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Instructions on Laboratory Safety Management

Enacted on 07/28/2016, Instruction No. 49

Amended on 11/20/2016, Instruction No. 55

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Chapter 1 General Regulations

Article 1 (Purpose) The purpose of these instructions is to establish the safety standard required to ensure the safety of laboratories in Ulsan National Institute of Science and Technology (hereinafter referred to as "UNIST") and the establish research environment and contribute to the efficient safety management work and prevention of safety accidents in accordance with the Act on Establishment of Safety Environment for Laboratories (hereinafter referred to as the "Laboratory Safety Act.")

Article 2 (Scope) These instructions must be applied to all research and experiment laboratory affiliated to UNIST and everyone who conducts research and experiment.

Article 3 (Definition of Terms) The definition of terms used in these instructions is as follows.

1. "Laboratory" means an experiment room, a practice room, an experiment preparation room, etc. equipped with research facilities, equipment and materials for research and development in science and technology fields.
2. "Head of a research entity" means the President who represents UNIST.
3. "Laboratory director" means a person who directs, manages, and supervises research and development activities in science and technology fields and the research workers, such as an advisor, a head of department (school) and a director of research institute (director of the center) who is in charge of research and

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development projects.

4. "Research worker" means students (undergraduates and graduate students), researchers and research assistants engaged in research and development activities in the field of science and technology.

5. "Laboratory safety manager" means a person who performs laboratory safety management and accident prevention work among research staffs in the laboratory concerned.

6. "Safe laboratory environment manager" means a person who assists the head of a research entity on technical matters related to laboratory safety and supports the department staff in charge of safety and instructs the laboratory staff in charge of safety management.

7. "School safety manager" means a person who is assigned to the department that manages the laboratory and is designated as the staff in charge of school safety and is responsible for the laboratory safety management work.

8. "Laboratory management department" means departments, research institutes (research centers), administrative departments, etc. that are in charge of the safety management of the laboratory concerned.

9. "Safety management department (hereinafter referred to as the "Safety Team") is the department that oversees the safety management works of UNIST.

10. "Safety check" means the act of investigating the risk factors inherent in the laboratory by a person who has experience and skills inspecting by visual inspection or an inspection device.

11. "Thorough safety inspection" means the investigation and evaluation conducted by a person with a standard or qualification prescribed by the Presidential Decree for the purpose of finding potential hazards and establishing remedial measures in order to prevent hazards that may occur in the laboratory.

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12. "Laboratory accident" means a case where a research worker suffers a loss in life and body, such as injury, illness, physical disability or death in relation to the research activity in a laboratory, or the facilities or equipment in a laboratory is damaged.

13. "Serious laboratory accident" means an accident in which the degree of loss or damage is severe among the laboratory accidents, and refers to the following accidents.

A. Accidents where death or residual injuries suffered by one or more persons

B. Accidents involving 2 or more people had injury that requires at least 3 months of convalescence at the same time

C. Accidents where there are at least 5 persons injured or ill at the same time

D. Accidents caused by serious defects of the laboratory in accordance with the law

14. "A risk element" means a potential factor that can become the cause of safety accidents in the laboratory currently or in the future and bring a casualty or property damage.

15. "A harmful factor" is a factor that can cause accidents, such as a chemical or physical risk element.

16. "Preliminary harmful factor risk analysis" means a pre-analysis of harmful factors before the start of research and development activities.

Chapter 2 Organization and Duty

Article 4 (The Head of a Research Entity) ① The head of the research entity must comply with the relevant laws and the government guidelines, and take final

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responsibility for the safety of the laboratory on behalf of UNIST.

② The head of the research entity must take safety as the top priority in all decision making and establish and implement the regulations and policies necessary for securing the laboratory safety and creating the safety environment.

③ The head of the research entity must necessary deliberative bodies and departments in charge for safety management and secure and organize related budget.

④ The head of the research entity must conduct the education and training, safety check and diagnosis necessary to raise awareness on safety and prevent accidents in the laboratory, and maintain safety related facilities and equipment.

Article 5 (Laboratory Safety Environment Manager) ① The laboratory safety environment manager must be appointed according to the Laboratory Safety Act in order to assist the head of the research entity and instruct the person in charge of the laboratory safety manager. In this case, the laboratory safety environment manager must be in charge of the safety management of the laboratory only.

② The qualification of the laboratory safety environment manager must be pursuant to the Laboratory Safety Act.

③ The laboratory safety environment manager has the following responsibilities and obligations.

1. Establishment and implementation of laboratory safety check and thorough safety diagnosis execution plan
2. Establishment and implementation laboratory safety training plan
3. Investigation of cause of the accident in laboratory and technical guidance and advice to prevent recurrence
4. Maintain and manage statistics on safety environment and safety management status of the laboratory

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5. Recommendations for measures to be taken against research workers violate of safety-related laws and regulations such as Laboratory Safety Act, government guidelines, and regulations and orders of UNIST
6. Matters concerning the safety of research facilities pursuant to other laws and regulations
7. Other matters required in relation to safety and health of the laboratory

Article 6 (Laboratory Director) ① The head of the research entity must designate 1 person having the following requirements in each laboratory as the laboratory director in order to prevent accidents in the laboratory and to secure the safety of research workers.

1. The laboratory director or a faculty member in the assistant professor or higher rank
2. The person who directly guides, manages and supervises research and development activities and research workers of research laboratory
3. A person with authority and responsibility for the use and safety of the laboratory

③ The laboratory director has the following responsibilities and obligations.

1. Responsibility for the safety of research and development activities in the laboratory
2. Compliance with safety-related laws, government guidelines, and provisions of UNIST
3. Education on harmful factors in the laboratory for research workers
4. Giving instructions to the laboratory safety officer to perform routine inspections of the laboratory and to remove any harmful or risk elements found
5. Execution of follow-up measures such as periodic inspection, special inspection, and thorough safety diagnosis on laboratory safety

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6. Execution of a preliminary risk analysis of hazardous factors including safety status of the laboratory, hazard analysis by hazard factor, laboratory safety plan, emergency plan, etc. prior to the commencement of research and development activities

7. Other matters required for safety and health in the laboratory

Article 6-1 (School Laboratory Manager) ① The head of the school or the track must be appointed as the school laboratory manager. The school laboratory manager must assist the head of the research entity and supervise the safety management work of each school.

② The school laboratory manager must be responsible for the matters specified in the following clauses for safety management. (However, each laboratory manager must perform the task in the fundamental course school.)

1. Compliance with safety related regulations
2. Management and supervision of a person related to safety in each school
3. Prevention, taking measures against, and report of accidents
4. Activities to establish and promote safety culture
5. Establishment and education of the emergency response plan of the school
6. Execution of risk assessment in each area

Article 7 (Laboratory Safety Manager) ① The laboratory director must designate the person in charge of safety management in the laboratory among the research workers in the laboratory to efficiently perform the safety management work of the laboratory concerned.

③ The laboratory safety manager has the following responsibilities and obligations.

1. Conduct daily inspection of the relevant laboratory and report the results to the school safety manager and the laboratory director

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2. Improve unsatisfactory and inadequate matters in the laboratory and report it to the school safety manager and the laboratory director
3. In the case of change in spatial information of the laboratory, report it to the school safety manager
4. Manage safety-related equipment such as Material Safety Data Sheet (MSDS) and personal protective equipment
5. Other matters required for safety and health in the laboratory

Article 8 (School Safety Manager) ① The head of the research entity must designate the school safety manager in order to support the safety work of the safety team and to instruct and support the laboratory safety work and the research workers of the school.

③ The school safety manager has the following responsibilities and obligations.

1. Execution of safety-related tasks as determined by the Laboratory Safety Management Committee
2. Verification of the various harmful and risk elements of the laboratory and the result of the improvement measures and the change of the spatial information and reports to the safety team
3. Preparation and storage of safety related documents for the laboratory, and supply of administrative information such as safety management instructions for research workers
4. Other matters required for safety and health in the laboratory

Article 9 (Research Worker) A research worker has the following responsibilities and obligations.

1. Compliance with safety related laws and regulations such as Laboratory Safety Act, government guidelines, regulations and instructions of UNIST

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2. Acceptance and fulfillment of matters requested by personnel such as the laboratory director, laboratory safety manager, and school safety manager
3. Completion of legal safety education and training [Table 1]
4. Learning risk information related to research and experiment and wearing suitable personal protective equipment for research and experiment
5. Report of the risks exposed in the laboratory to the laboratory director or the laboratory safety manager
6. Other matters required for safety and health in the laboratory

Chapter 3 Laboratory Safety Management Committee

Article 10 (Establishment and Operation of the Laboratory Safety Management Committee) ① The Laboratory Safety Management Committee must be established for the safety and security of laboratories at UNIST, and for the deliberation and resolution of matters necessary for the efficient safety management.

② The Laboratory Safety Management Committee must consist of the following.

1. Chairman (ex officio member): Vice president for research affairs
2. Member (ex officio member): Vice president for academic and student affairs, dean of Admissions and Students, dean of administrations, and leader of safety team
3. Member (appointed member): A person appointed by the president with the recommendation of the chairman
4. Secretary (appointed position): Leader of the Safety Team

③ The term of office of the chairman and ex officio members must be the period of the person's term of office, and the term of the other committee members must be the period of safety work.

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④ The laboratory safety management Committee must deliberate and resolve the matters in the following clauses.

1. Establishment and amendment of laboratory safety regulations
2. Establishment and implementation of basic protocol for safety management of laboratory
3. Accident prevention and investigations and establishment and implementation countermeasures in case of an accident in laboratory
4. Establishment of a budget execution plan for laboratory safety
5. Deliberation on other important matters concerning laboratory safety

⑤ The Laboratory Safety Management Committee must deliberate on the serious accidents that occur in the laboratory in the following clauses.

1. Serious accidents in the laboratory as defined in Article 1-2 of the Enforcement Regulations of Laboratory Safety Act
2. Accidents with more than 100 million won worth of property damage estimated by the competent fire department
3. Matters concerning compensation for the victim and punishment of persons cause the accident

Article 11 (Meeting) ① The meeting must be convened by the chairman when the chairman recognizes the need or when there is a request of a majority of the committee members.

② The meeting can be held as a convened meeting or a written resolution in accordance with the decision of the chairman.

② The committee meeting must be composed of a majority of the committee members including the chairman and be voted on by a majority vote of the members present. However, in the case of an equal number of votes, the chairman decides yes

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or no.

④ If it is deemed necessary by the chairman, the chairman can bring a person who is related to the proposed agenda to the committee to state the person's opinion.

Chapter 4 Safety Education and Safety Inspection and Diagnosis

Article 12 (Safety Education and Training) ① The head of the research entity must regularly or occasionally give the education and training necessary for safety assurance and accident prevention for research workers.

② Research workers must complete regular education and training.

③ The time and contents of education and training that research workers must complete are as shown in [Table 1].

④ All new students in a degree program, full-time and part-time faculty members, researchers (including research assistants) must complete the education and training due to admission or new recruitment.

⑤ The faculty member in charge of an experiment and practice course must give safety education related to the course before experiment and practice.

Article 13 (Measures to be Taken against Person Fails to Take Safety Education and Evaluation) ① The laboratory director must restrict access to the laboratory of a person who have not completed the legally required safety education.

② The head of the research entity can disclose the information of laboratories and researchers who failed to complete or pass the legally required safety education, and can impose necessary sanctions.

③ The laboratory director must be responsible for the incident caused by the entrance

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of the laboratory by a person who has not completed the legally required safety education or an outsider who is not enrolled in UNIST.

Article 14 (Daily Inspection) ① The laboratory safety manager must visually inspect the state of storage of machinery, instruments, electricity, drugs and pathogens used for research and development activities, and register the results in the daily inspection record in the safety management system.

② The supervisor of the laboratory must direct and supervise daily inspections, and can limit the research activities of research workers who have not conducted daily inspections.

③ The laboratory safety manager must obtain an approval from the laboratory director and submit the results of the daily inspection to the school safety manager before the next month's safety inspection day, and the school safety manager must collect all the results of the daily inspection and submit it to the safety team.

Article 15 (Regular Inspection) ① The safety team must regularly inspect the stored status of machinery, appliances, electricity, medicine, and pathogens used in research and development activities, and the management status of protective equipment every year.

② The Safety Team must notify the school or department concerned of the results of the regular inspection, and the laboratory director must submit the results of the complementary and improvement measures to the Safety Team.

Article 16 (Special Inspection) ① The Safety Team can carry out special inspections in cases where there is a possibility of an extremely dangerous safety accident, such as an explosion or a fire, or where it is deemed necessary for ensuring the safety of the laboratory.

② The Safety Team must notify the school or department concerned of the results of the special inspection, and the laboratory director must submit the results of the

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complementary and improvement measures to the Safety Team.

Article 17 (Thorough Safety Diagnosis) ① The Safety Team must conduct a thorough safety diagnosis on a regular or occasional basis in accordance with the Thorough Safety Diagnosis Guidelines established by the Laboratory Safety Act, when it is deemed necessary for ensuring laboratory safety and accident prevention.

② The laboratory subject to thorough safety diagnosis is one corresponding to the following clauses.

1. Laboratories dealing with hazardous chemicals specified by the Chemicals Control Act
2. Laboratories dealing with harmful factors stipulated in the Occupational Safety and Health Act
3. Laboratories dealing with toxic gas stipulated in the Decree of the Ministry of Science and ICT (Amended on 09/05/2017)

③ Thorough safety diagnosis must be conducted at least once a year.

④ The Safety Team must notify the school or department concerned of the results of the thorough safety diagnosis, and the laboratory director must submit the results of the complementary and improvement measures to the Safety Team.

Chapter 5. Safety Measures in the Laboratory

Article 18 (Obligation of Observance) In order to secure laboratory safety and prevent accidents, the laboratory director, the laboratory safety management manager, the school safety manager, and the research worker must first comply with the related regulations and the regulations of UNIST and diligently fulfill the requirements of the head of the research entity.

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Article 19 (List of Safety Management Objects) (1) The laboratory director must register and manage the list of safety management objects through the laboratory safety management system.

② The laboratory director must check the safety management status of gas, chemical, dangerous machines and instruments, bio, and laser on a regular or occasional basis to secure laboratory safety and prevent accidents.

Article 20 (Safety and Health Sign) ① The laboratory director must attach and manage the sign of risk group for each laboratory on the laboratory safety information signboard installed at the entrance of the laboratory.

② The laboratory safety management manager must attach signs of prohibition, caution, warning, instruction, guidance, etc. on facility, material, etc., which have harmful or risk factors or that can have accidents or affix the markings where they can be easily identified by persons who enter the laboratory to prevent safety accidents in the laboratory.

③ The form of the safety and health sign is the same as [Table 2].

Article 21 (Standards and Safety Measures of Safety Facilities) ① Any person who intends to install safety facilities related to gas, chemicals, etc. in the laboratory must consult with the Facility Team in advance and install safety facilities in accordance with the relevant laws and regulations.

② Flammable and toxic gases must be stored in an outdoor storage or an exclusive cylinder-type cabinet that has received the complete inspection certificate of or Korea Gas Safety Corporation. Depending on the type of gas, necessary measures such as linking a gas leakage alarm and an appropriate neutralizing and detoxification device must be taken.

③ The high-pressure gas facility must be constructed by a qualified company with type 1 gas construction industry license.

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④ Any person who uses a specific or special high pressure gas must report the use to the competent district office and use it after receiving the complete inspection of the Korea Gas Safety Corporation.

⑤ Safety devices such as eyewash stations and emergency showers must be installed in places where toxic, corrosive and skin irritant materials are handled.

⑥ Harmful chemical substances must be handled in a fume hood to prevent harmful chemical substances from being exposed to human body, and a separate local exhaust system must be installed if necessary.

⑦ There must be no obstacles in the vicinity of the eyewash station and the emergency shower.

⑧ Harmful chemical substances must be stored in a reagent cabinet with proper performance by appearances, and the negative pressure of the reagent cabinet must be maintained through forced exhaust.

⑨ When dealing with genetically modified organisms, pathogens, and infectious substances, bio-safety work tables must be used.

Article 22 (Experiment at Out of Hours) ① When a research worker conducts experiments out of work hours such as at night and on holiday the research worker must obtain permission from the laboratory director in advance.

② The laboratory director must sufficiently educate the research workers to understand the safety rules, the measures in case of an accident, and the precautions before conducting experiments.

Article 23 (Material Safety Data Sheets) ① When handling gas and chemical substances, the research workers must learn safety and health related information by using Material Safety Data Sheets (MSDS) beforehand, and check related laws and regulations and various rules.

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② The laboratory director must obtain MSDS of all the materials used in the laboratory, such as gas, chemicals, etc., from the place of purchase and learn and stored MSDS.

Article 24 (Incoming and Release of Gas and Chemical Substances) ① When gas or chemical substances are bringing into the laboratory, gas or chemical substances must be registered in the list of safety management objects of the laboratory safety management system (incoming).

② When gas or chemical substances are released or disposed the laboratory, the gas or chemical substances must be registered in the list of safety management objects in the laboratory safety management system (release).

③ The laboratory director must check occasionally whether the actual status of the gases and chemicals stored in the laboratory is consistent with the status on the list of safety management objects in the laboratory safety management system.

Article 25 (Obligations of Users of Gas) ① Users of gas must comply with relevant laws and regulations and various rules and comply with facilities and technical standards for gas use facilities.

② The laboratory supervisor must notify the school safety manager in advance when using flammable and toxic gas in the laboratory.

③ Users of gas users must be familiar with safety regulations, measures to take in case of an accident, precautions, etc., and take primary responsibility for safety management of the gases they use.

④ Users of gas must inspect the safety status of the gas facilities on a daily basis and record and maintain the results, and if there is a problem, the users of gas must report it to the laboratory director and the school safety manager without delay.

⑤ If flammable and toxic gases are used, the laboratory director must store gas

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containers in an outdoor storage or in a gas cylinder cabinet certified by Korea Gas Safety Corporation, and must have sufficient safety equipment to prevent gas accidents such as gas leakage alarms, automatic shutoff valves, and neutralizing and detoxification devices.

⑥ The laboratory director must notify the Safety Team when importing high pressure gas containers.

Article 26 (Obligations of Users of Chemical Substances) ① The users of chemical substances must comply with relevant laws and regulations and various rules and take necessary safety measures to prevent accidents.

② In case of using a chemical substance required to be notified to or approved by the relevant authorities in accordance with relevant laws and regulations, the users of the chemical substance must notify the Safety Team and then report the use or obtain permission.

③ The laboratory director must have adequate facilities and equipment to prevent accidents and hazards to human body and environment due to chemical substances. In addition, the laboratory director must educate the chemical user safety rules, measures in case of an accident, and precautions.

④ Users of chemical substances must obtain permission from the laboratory director in advance to use the substances and take primary responsibility for safety management of the chemical substances they use.

⑤ The laboratory director must instruct the user of the chemical substances to purchase and use the minimum amount of chemical substances required.

⑥ Users chemical substances must wear suitable personal protective equipment and work within safety equipment or safety facilities such as fume hoods and glove boxes.

⑦ Users chemical substances must dispose of used chemical substances and expired

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chemical substances using a safe and appropriate method.

Article 27 (Obligations of Users of Hazardous or Dangerous Machines and Instruments)

① The users of hazardous or dangerous machines and instruments must comply with relevant laws and regulations and various rules and take necessary safety measures to prevent accidents.

② If a hazardous or dangerous machine and instrument user uses an instrument that is subject to mandatory safety certification in accordance with relevant laws and regulations, the user must confirm whether the instrument has received the safety certification and use it after receiving the safety certification.

③ The laboratory director must notify the Safety Team in advance of the use of hazardous or dangerous machine and instrument and undergo a safety inspection in accordance with relevant laws and regulations.

④ The laboratory director must install appropriate protection devices for all hazardous or dangerous instruments in accordance with related laws and regulations and educate users of hazardous or dangerous machine and instruments safety rules, measures for accidents, and precautions for handling.

Article 28 (Firefighting Facilities, etc.) ① When installing or changing firefighting facilities, the Facility Team must be consulted beforehand and the construction must be proceed in accordance with relevant laws and regulations and various rules.

② The laboratory director must provide 1 fire extinguisher per 33 m² of space for firefighting in all laboratories.

③ The following actions that interfere with the normal functioning of firefighting facilities must be strictly prohibited.

1. Closing or damaging fire doors or automatic fire shutters for firefighting areas
2. An action of obstructing evacuation by installing obstacles in the evacuation

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passage

3. An action of closing or damaging the evacuation passage

4. An action of arbitrarily changing other firefighting and evacuation-related facilities

Article 29 (Management, Disposal, etc. of Reagents and Dangerous Substances) ①

Reagents and dangerous substances must be safely and separately stored at the reagent cabinet and designated places.

② All containers must be marked with warning signs (name of contents, suppliers, warning signs, hazard risk statements, precautionary statements, etc.).

③ The reagents and dangerous substances must be distributed only for the amount necessary for the experiment and the practice, and the remaining amount must be recovered and stored at the designated place.

④ Reagents and dangerous substances accumulated due to research projects, completion of experiment and graduation the user must be disposed because they are dangerous in terms of environmental safety such as the limited space, conduction, ignition, and unclearness of sources.

⑤ Waste disposal standards such as waste reagents and reagent bottles must be in accordance with "Standards for Disposal of Household Waste and Designated Waste" in [Table 3].

Article 30 (Emergency Network and Instructions on Emergency Action) ①

The laboratory director must provide "Emergency Contact Network and Instructions on Emergency Action" in [Form 1] in order to minimize damages in the event of a safety accident.

② The telephone number of the laboratory director or manager, all-source situation room, safety management department, nearby fire department, and hospital

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emergency room must be recorded in the emergency network.

③ Laboratory or practice room users must take emergency measures in case of a safety accident or danger of safety accidents in the laboratory or practice room in accordance with the emergency network and instructions of emergency action.

Chapter 6 Health Checkup and Subscription of Insurance

Article 31 (Health Checkup) ① Research workers must receive a general health checkup every year in accordance with the School Health Law.

② Research workers handling hazardous substances and harmful factors specified in the Enforcement Decree and the Enforcement Regulations of the Occupational Safety and Health Act must receive special health checkups.

Article 32 (Report on the liquidation) ① The research worker must report the liquidation of the dangerous substances such as gas, chemicals, etc. and the experimental equipment that the research worker has used upon graduation, transfer, leave of absence or retirement.

② The research worker must prepare a 'Dangerous Substances and Laboratory Equipment Liquidation Report' and submit it to the school safety manager with the signature of the laboratory director.

③ The school safety manager must confirm and sign the contents of the liquidation report (return, disposal, handover, etc.), keep the liquidation report for 3 years, and send 1 copy to the Safety Team by the day before the safety inspection day every month.

④ The form of Dangerous Substances and Laboratory Equipment Liquidation Report is as [Form 2].

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Article 33 (Insurance Subscription) ① The head of the research entity must, in accordance with the standards set by the Laboratory Safety Act, subscribe the insurance with the research workers as the insured and beneficiary in preparation for the injury or death of the research workers and include the cost of insurance in the annual budget.

② The type of insurance to subscribe must be insurance that cover for life and bodily damage such as injury, illness, physical disability, and death resulting from an accident occurring in the laboratory.

③ At the time of insurance, the head of the research entity must report the fact to the head of the government department concerned of UNIST.

Article 34 (Subject to be insured) The person to be insured must be selected by the Safety Team annually and be insured under the standards prescribed by the relevant laws and regulations. However, research workers who fall under any of the following clauses must be excluded from the subject of insurance.

1. Research workers compensated under the Industrial Accident Compensation Insurance Act
2. Research workers compensated under the Public Officials Pension Act, the Pension for Private School Teachers and Staff Act or the Veteran's Pension Act

Chapter 7. Report and Investigation of Accidents in Laboratory

Article 35 (Report of Accident) ① The accident site must be kept as is until the investigation of cause of accident is completed, and it must not be changed or damaged without the instructions of the laboratory safety environment manager.

② The laboratory director must report the details, contents, and degree of damage of

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the accident to the Safety Team without delay as the [Form 3] "Laboratory Accident Report."

③ If a serious laboratory accident occurred or it is difficult to identify the cause, it can be outsourced to an external professional agency.

④ The head of the research entity must prepare a laboratory accident investigation sheet prescribed in the Laboratory Safety Act and report it to the head of the government department concerned of UNIST within 1 month from the date of the accident when a laboratory accident that has caused damage to the life or body of the research worker has occurred.

Article 36 (Investigation of Accidents) ① The Safety Team must promptly provide relief measures when an accident occurs, and request support from the competent fire department if necessary.

② The laboratory safety environment manager must closely examine details, contents, and degree of damage of the accident and report to the Laboratory Safety Management Committee according to the severity of the accident.

③ The head of the research entity can request an external expert or special agency to investigate the accident if it is a serious accident or a technical cause is required.

④ The Laboratory Safety Management Committee must review the accident investigation sheet and report it to the head of the research entity by establishing measures to prevent recurrence and follow up measures to prevent accidents.

⑤ The head of the research entity must publish accident cases to prevent accidents and recurrence.

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Chapter 8 Laboratory Safety Management Cost

Article 37 (Appropriating of Safety Management of Laboratory) ① The head of the research entity must appropriate the expenses necessary for the following clauses as laboratory safety management cost in the annual budget to secure the laboratory safety and the safety environment.

1. Insurance premium
2. Installation, purchase, maintenance and repair of facilities and equipment for laboratory safety
3. Safety inspection and thorough safety diagnosis
4. Education and training for research workers
5. Professional training for the Lab Safety Environment Manager
6. Health checkup
7. Purchase of protective equipment for research workers
8. Provision of information on safety management
9. Other necessary matters to secure safety and create safety environment in the laboratory

② If the director of the research entity decides the research fund for the research project, the amount of 1% to 2% of the total labor cost must be appropriated as the laboratory safety related expenses.

Article 38 (Use of Laboratory Safety Management Cost) ① In case the safety management cost of the laboratory is appropriated to the research fund for the research project, the research project manager must first execute the cost. After the term of the research project ends, the execution balance must be absorbed into the designated account of the Safety Team.

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② The Safety Team must use the absorbed laboratory safety management costs for the matters required to create safe environment in the laboratory.

Chapter 9. Administrative Measures

Article 39 (Deliberation Decision on Restriction on Laboratory Use and Administrative Measures) ① Administrative measures in violation of the safety management rules of the laboratory, such as the occurrence of environmental safety accidents and remedial measures, must be implemented by the Laboratory Safety Management Committee or the head of the research entity and take effect within 7 days.

② In the event that it is difficult to convene a meeting for any unavoidable reason, the meeting may be replaced by a written resolution.

Article 40 (Request for Review) ① If the decision on administrative measure is deemed unreasonable, a request for review may be filed within 5 days from the date of receipt of the request or order, in accordance with [Form 4] "Request for Review."

② As a result of the review, administrative measures can be reduced if there are reasonable reasons, and the results must be announced within 3 days from the decision date.

Addenda (07/28/2016)

Article 1 (Effective Date) These instructions shall enter into force on the date the President grants approval.

Article 2 (Interim Measures) Any matter that has been processed before the enactment of these instructions must be deemed to have been dealt with in these instructions.

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Addendum (11/20/2016)

These instructions shall enter into force on the date the President grants approval.


Addendum (09/05/2017)

These instructions shall enter into force on the date the President grants approval.

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[Table 1]






Time and Details of Education and Training of Research Workers (In Relation to Article 9, Paragraph 1)

Program	Subjects	Time	Contents
1. Regular education and training	Research Workers (All programs such as undergraduate, graduate, and doctorate and researchers)	No less than 6 hours for every half year	<ul style="list-style-type: none"> • Matters concerning laws and regulations for safety environment for laboratories • Matters concerning harmful factors in laboratories • Matters concerning safe research activities • Matters concerning MSDS • Other matters concerning safety management of laboratories
2. Education and training according to new recruitment, etc.	New research workers (including contract workers)	No less than 8 hours	<ul style="list-style-type: none"> • Matters concerning laws and regulations for safety environment for laboratories • Matters concerning harmful factors in laboratories • Matters concerning handling and use of protective equipment and safety devices • Matters concerning cases of accident and measures to prevent accidents in the laboratory • Matters concerning safety signs • Matters concerning MSDS • Other matters concerning safety management of laboratories
	Researchers who employed in universities and research institutes and newly engage in research and development activities (undergraduate students, graduate students, etc.)	No less than 2 hours	
3. Special education and training	In the case of a major laboratory accident or change of research details, research worker who are deemed necessary by the head of the research entity	No less than 2 hours	<ul style="list-style-type: none"> • Matters concerning harmful factors in laboratories • Matters concerning safe research activities • Matters concerning MSDS • Other matters concerning safety management of laboratories
Verification of completion of education	- Access the portal homepage – Laboratory Safety Management System, then My Page  Verification of completion of education - Status of completion of education can be searched by individual or period		
<p><u>Note</u> Regular education and training can be conducted <u>in the form of cyber education</u>. In this case, only those who score more than 60 points out of 100 points must be deemed complete the education. (However, education time must be recognized for a person who attends collective education.)</p>			









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[Table 2] Safety and Health Signs




Chemical Substances

Explosives		<p>DANGER</p> <p>Explosive; mass explosion hazard</p>
Flammable gases 1		<p>DANGER</p> <p>Extremely flammable gas</p>
Flammable gases 2		<p>WARNING</p> <p>Flammable gas</p>
Aerosols		<p>DANGER</p> <p>Extremely flammable aerosol</p>
Oxidizing gases		<p>DANGER</p> <p>May cause or intensify fire; oxidizer</p>



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<p>Compressed gas Liquefied gas Dissolved gas</p>		<p>WARNING</p> <p>Contains gas under pressure; may explode if heated</p>	
<p>Refrigerated liquefied gas</p>		<p>WARNING</p> <p>Contains refrigerated gases; may cause cryogenic burns or injury</p>	
<p>Flammable liquids</p>		<p>DANGER</p> <p>Highly flammable liquid and vapour</p>	
<p>Self-reactive substances and mixtures Organic peroxides</p>		<p>DANGER</p> <p>Heating may cause a fire or explosion</p>	

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<p>Pyrophoric liquids Pyrophoric solids</p>		<p>DANGER</p> <p>Catches fire spontaneously if exposed to air</p>
<p>Self-heating substances and mixtures</p>		<p>DANGER</p> <p>Self-heating; may catch fire</p>
<p>Substances and mixtures which, in contact with water, emit flammable gases</p>		<p>DANGER</p> <p>In contact with water releases flammable gases which may ignite spontaneously</p>

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<p>Oxidizing liquids Oxidizing solid</p>		<p>DANGER</p> <p>May cause or intensify fire; oxidizer</p> 
<p>Corrosive to metals</p>		<p>WARNING</p> <p>May be corrosive to metals</p> 
<p>Acute toxicity</p>		<p>DANGER</p> <p>Fatal if swallowed(oral) Fatal if contact with skin(dermal) Fatal if inhaled(gas,vapour,dust,mist)</p> 
<p>Skin corrosion /irritation</p>		<p>DANGER</p> <p>Causes severe skin burns and eye damage</p> 
<p>Serious eye damage/ Eye irritation</p>		<p>DANGER</p> <p>Causes severe eye damage</p> 

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Respiration sensitizer



DANGER

May cause allergy or asthmatic symptoms or breathing difficulties if inhaled



Skin sensitizer



WARNING

May cause an allergic skin reaction



Germ cell mutagenicity



DANGER

May cause allergy or asthmatic symptoms or breathing difficulties if inhaled



Carcinogenicity



DANGER

May cause cancer



Specific target organ toxicity



DANGER

Causes damage to organs



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Aspiration hazard



DANGER

May be fatal if swallowed and enters airways



Acute hazards to the aquatic environment



WARNING

Very toxic to aquatic life



Hazardous to the ozone layer



WARNING

Harms public health and the environment by destroying ozone in the upper atmosphere



Organism

**No.4 Hazard Group
BioSafety LEVEL 4**



DANGER

BioSafety LEVEL 4
Avoid exposure: Obtain special instruction before use



**No.3 Hazard Group
BioSafety LEVEL 3**



WARNING

BioSafety LEVEL 3
Do not enter unless escorted



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No.2 Hazard Group
BioSafety LEVEL 2



WARNING

BioSafety LEVEL 2
 Do not enter unless escorted



No.1 Hazard Group
BioSafety LEVEL 1



CAUTION

BioSafety LEVEL 1
 Wear suitable protecting clothing and gloves



Radioactive Materials or Hazardous Instruments

Radioactive Materials



CAUTION

Radioactive Material
 Avoid exposure/Do not touch



Hazardous Instruments
 (Presses, grinders, hoists, etc.)



CAUTION

Hazardous Instruments
 Do not operate without special instructions



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[Table 3]

Standards for Disposal of Household Waste and Designated Waste

1. Classification of Waste

Division		Remarks
Household waste	General waste	Waste generated during the daily life of a person
	Recyclable waste	Recyclable general waste (scrap paper, cans, and plastic)
Designated waste	Chemical waste	Corrosive waste, waste oil, waste oil agent, waste toxic substance (waste reagent), glasses (beakers, etc.), and other byproducts (reagents, plastic, vials, gloves, tissues stained with reagents)
	Medical waste	All designated wastes that may be contaminated (Culture fluid, containers, slides, syringes, gloves, adsorbed paper generated after biological experiments)

※ Syringe must be discharged as medical waste.

2. Waste Discharge Method

Laboratory Waste		Statues of Consigned Waste Disposal			Disposal Method		
		Type	Classification	Processing Method	Due Date	Date and Time	Special Remarks
Laboratory wastewater	Organic wastewater	Organic solvent	Designated waste	High temperature incineration	45 days	Every Monday, Wednesday, Thursday, Friday at 12:00	.Only about 90% of the collection container capacity must be collected .No more than 2 collecting containers must be stored indoors, and organic wastewater must be discharged within 45 days after the start of collection .No wastewater discharge to all sinks
	Acid wastewater	Laboratory wastewater	Designated waste	Physical and chemical treatment etc.	Frequently	Thursday, Friday at 12:00	
	Alkali wastewater						
	Inorganic wastewater						
Waste reagents	Reagents to dispose	Toxic waste	Designated waste	High temperature incineration	Notice period	Notice date and time	.The remaining reagent in the reagent bottle should never be collected (mixed) in a separate container. .Divided by appearances, box packaging
폐시약	Laboratory reagent containers and rubber gloves stained with reagent and waste test instruments such as laboratory rubber gloves, syringes, pipettes, Kimwipes, etc.						
Waste reagent containers	Waste glass bottles	Waste glass	Industrial waste (Designed upon discharge)	Recycle	Frequently	Frequently	.Must be washed 2-3 times before discharge .Washing water must be discharged as laboratory wastewater .The reagent-stained waste reagent container and waste test instruments must be discharged as the waste reagent (discharge must be minimized by washing as much as possible) .Waste test instruments note stained with reagent must be discharged as industrial (daily) waste
	Waste plastic bottles	Waste synthetic resin					
	Rubber gloves washed due to stain by reagent and waste test instruments such as laboratory rubber gloves, syringes, pipettes, Kimwipes, etc.						
	Waste metal cans, etc.	General waste					
Medical waste	Animal carcasses, blood, blood products, etc.	Tissue waste	Designated waste	General incineration	15 days	Every Tuesday 12:00	.Date of use start date immediately after input .Disposal due date (15 or 30 days) must be observed .A disposal slip must be attached to a dedicated container for disposal .LMO-related wastes must be treated and discharged as waste reagent (must be discharged after elimination of biological activity) .Must not be added to general waste
	Bandages, gauze, etc., containing blood, secretions, and excretions	General medical waste					
	Culture media, culture containers, stored strains, waste test tubes, waste gloves, waste media, etc. used for tests and examination	Pathological waste					
	Waste vaccines, , waste anticancer drug, and waste chemotherapeutic agents	Biochemical waste					
	Syringe needles, surgical blades, acupuncture needles, broken glass test instruments, etc.	Damaged waste					
Other wastes							. Waste treatment consultation (Ext. 8282)

3. Obligation of a Person who Discharge Waste

- A. All wastes generated from laboratories and practice rooms must be treated and stored adequately.
- B. The laboratory director must check the type and amount of waste generated in the laboratories and practice rooms, and pay attention to safety management in disposal of waste.

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[Table 4]

Criteria of Administrative Measures

1. General Criteria

- A. If there are two or more violations or administrative measures in violation of the upper legislations, the more severe measure criteria must be followed.
- B. Administrative action criteria based on the number of violations must apply if same violation is committed again within a year.
- C. If the reason has not been eliminated after the administrative action period, the period can be extended.
- D. In case of experimental activities was conducted during the period of administrative measures, the laboratory of the person who approved the research activities and the person who performed the research must be withdrawn and disciplinary action must be proposed in accordance with relevant laws and regulations and the rules.
- E. If the violation is not severe and it is recognized that the violation can be rectified in a short period of time, the corrective action can be ordered only for the 1st violation.
- F. Violations not listed in the individual criteria must be dealt in accordance with the disposition criteria for similar violations listed in the individual criteria, only when there is an order of corrective action from a government agency in accordance with related laws and regulations.
- H. Administrative measures of the state (city and province) government agency caused by failure to comply with relevant laws and regulations must be carried out by the laboratory director (advisor) and the offender.
- I. Administrative measures of the state (city and province) government agency caused while performing justifiable research activities in compliance with relevant laws and regulations must be carried out by the safety management department.

2. Individual Criterion

A. Matters Related to Preventive Activities

Violation Frequency Violation Type	1 st Violation	2 nd Violation	3 rd Violation
1. Failure to comply with regulations and safety guidelines 2. Failure to follow instructions (guidance, supervision) 3. Neglecting hazardous elements	Correction order	- Correction plan submitted by the laboratory director - Execution of special safety education and submission of evidential materials	5 days of restricted access to the laboratory <Laboratory director, manager, research worker>
4. Failure to complete safety education	Correction order	Restricted access until the completion of education	-
5. Concealment and false reports of the accident	5 days of restricted access to the laboratory	-	-

B. Matters Related to Occurrence of Accidents

Division	Accident occurred for the 1 st time	Same (repeated) accident occurred	Remarks
1. Environmental waste accident	Restricted access for 3 days	Restricted access for 5 days	
2. Minor accident	Restricted access for 3 days	Restricted access for 5 days	
3. Severe accident	Laboratory closed for 5 days	Laboratory closed for 7 days	

※ Support for laboratory environment improvement projects for laboratories that were subject to administrative action in these instructions must be limited.

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[Form 1]

Emergency Network and Instructions on Emergency Action

A. Emergency Network

Division	Affiliation	Name	Office	Mobile Phone
Laboratory director				
Laboratory safety manager				

Department Name	Task	Phone No.	Department Name	Task	Phone No.
Safety Team	Laboratory safety	1542	Operation	Security	0112
	LMO	1544		Electricity	6980
	Radiology	2504		Waste	8282
All-source situation room	Situation room (Day/night)	0119		Gas	6975
Healthcare center	Minor injuries	4012		General facilities	6966
Good Samjeong Hospital	Emergency room	052-220-7600			
119 safety center	In case of emergency	119 (no area code)			

B. Instructions on Emergency Action

In Case of Fire

1. Operate the fire hydrant transmitter installed in the hallway and notify the accident to the people nearby.
2. Notify the safety management department of fire.
 - A. Day: The Safety Team of the all-source situation room
 - B. Night: The all-source situation room or 119 Fire Center
3. If the fire can be easily put out, extinguish the fire with a fire extinguisher.
4. If the fire cannot be put out in early stage, close the door of the laboratory where the fire occurred and evacuate safely.
5. Quickly evacuate the people in the building and report the accident to the laboratory director (advisor).

In Case of Injury

1. If the injury is minor, contact the Healthcare Center for treatment.
2. If the injuries are determined to be serious or on weekends, call the 119 Fire Center for assistance.
3. Perform first-aid until the healthcare center staff and 119 paramedics arrive.
4. Report the accident to the laboratory director (advisor) and the laboratory safety manager.

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[Form 2]

Dangerous Substances (Gas, Chemicals) and Laboratory Equipment Liquidation Report

1. Personal Information

Dept.		Program	<input type="checkbox"/> Undergraduate <input type="checkbox"/> Graduate <input type="checkbox"/> Ph.D	ID No.		Name	
Contact info.	- Telephone No. (Home) : - Mobile phone: - Email:						

2. Liquidation Details

Gas			Chemicals			Research Equipment			
Name of Gas	Disposal	Received by	Name of Chemical	Disposal	Received by	Name of Equipment	Disposal	Received by	
		(Seal)			(Seal)			(Seal)	
		(Seal)			(Seal)			(Seal)	
		(Seal)			(Seal)			(Seal)	
		(Seal)			(Seal)			(Seal)	
		(Seal)			(Seal)			(Seal)	
※ Other safety measures									
School Safety Manager							Confirmation:		(Seal)

※ Preparation instructions

- Prepare the report for each gas, chemical, and experiment equipment (if necessary, add the page).
 - If the item is returned or disposed, mark (✓) on the disposed section (Signature of the recipient not required.)
 - In the case of handover of gas, chemical drugs, laboratory machinery or instruments, the name and signature of the recipient are required.
 - Special precautions related to the material and equipment being liquidated must be recorded in the Other Safety Measures section.
 - After completing the details of the liquidation, obtain the signature of the advisor and **submit it to the school safety manager.**
 - **The school safety manager must receive the liquidation report, check the safety details and take necessary measures.**
- (Storage period: 3 years)

Mm dd yyyy

Prepared by:

(Seal)

Confirmed by Advisor:

(Seal)

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[Form 3]

Laboratory Accident Investigation Sheet

Institution Name (Address)			
Date and time of accident	(yy mm dd time)	Location of accident	
Casualties	<i>○ Personal details of the research worker who had accident</i> <i>- Name, age, identity, type and extent of injury</i> <i>- Estimated duration of treatment and if it will be cured completely:</i>		
Property damage	<i>○ About thousand won / None when there is no property damage</i> <i>- Details of property damage and the ground (from fire department, etc.)</i>		
Cause of accident and details of occurrence	<i>Record the material handled involved in the accident, contents of the research activities of the research worker (or victim) at the time of the accident, and process of the accident occurrence</i> <i>- Record five W's and one H (when, who, where, what, how, why) and attach the picture of the scene of accident</i>		
Current measures and future plans	<i>Record the status of the internal reporting, etc. and future plan (treatment and recovery) until the reporting date</i>		
Laboratory safety management status	Division	Record of laboratory safety management status	
	Preparation of safety management regulations	<i>Whether it is prepared and the date of preparation</i>	
	Execution of periodic inspection		
	Execution of thorough safety diagnosis		
	Insurance subscription for research workers	<i>Write as subscribed (name of insurance, date) or not subscribed</i>	
	Execution of laboratory safety education	<i>Write the status of education</i>	
	Safety and maintenance expenses of laboratory	Planned in the budget of the institution: Appropriated in the research fund: Total:	thousand won thousand won thousand won
Future recurrence prevention plan	<i>A detailed plan must be attached</i>		
Confirmed by person concerned (dd/mm/yyyy)	Head of a research entity Head of a laboratory safety management department Safe laboratory environment manager Laboratory director		(Sign or seal) (Sign or seal) (Sign or seal) (Sign or seal)

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[Form 4]

Request for Review

Requested by	Name		Position	
	School		Track	
	Name of Laboratory	(Tel:)		
Disposition request and details of instructions	Date of disposition	(dd/mm/yyyy) ~ (dd/mm/yyyy)		
	Details			
Purpose and reasons of claim (in detail)				
<p>I hereby request a reconsideration as above pursuant to Article 14 (Request for Review) of the Laboratory Safety Management Instructions.</p> <p style="text-align: right;">(dd/mm/yyyy)</p> <p style="text-align: right;">Applicant (Seal)</p> <p>Attachment: pages including the cover</p> <p style="text-align: center; margin-top: 20px;">To Chairman of Laboratory Safety Management Committee of UNIST</p>				