficient earthquake-proof characteristics, and do not place heaters near flammable objects.
- ☐ Smoking is not allowed except in designated smoking areas.
- ☐ Lock laboratories and other rooms when you go out, and check the room for safety before leaving.
- ☐ When you borrowed a MALT key, do not lend the key to others. Also, when using the key to enter MALT, do not enter with stranger
- ☐ When working with CRT displays and other visual display terminals (VDT), do not work continuously for more than one hour, and take breaks of 10 to 15 minutes before resuming continuous work.
- ☐ When going up and down the stairs, take hold of the handrail and pay attention so as not to fall down.

4. Emergency Procedures

4.1 Basics of Emergency Response

Ensure your own safety and Inform others

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Report using emergency network

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Respond (put out fires/help others)

Emergency network is posted on the wall beside door of each room.

4.2 Response to Fire and Explosion

MALT is the facility where radiation-generating apparatus is used. In case that a fire breaks out around MALT, it is required by law to report the situation to Nuclear Regulation Authority through Division for Environment, Health and Safety regardless of presence/absence of abnormalities.

Initial Response

○ Ensure personal safety.
○ When discovering a fire, first loudly alert others nearby.
○ Check the surroundings, and assist anyone who has been injured.
○ In case of explosion, immediately secure the device that caused the explosion to prevent further hazard. There is a risk of secondary accidents occurring nearby due to the blast wave or flying debris, so e sure to check the surroundings in addition to the source of the explosion.

Report

○ Press the fire alarm button. The alarm will sound, and the hydrant pump will start.
○ Contact the MALT staff or call 119 (firehouse).

Try to put out fire/Evacuation

○ Try to put out the fire to the extent that your own safety is secured (use fire extinguishers and fire hydrants).
○ Evacuate the premises (use the safest route available).
○ If there is a danger of a further explosion, evacuate the premises immediately.

4.3 Response to Earthquakes

Initial Response

○ Ensure personal safety.
The Earthquake Early Warning is broadcast when an earthquake of intensity 4 or greater is forecasted.

There is the risk of oxygen deficiency by insulation gas leakage from accelerator tank.

○ Put out fires.
○ Secure evacuation routes.
In the event of an earthquake of intensity 5 or greater, cancel all classes, experiments, and meetings.

Emergency response

○ Assist injured persons.
○ Respond to fires or leaks of harmful materials or damage of devices.
○ Report the situation to MALT staff (Request assistance if necessary).

Evacuate premises, and confirm safety of personnel

○ Move to the place in front of entrance of MALT.
○ Confirm safety of personnel.
○ Move to the place in front of Takeda building.

4.4 Response to Injury and Sickness

Initial Response

○ Summon help from others nearby.
○ Give injured people first aid if possible.

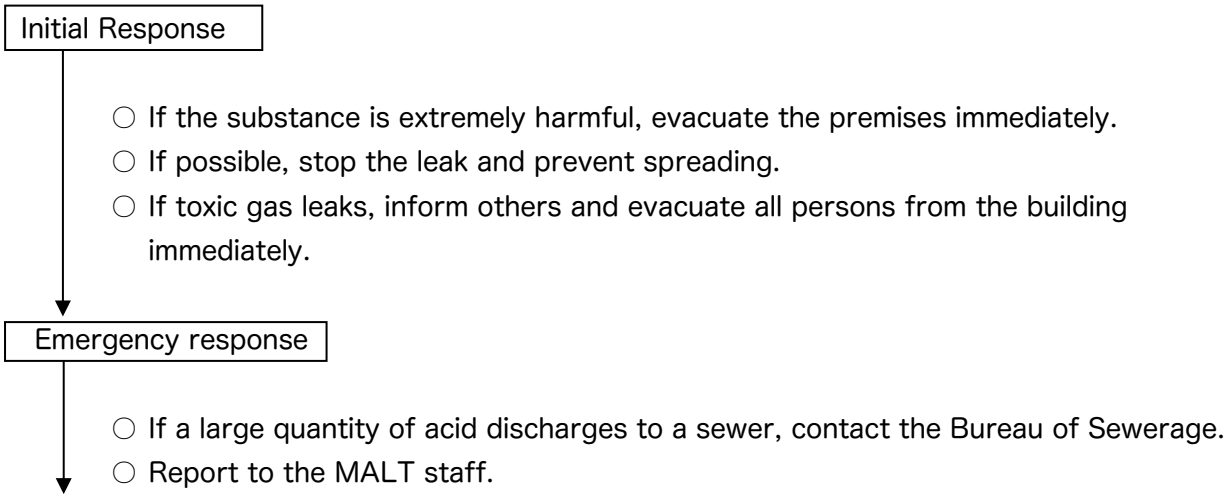
Emergency response

○ Call emergency services and go to hospital.
・Hongo Health Service Center: ext. 22573
・Univ. Hospital: ext.34100
*Someone needs to go with the injured person to the hospital.

Evacuate premises, and confirm safety of personnel

○ Report the accident to your supervisor and MALT staff.
○ Submit an accident report.

4.5 Response to Chemical leaks



4.6 Safety confirmation

- ❑ In the event of an accident, contact MALT staff.
- ❑ As soon thereafter as possible, submit an accident report via the online system.
- ❑ Near-miss incidents (that did not result in injury) must be similarly reported. The University of Tokyo compiles a database of these reports and utilizes it to prevent similar accident.
- ❑ Submit an accident report.

5. Safety Precautions when Carrying Out Research Activities

5.1 Basics of Safety Management

☐ Assess potential risks of substances and equipment to be used, and check related Acts and regulations.

☐ Conduct Risk Assessment for experiments.

※Consider replacing high-risk substances/equipment with lower-risk alternatives.

☐ Establish safety measures to avoid potential risks from becoming actual hazards.

☐ Conduct experiments and operations after implementing sufficient safety measures.

☐ Contact MALT staff if there are any questions or anything unclear.

5.2 Precautions while Conducting Experiments

(1) Always keep laboratories neat and organized.

(2) Clarify how to dispose of expected laboratory waste before the experiments.

(3) Do not leave excessive amount of chemicals on laboratory tables. Never leave containers of reagents of the floor.

(4) Protective equipment, such as protective glasses, etc., must be used according to the situation of the experiment.

(5) Those who conduct experiments must have a sincere attitude.

(6) As a rule, operations with a high potential for risk or damage should not be conducted at night or on holidays. Also, conduct such operations never alone.

(7) Check in advance the locations of emergency exits, and the locations and types of fire extinguishers as well as how to use them in case of an accident.

(8) Minimize unattended operations of equipment. If a device needs to be operated unattended, implement safety measures, and post emergency contact numbers.

(9) Notify MALT staff when bringing experimental instrument in MALT anew.

(10) There is a tendency to think of university laboratories as being immune to outside intervention, but in fact these laboratories are subject to the same safety and health regulations as company laboratories.

5.3 Management of Hazardous Materials

Many of materials used in chemical experiments are subject to legal regulations for handling and storage. If a material is assumed to same level of risk as the materials subject to regulations, sufficient safety measures must be taken even if not stipulated by act.

(1) Hazardous material should be handled and transported under guidance of persons with sufficient knowledge of the materials.

(2) Before using hazardous materials, consider measures to prevent accidents, and take all necessary precautions. If there is a risk of fire or explosion, persons handling these materials must use a protective board, etc., and have easy access to a fire

extinguisher. If there is a risk of poisoning, an exhaust system such as a fume hood, a protective mask, and other appropriate protective equipment must be used.

(3) Ensure that materials do not leak, and are not blown into the air or lost. Containers must be sturdy, and have lids or stoppers to ensure that the materials do not spill, leak, seep out, or evaporate.

(4) Use a local exhaust ventilation system (fume hood or draft chamber) when handling materials that may generate hazardous vapor or dust.

(5) In laboratories using volatile solvents, heaters with open flames must not be used.

(6) Confirm the locations of fire extinguishers. Particularly when there is a risk of fire, keep fire extinguishers close at hand.

(7) When going out of a room, always turn off the gas at the main valve.

(8) When conducting a potentially hazardous experiment, inform people in the vicinity in advance, and implement appropriate safety measures.

(9) When using a hazardous material, minimize the amount.

(10) Do not mix hazardous materials with non-hazardous waste (general waste). Follow the established disposal procedures for each type of material.

5.4 Management of Chemical Substances.

(1) Every time using chemicals, borrow the key of the cabinets from MALT staff. After using the necessary amount, return the rest to the cabinets.

(2) When chemicals are kept in sample bottles or other containers, always indicate the contents of such container clearly using labels, and dispose of them immediately when they are no longer needed.

(3) When chemicals are disposed of, follow the determined procedures.

(4) Every time using chemicals, fill out the form of “薬品使用記録ファイル (Chemical Use Record)”, and submit “実験終了報告書 (Experiment Completion Report)”.

5.5 High-pressure Gas and Liquefied Gas (Cryogen)

(1) High-pressure gas and liquefied gas should be handled by persons with sufficient knowledge of the materials, or under guidance of them.

(2) Handling cryogens, such as liquid nitrogen, requires completion of Cryogen Safety training offered by Cryogenic Research Center.

(3) When handling high-pressure gas, the University of Tokyo’s high-pressure gas self-management standards require safety measures for hazardous gases.

(4) Gas cylinders should be tied up with bands or chains at two points so as not to turn over and fall down.

(5) When handling high-pressure gas, pay enough attention to the explosion.

(6) Gas cylinders should be removed immediately if it was used up or it is no longer used.

5.6 Hazardous Equipment/Operation and Safety

(1) When handling equipment that involves high temperatures, high pressure, high voltage, high speed, or heavy weight, implement sufficient protective measures, and handle such equipment with care.
(2) When handling equipment with which you have little experience, take special care in preparations. Prior to use, check every part of the equipment if possible. Persons using equipment for the first time must receive instruction beforehand from an experienced person.
(3) Equipment that requires proficiency to operate should only be handled after receiving training in basic operation. Using such equipment without due consideration may result in serious damage.
(4) Always check equipment carefully after use. If any disorder is found, fix it or inform the staff of that.
(5) Have a thorough knowledge of how to use protective equipment. If necessary, conduct training so that such equipment can be used appropriately.
(6) After using protective equipment, pay close attention to disinfection of the equipment and sanitary storage.
(7) Before using glass instruments, make sure there is no crack.

5.7 Radiation generating Apparatus and Radioactive Materials

Handling the radiation generating apparatus and radioactive materials must comply with the Radiation Damage Prevention Regulations of MALT.

If there is any abnormality in accelerator or other apparatus, inform the staff of that.

6. Waste Disposal

6.1 Household Waste (Domestic Waste)

(1) Sort domestic waste following the rules specified by the Environmental Science Center (combustible waste, incombustible waste, plastics, PET bottles, beverage cans, glass bottles).
(2) Recyclable papers (magazine, cardboard documents such as copy papers, shredded documents, etc.) are put in recycling boxes in the buildings or the specified used paper collection place of each building.
(3) Re-sort general waste correctly at once when asked to do so.

6.2 Laboratory Waste

(1) All chemical materials considered harmful must be processed appropriately, even if they are not regulated by law.
(2) The reagent used by the experiment and the third cleaning solvent must be discharged as laboratory liquid waste.
(3) If there is no hazardous substance attached, syringe needles, syringes, unclean latex gloves, and sharp blades shall be disposed of as infectious waste (regardless of infections or not) using specified plastic containers. If mercury is present, dispose of them as waste with mercury. If other hazardous substances are present, dispose of them as Classification L.
(4) Clean, sterilized latex gloves, chips, pipettes, tubes, Petri dishes without residual attached, etc. shall be disposed of as “other laboratory plastic waste”.
(5) In principle, batteries, capacitors, etc. shall be taken back by the supplier. If the supplier is not known, contact the MALT staff.
(6) Take your own samples and measured cathode with you.
(7) Unknown reagents and unknown waste materials (liquid or solids) cause safety problems as well. Therefore, no such unknown materials should be generated under any circumstances.