



**FACULTY OF
CHEMISTRY AND METALLURGY
OCCUPATIONAL HEALTH
AND SAFETY COMMISSION**

Yıldız Technical University
Faculty of Chemistry and
Metallurgy, Davutpaşa Campus
Esenler, İstanbul – Türkiye

LABORATORY SAFETY AND WORKING RULES

A. GENERAL RULES TO FOLLOW IN THE LABORATORY

1. Show responsible behavior during your time in the laboratory. Tampering the laboratory equipment, pulling pranks and irresponsible behavior is not tolerated.
2. Follow all written and verbal rules carefully. In cases where the rules are not fully understood, consult the appointed laboratory supervisor.
3. Do not touch any equipment, supplies or materials in the laboratory without the permission of the laboratory supervisor.
4. No materials or devices should be taken out of the laboratory without the permission of laboratory supervisor.
5. Only carry out permitted and approved tests. Do not perform any experiments when the laboratory supervisor is not in the laboratory. Inform the laboratory supervisor in case of out of hours working.
6. Never leave an experiment unattended unless approved by the laboratory supervisor. If you need to leave the laboratory, ask your classmate/colleague to check on your experiment on your behalf.
7. Working out of hours is subject to permission given by the dean's office, FR-1251 permission form must be obtained from the laboratory manager, filled out and submitted to your department by Wednesday of each week.
8. Never eat food, drink, smoke, chew gum or taste anything in the laboratory.
9. Wear appropriate and protective clothing. Do not wear open-toed shoes, sandals, shorts or shirts with wide sleeves. Tie up long hair at the nape of your neck and avoid wearing dangling jewelry.
10. If you receive instructions, use protective glasses, gloves and a mask. Never remove the protective glasses during the experiment. There are no exceptions to this rule!
11. Keep your hands away from your face, eyes and mouth when using technical materials and equipment or working with chemicals. Wash your hands with soap and water before leaving the laboratory.
12. Keep your work area and laboratory room clean and tidy. Bring only laboratory instruction booklets, workbooks, and writing utensils to the work area. Personal belongings should be stored in an area that will not disrupt the laboratory environment.
13. Contact lenses should not be used in the laboratory.
14. Eyes should always be protected except when weighing on a precision scale. It is useful to wear safety glasses. In order to prevent any irritation of the eyes due to gases, it is necessary to wash the eyes frequently with cold water.
15. If there are cuts, wounds or similar conditions on the hands, they should only be covered with a waterproof tape before working, otherwise working is prohibited.
16. If you have any health problems (diabetes, asthma, etc.), please declare this in writing to the laboratory supervisor.
17. Laboratory doors and windows should be kept closed while working, and unnecessary and sudden movements that may spread microorganisms or spores should be avoided.
18. Water, gas taps and electrical switches should be turned off when not in use.
19. After your experiment is completed, clean all work areas and equipment. Return all clean and working equipment to the appropriate storage area. All chemicals should be secured and gas taps should be turned off from the main tap. The pressure settings of gas cylinders should never be tampered with. Cylinder changes should definitely be left to the laboratory supervisors.
20. Dispose of sharps appropriately – put broken glass in the glass waste bin, metals in the metal waste bin, and other waste items in the designated bin(s). Secure cutting tools such as needles, spikes, probes, blades, etc.
21. Report any security breach-related situations or events you become aware of to your laboratory manager/consultant, security chief (4055) and 112 Emergency, depending on the level of urgency.
22. After completing the work, hands should be washed with soapy water and, if necessary, an antiseptic liquid.



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B. GENERAL RULES TO FOLLOW WHEN WORKING WITH CHEMICALS

1. Use all chemicals in the laboratory with care within the scope of safety. Avoid contact of chemicals with your eyes, skin, clothes or mouth.
2. Solid substances should always be removed from the bottles with a clean spatula. The same spatula should not be used to take another substance without cleaning.
3. Bottle caps (the side in contact with the bottle) should never be placed on the table. Otherwise, since the cap will be contaminated with impurities, when it is placed back into the bottle, the impurities may come into contact with the pure substance or solution in the bottle and spoil it.
4. Substances in containers closed with lids and stoppers should never be heated, and heating and boiling should not be carried out in containers that do not have a fire-resistant sign.
5. Some chemicals react with each other, causing fires, violent explosions, or creating toxic products. Such substances are called incompatible chemicals. These should always be kept in separate places. Chemicals that need to be stored separately in the laboratory are given in Table 1.
6. Chemical substances should not be mixed haphazardly as this may cause danger.
7. In laboratories, all container containing chemicals should be labeled. The label should be read carefully before use. When chemicals are transferred from one container to another, it should not be forgotten to label the new container. The label should include preparation date, storage period, sample owner, properties of the solution/sample and other necessary information.
8. Even if the chemicals taken from the bottle are not used, they should never be put back into the original bottle, and a pipette should not be dipped into the original bottle.
9. The pipette used to take a solution should not be inserted into a different solution bottle.
10. Poisonous and caustic solutions should not be withdrawn from the pipette orally. For this process, pipe, pipettor or any other similar device or vacuum should be used.
11. Flammable liquids should only be kept in the required amount in a closed container on the test bench and should be kept away from heat sources (burner flame, electric heater, etc.).
12. When a liquid in the tube is to be heated, the tube should be heated slowly from the top to the bottom and the tube should be shaken very gently continuously. Tubulure should not be pointed towards yourself or the person working next to you, and you should never lean over and look into the tube.
13. Chemicals should never be spilled into sinks or other places. Act in accordance with the instructions of the laboratory manager regarding the disposal of waste generated during the experiment.
14. Very volatile substances such as gasoline, ether and carbon sulfide should not be used in the laboratory where there is a flame, no matter how far away it is. Ether vapors can burn from the flame 5 meters or even further away, and those burning vapors can carry the fire.
15. Breathing toxic vapors and gases should be avoided. Acids such as sulfuric acid, nitric acid, hydrochloric acid, hydrofluoric acid and substances containing poisonous gases such as bromide, hydrogen sulfide, hydrogen cyanide and chloride should be used in a fume hood.
16. When diluting all acids and alkalis, they should always be poured slowly over the water, never the other way around.
17. If a chemical substance and/or sample is spilled into the laboratory environment, it should be cleaned immediately using a "spill kit" and/or appropriately, and the situation should be reported to the laboratory technical personnel when necessary.
18. If mercury is spilled in any way, it should be collected by vacuum source or foam type synthetic sponges. If the amount is too small to be collected, it should be rendered harmless by sprinkling powdered sulfur on it.
19. Mercury-containing parts of thermometer shards or mercury residues should never be thrown into the trash or sink.
20. If corrosive or caustic substances such as acids or bases drip or splash on the skin, they should be washed immediately with plenty of water.
21. Cleaning, sanitation and disinfection operations should be carried out periodically in each section of the laboratory according to written instructions, and records should be kept.
22. When moving chemicals from one part of the laboratory to another, they should be carried carefully and safely. When carrying chemicals, two hands should be used; one hand should hold the cap tightly while the other hand should grasp the bottom of the bottle.



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23. If it is necessary to transport chemicals, biological substances or samples from one laboratory to another, a strong, protected basket, wheelbarrow, etc. should be used. It is strictly forbidden to carry it without protection.

Table 1. List of Chemicals That Should Be Stored Separately in Laboratories

Chemical	Chemicals required to be stored seperately
Active Carbon	Calcium hypochloride, oxidizing substances
Alkali metals (Na, K, etc.)	Hydrocarbons and their aqueous solutions, water
Ammonia	Mercury, chlorine, iodine, bromine, calcium
Ammonium nitrate	Powdered metals, flammable liquids, sulfur, chlorates, all acids, nitrites
Aniline	Hydrogen peroxide, nitric acid
Acetic acid	Chromic acid, nitric acid, hydroxyl-containing compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetylene	Fluorine, chlorine, bromine, copper, mercury, silver
Acetone	Concentrated nitric acid, concentrated sulfuric acid
Copper	Acetylene, hydrogen peroxide
Bromine	Ammonia, acetylene, butane and other petroleum gases, turpentine
Mercury	Acetylene, ammonia
Fluorine	All substances
Silver	Acetylene, oxalic acid, tartaric acid, ammonia, carbon dioxide
Hydrofluoric acid	Ammonia
Hydrogen peroxide	Copper, chromium, iron, metals and metal salts, flammable liquids, aniline, nitromethane
Hydrogen sulfide	Nitric acid, oxidizing agents
Hydrocarbons	Fluorine, chlorine, bromine, chromic acid, sodium peroxide (benzene, ether)
Hydrocyanic acid	Nitric acid, alkalis
Iodine	Acetylene, ammonia
Calcium oxide	Water
Chlorine	Ammonia, acetylene, butane and other petroleum gases, turpentine
Chlorates	Ammonia, powdered metals
Chromic acid	Acetic acid, glycerin, some alcohols, flammable liquids, turpentine
Sulfur hydrogen	Nitric acid, oxidant gases
Nitric acid	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids and gases
Oxygen	Oils, grease, hydrogen, flammable liquids, flammable solids and flammable gases
Oxalic acid	Silver, Mercury
Perchloric acid	Acetic anhydride, alcohols, carbon tetrachloride, carbon dioxide
Potassium permanganate	Glycerin, ethylene glycol, benzaldehyde, sulfuric acid
Sodium nitrate	Ammonium nitrate, other ammonium salts
Sulfuric acid	Chlorates, perchlorates, permanganates
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, halogens



C. GENERAL RULES TO FOLLOW WHEN WORKING WITH BIOLOGICAL SUBSTANCES

1. Laboratory gloves and clothing suitable for the study should be used to minimize the risk of infection during the study.
2. The surface where the experiment is carried out should be disinfected.
3. Hands must be washed when the work is completed.
4. Extreme care should be taken when working with sharp materials such as syringes, pipettes and scalpels.
5. When the study is completed, the syringe needles should be placed in the appropriate waste container in the laboratory.
6. Contaminated materials should be placed in appropriate waste containers with special gloves in accordance with predetermined procedures.
7. All cultures should be treated as potentially pathogenic and the following precautions should always be observed:
 - a) Cultures should always be labeled.
 - b) In the laboratory, cultures should always be transported in a tube stand.
 - c) Cultures in liquid media should never be pipetted orally.
 - d) Cultures should not be taken outside the laboratory.
8. Biosafety cabinets must be used to carry out studies on microorganisms and pathogens that pose a risk of contamination in a healthy and safe manner.
9. Before starting work, it is necessary to ensure that a safe air flow occurs after the fan is turned on.
10. Before starting the study, all materials required for the experimental study should be placed in the biosafety cabinet.
11. Care should be taken when the employee frequently puts his or her hand or arm in and out of the biosafety cabinet, as this will affect the safety of the airflow in the cabin.
12. All work should be carried out in a biosafety cabinet.
13. After the work is completed, the materials used should not be removed from the biosafety cabinet immediately, they should be waited for approximately 5 more minutes to ensure that the aerosols in the environment are removed.
14. Serious precautions should be taken when using sharp objects such as needles, glass pipettes and scalpel tips.
15. The syringe needle should not be placed in its container after use and should not be broken or bent. It should be disposed of in the appropriate waste container for cutters.
16. A basket or cart should be used to transport glass containers containing liquids, culture media, or cell cultures within or between buildings.
17. Biological waste must be collected in designated places labeled “Solid biological waste” or “Liquid biological waste” and disposed by autoclaving procedure at 121°C for 20 minutes under the supervision of the laboratory manager.
18. Dry, insulated cryogenic gloves should be worn when handling objects that come into contact with dry ice, cryogenic liquids and vapors.
19. Tongs should be used to remove objects immersed in a cryogenic liquid.
20. A face shield or protective glasses should be used during the transfer and handling of cryogenic liquids.
21. Dry ice should not be inhaled.
22. No biological or chemical materials should be poured into the sink.
23. Areas where there is a risk of exposure to UV light should not be entered. UV protective glasses, hood, apron and gloves should be used in rooms with UV installation.



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D. RULES TO FOLLOW WHEN WORKING WITH GLASS MATERIALS

1. Broken glass materials should never be used. Dirty or cracked glassware should not be used. Especially when carrying long glassware, care should be taken to keep them upright.
2. Rubber stoppers should not be placed on broken glass tubes or pipes with sharp ends. Such extremes; The gas stove should be smoothed with sandpaper or file.
3. Special gloves or cloth should be used to prevent cuts on hands when cutting glass and corking.
4. Thermometer, pipette etc. Glassware that can roll should be placed on the laboratory bench in a way that prevents them from falling to the floor.
5. Glass tube, thermometer etc. A lubricant should be used before placing the materials on the cork. One must be very careful against sudden breaks, do not apply excessive force, and gloves must be worn.
6. Hot glassware should not be placed in a cold environment or on the workbench. This process may cause the glass material to crack or break. It should be held with wooden tongs until it cools.
7. Since the appearance of cold and hot glass is the same, heated glassware should not be placed in a random place without any warning.
8. Glassware should be washed with distilled water after use.
9. Broken glass materials should never be touched with bare hands. Broken glass materials should be swept up immediately and carefully thrown to a suitable place. Broken glass should be thrown into the “broken glass bin”, not the trash.

E. RULES TO FOLLOW WHEN USING LABORATORY DEVICES

1. Before working with any electrical circuit or electronic device, always make sure that the buttons are in the off position.
2. You must work in pairs or teams when operating electrical circuits or electronic devices other than computers.
3. When dealing with electricity, hands and the area touched should be dry, there should be no metal, and electrical plugs should not be removed by pulling on the cord. In order to be able to carry out some operations immediately when necessary, sufficient electrical knowledge must be obtained, and major repairs must be carried out by qualified technicians.
4. When any device is used for the first time in the laboratory, laboratory technical personnel should be informed and the necessary information should be obtained from them, and the device usage instructions should be read.
5. The temperature of heating devices should not be controlled manually.
6. Devices such as ovens and ovens should not be used with plastic gloves. Tongs should be used when working at high temperatures.
7. Materials washed with solvents should not be placed in the oven to dry due to the risk of explosion.
8. Care should be taken to ensure that the sample containers and tongs do not touch the oven wall.
9. The precision scale should be closed and unloaded when not in use.
10. The balance of the precision scale should be checked. In equilibrium, the air bubble in the spirit level should be centered.
11. Care should be taken not to spill chemicals on or around the precision scale. Spilled chemicals should be cleaned with a brush.
12. The ventilation system must be operated before using fume hoods.
13. When working with a fume hood, chemical substances should be placed at least 15 cm from the front of the fume hood and the window of the fume hood should be kept closed as much as possible.
14. When working in a fume hood with explosive or flammable chemicals, the electrical connection of all devices must be made in advance.



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F. RULES TO FOLLOW IN DANGER AND ISSUES REQUIRING FIRST AID

1. In case of chemical substance splashing on the skin or eyes, it should be washed with plenty of water and the person exposed to the accident should be immediately taken to the nearest health institution.
2. Chemical burns that may occur in the laboratory should first be washed with plenty of water, clean cold water or indirectly ice should be applied until the pain subsides, and depending on the level of exposure, the person exposed to the accident should be immediately transported to the nearest health institution.
3. In case of chemical substance such as acid burns, wash with plenty of water. If the burn is under clothing, no attempt should be made to remove the clothing. Apply ointment/spray etc. to the wound. No application should be made. The burn should never be touched by hand. The person who was exposed to the accident should be immediately taken to the nearest health institution.
4. If the fire alarm goes off while you are in the laboratory, turn off all gas valves and electrical equipment before going out.
5. Fire, emergency service, natural gas malfunction etc. In case of an emergency, 112 Emergency number should be called.
6. When a fire breaks out, the door should be closed and help should be sought to prevent the fire from spreading. When help arrives, fire extinguishers are used. If a person is on fire, a fire blanket should be used to prevent contact with air.
7. Clothes should never be run in case they catch fire; try to extinguish the flame by rolling on the ground and call for help.
8. In case of cuts or bleeding; the wound and its surroundings are cleaned and covered with gauze. Depending on the severity of bleeding, pressure can be applied with a loose or tight tampon. The person who was exposed to the accident should be immediately taken to the nearest health institution.
9. If one eye is irritated, the unirritated eye should be protected immediately; the other eyelid should be opened and washed with water or eye cleaning liquid for at least 15 minutes.
10. Care should be taken to carry out the washing process from the upper level of the nose towards the ears, to ensure that the other eye is not affected and that washing water contaminated with chemicals does not come into the eye again.
11. In case of chemical ingestion, the person exposed to the accident should be immediately taken to the nearest health institution.
12. If the chemical is inhaled, the area should be evacuated, the exposed person should be provided with fresh air and a health institution should be contacted.
13. Be informed about emergency procedures. Know the locations of fire extinguishers, first aid cabinets, emergency showers and emergency exits.



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Student's Risk, Waiver and Consent Acceptance Form

1. I accept the activity voluntarily and with my own consent.
2. I am physically able to participate in the activity. I declare that I do not have any incapacity or disability that would prevent me from participating in the activity or could cause injury to me or anyone else.
3. I accept personal responsibility for all consequences that may arise from negligence of the discharged items, including injury, permanent disability or death, as well as damage caused by negligent persons.
4. I knowingly and freely assume responsibility for all risks, including foreseeable and unforeseen risks, even risks that may arise from my negligent behavior or that others may ignore; and I take full responsibility for my own involvement.
5. I hereby declare that I will bear and indemnify all relevant losses, damages, debts or expenses that may arise from my participation in the activity and that may arise as a result of the negligence of any or all of the discharged items.
6. I knowingly and with my free will assume responsibility for all work, including the Covid-19 epidemic that I may be exposed to; and I take full responsibility for my own involvement. If I am diagnosed with Covid-19 disease, I will immediately inform the advisor responsible from me; I understand and accept that my internship and/or laboratory work will be terminated immediately.

By signing this waiver, I acknowledge that I have read and fully understand all clauses in the waiver; I acknowledge and declare that I will follow all the rules specified in the waiver and that I have signed it voluntarily of my own free will. I declare that no other verbal representation, statement or encouragement has been made other than the agreement clauses written above. I am over eighteen (18) years of age and a legal adult; I declare that I will fully, adequately and completely consider the discharged articles and that I will fully maintain my intention in this direction. I fully understand and accept that by working in a research laboratory, I may engage in activities that may expose me to risky and hazardous substances.

I agree to adhere to all departmental security policies and procedures.

I am over eighteen (18) years of age and a legal adult; I declare and confirm that I fully understand all clauses, related risks and my responsibilities specified in this risk, waiver and consent acceptance.

Student Name: _____

Student Number: _____

Cell No: _____

E-mail: _____

Department: _____

Laboratory Name: _____

Advisor/RP Name: _____

Working Dates: Between _____ and _____

Person/People to be notified in case of an emergency:

Name(s): _____

Relation Degree(s): _____

Telephone (home): _____

Telephone (cell): _____

Signature: _____

Date: _____