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ENVIRONMENTAL ENGINEERING DEPARTMENT

LABORATORY SAFETY AND WORKING RULES

GENERAL RULES FOR LABORATORIES

1. It should be kept in mind that the laboratory is an environment where serious work is carried out, and it is forbidden to act in a way that could disrupt the order or cause danger in laboratories.
2. All verbal or written rules must be carefully followed, any unclear issues should be asked to laboratory technical personnel, and it is not allowed to work in the laboratory without permission.
3. Students are not allowed to work in laboratories except weekdays and weekends without authorization.
4. The laboratory should not be entered without wearing an apron. Personal items like coats, jackets, handbags etc. should not be brought to the laboratory. The lab coat should be closed. Working with an open front apron is dangerous.
5. Eye and skin protective equipment such as glasses, face mask and gloves should be used according to the characteristics of the study during the period studied in the laboratory.
6. Contact lenses should not be used in the laboratory.
7. In case of chemical spills and glass fractures, always wear closed shoes.
8. Since long hair, shaky jewelry and loose dresses in the laboratory environment can cause danger, long hair should be collected at the back, shaky jewelry should be removed and loose dresses should not be worn.
9. Eating, drinking, and keeping food materials in the laboratory equipment are forbidden.
10. Hands should not be placed on the face and nothing should be taken into the mouth while working. Experimental studies should only be carried out as described and indicated by the laboratory technicians.
11. A method other than the one described and shown by the laboratory technicians must not be followed.

12. It should not be used alone in the laboratory, especially in a locked place. If the person is working on his/her own in compulsory situations, he/she has to explain the work he/she will do to another person in advance and inform them continuously.

13. The cleaning of the materials, the test setup and the test bench should be done with care before leaving the laboratory.

14. Before leaving the laboratory, gas valves and taps must be closed, unnecessary lights should be turned off.

15. After the work is finished, hands should be washed with soapy water and if necessary with an antiseptic liquid.

GENERAL RULES FOR WORKING WITH CHEMICALS

1. All chemicals in the laboratory are to be considered dangerous. For this reason, never taste or smell any chemicals. Never touch any chemical with your bare hands.

2. Always use a clean spatula to remove the solids from the bottles. Do not use the same spatula for different solids without cleaning.

3. Bottle caps (the side that touches the bottle) should never be placed on the table. Otherwise, because the cap is contaminated with foreign substances, these foreign substances may come into contact with the pure substance or solution in the bottle and disrupt it.

4. Materials in containers with lid and stopper must not be heated and heating and boiling should not be carried out in containers if the container does not have a flameproof sign.

5. Chemicals should not be mixed indiscriminately since this may create hazard.

6. Make sure that all chemical containers are appropriately labeled. The label must be read carefully before use. If the chemicals are transferred from one container to another container, new container should also be labelled. Containers must be labeled with the full chemical name, date of preparation, storage date, name of person who prepared the solution, properties of the solution and other necessary information.

7. Never return chemicals to their original containers even if they are not used and to avoid contamination never insert pipets into reagent bottles.

8. Do not use same pipette for different solutions.

9. Do not ever use your mouth to pull the liquid into a pipette.

10. Flammable liquids should be stored in a closed container on the test bench and kept away from heat sources (burner, electric heater, etc.).

11. When a liquid in the tube is to be heated, the tube should be gently heated from the top and the tube should be shaken very lightly. Point the mouth of the test tube away from yourself and all other people and never look down into it.

12. Chemical wastes must be collected according to the instructions of laboratory technical personnel and chemicals should not be poured into the sinks and other places.

13. Avoid inhalation of toxic vapors and gases. When using acids such as Sulfuric acid, nitric acid, hydrochloric acid, hydrofluoric acid and substances containing toxic gases such as bromide, hydrogen sulfide, hydrogen cyanide, and chlorine work in a fume hood.

14. While diluting acids you should always add acid to water. Never pour water on acid.

15. If the mercury is poured in any way, it must be collected with a vacuum source or foam type synthetic sponges. If its amount is too small to be collected, powder sulfur should be sprinkled on it.

16. If a mercury thermometer breaks, mercury and thermometer pieces containing mercury should never be thrown into the trash or the sink.

17. If chemical substances and / or samples are spilled into the laboratory environment, they should be cleaned immediately and laboratory technical personnel should be informed when necessary.

18. When transporting chemicals from one place to another, they must be handled carefully and safely. When carrying chemicals, two hands should be used, one hand must be held firmly on the lid and the other on the bottom of the bottle.

19. Chemical or other materials should never be taken out of the laboratory.

SAFETY DATA SHEETS (SDS)

Many of the chemicals used in laboratories are harmful to health. Knowing the properties of the chemicals is important both for health effects and determination of what will be the first aid after an accident. Before using chemicals, Safety Data Sheet (SDS) should be carefully examined and experimental studies should be carried out according to these information.

SDS contains following information;

1. Name of the chemical and contents

2. Manufacturer's information
3. Hazardous ingredients/identity information
4. Physical/chemical characteristics
5. Fire and explosion hazard data
6. Health hazard data
7. First aid data
8. Storage data
9. Reactivity and stability data
10. Data about spillage and leakage
11. Ecological and toxicological characteristics
12. Special precautions
13. Special protection data
14. Transportation data
15. Disposal data
16. Data about regulations
17. Other data

Note: Safety Data Sheets are available from manufacturer's web sites:

http://www.sigmaaldrich.com/safety-center.html

Some of the most frequently seen warning symbols on chemical bottles are given below.

	Explosive		Flammable		Oxidizing
	Gas Under Pressure		Corrosive		Toxic
	Health Hazard		Moderate Hazard		Environmental Hazard

RULES TO BE FOLLOWED WHILE WORKING WITH GLASS MATERIAL

1. Broken glass materials should never be used. Sharp tipped glass materials should be dulled in a burner flame.

2. Do not use dirty or cracked glass.

3. Particular care should be taken to carry the long glass objects upright.

4. Glass objects such as thermometer, pipette etc. that can roll should be placed on the laboratory bench carefully to prevent them falling down.

5. The lubricant should be used before placing the apparatus such as glass pipe, thermometer etc. in the cork ring. Precautions should be taken against sudden breakage, excessive force should not be applied and gloves should be worn.

6. The hot glass material should not be placed in a cold environment or on a workbench. This may cause the glass material to crack or break. The glass should be held with tongs until cool.

7. Since it is not possible to differentiate the hot and cold glass from their appearance, the heated glass ware 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 not be touched with bare hands. Broken glass materials should be swept off immediately and discarded carefully. Broken glass should be thrown into the "broken glass box", not into the waste bin.

RULES TO BE FOLLOWED WHILE USING A DEVICE

1. Prior to the first usage of any device in the laboratory, laboratory technical personnel should be informed and necessary information should be obtained from them and the instructions of the device should be read.

2. Pay special attention when using the burner. Hair and clothing should be kept away from burner flame.

3. Wooden tongs should be used if anything is heated in burner flame.

4. The burners or electric heaters should always be switched off when not in use.

5. In the heating or boiling process, it must be ensured that the container is not completely closed as there may be explosion due to pressure.

6. The temperature of the heating devices must not be controlled manually.

7. The current temperature setting should not be changed when using an oven or incubator. Laboratory technicians should be notified if necessary.

8. Devices such as oven and incubator should not be used with plastic gloves. Tongs should be used when working at high temperatures.

9. Equipment washed with solvents should not be placed in the oven to dry due to the risk of explosion.

10. Care should be taken to make sure that the sample containers and tongs do not touch the oven wall.

11. The precision scales must be closed and unloaded when not in use.

12. Check the balance of the precision scales. In the case of equilibrium, the bubble in the spirit level must be centered.

13. Care should be taken to eliminate the spillage of chemicals on or around the precision scale. Spilled chemicals must be cleaned with a brush.

14. Ventilation system must be operated before using fume cupboards.

15. When working with fume cupboard, the chemical materials should be placed at least 15 cm inside from the front of the fume cupboard and the glass of the fume cupboard should be kept close as much as possible.

16. The electrical connection of all devices must be done in advance when working on the fume cupboard with explosive or flammable chemicals.

17. Make sure that the hands are completely dry when connecting electrical appliances.

18. Devices should never be used if the usage directions are not fully known.

FIRST AID IN LABORATORY ACCIDENTS

Burns and Cutouts

1. In case of chemical splashes onto the skin or into the eyes, wash with plenty of water. The person exposed to the chemical should be delivered to the nearest health facility immediately.

2. Chemical burns in the laboratory should be washed with plenty of water first, clean cold water or indirect ice should be applied until the pain decreases. The person exposed to the accident should be delivered to the nearest health facility immediately according to the level of exposure.

3. In case of chemical burns such as acid burns, wash with plenty of water. If the burn is under the dress, dresses should not be attempted to be removed. The ointment / spray etc. should not be

applied to the wound. Do not touch the wound by hand. The person exposed to the accident should be delivered to the nearest health facility immediately.

4. The first thing to do when a fire comes out is to inform the authorities. In order to prevent the spread of the fire, the door must be closed and assistance should be sought. Fire extinguisher tubes are used to interfere the fire once the assistance is found. If a person is on fire, the fire blanket must be used to prevent contact with air.

5. Should not run if the clothes are on fire; should not attempt to extinguish the flame by rolling on the ground. Ask for help immediately.

6. In case of cuts or bleeding; the wound and the area is cleaned and covered with gauze bandage. Depending on the severity of the bleeding, a loose or tight buffer is used to apply pressure. The person exposed to the accident should be delivered to the nearest health facility immediately.

Irritation in eyes

1. If there is irritation in one eye only, the non-irritated eye must be protected immediately; the other eyelid should be opened and cleaned with water or eye cleaning liquid for at least 15 minutes.

2. It should be ensured that the washing process is carried out in the direction of the ears from the top of the nose in a way that the other eye is not affected and that the chemical contaminated washing water does not come back into the eye.

3. The contact lenses, if any, should be removed immediately for the effectiveness of the wash.

4. Health facilities should be contacted.

Swallowing a Chemical

The person exposed to the accident should be delivered to the nearest health facility immediately.

Breathing a Chemical

1. The area should be emptied and the exposed person should be provided with fresh air.

2. The health institution should be contacted.

3. If breathing stops (no breath sounds, no chest movement, and changing skin color), you should give artificial respiration within the time elapsed until you receive medical attention.

EMERGENCY RESPONSE PLAN		
INCIDENT	**LABORATORY WORKERS**	**LABORATORY TECHNICAL STAFF**
FIRE	- Inform the laboratory technical staff, department secretariat and other laboratory workers. - Do not interfere alone. - Remove flammable and combustible materials. - If a person is on fire, flame and air contact will be cut off by wrapping the person with fire blanket.	- For small-scale fires, use a fire extinguisher, turn off electricity and natural gas, and evacuate the laboratory. - Inform Head Of Department and Directorate of Internal Services - Call 110.
CHEMICAL SPILL	- Inform the laboratory technical staff and other laboratory workers. - Move other workers away. - Do not contact with spilled chemical, do not breathe the chemical.	- Learn the properties of spilled chemicals. - Wash with plenty of water or clean with a vacuum cleaner. - Wear protective gloves, goggles and mask when cleaning.
GAS ODOR ELECTRICAL LEAKAGE	- Inform the laboratory technical staff and other laboratory workers.	- Identify the source of gas / electric leakage - Inform Head of Department. - Switch the main breaker of the electricity leakage zone off. - If the gas leaks from the cylinder, turn it off immediately and call the Head of Department.
EARTHQUAKE	- Do not panic. - If you are near hazardous chemicals, move away immediately. - Bend over near to bench, table etc. close to you that have center of gravity near to surface, place your arms on your head, and wait by placing your head down between to your legs.	- Apart from what must be done next, after the quake ends; evacuate the workers in the laboratory.

PATH TO BE FOLLOWED FOR THE USE OF THE LABORATORY IN THE PROCESS OF STARTING AND COMPLETING THE MASTERS'S AND PH.D. STUDIES

1. The student who will work in the laboratory must get the approval of the Laboratory Manager and the Head of the Department within the knowledge of his / her Advisor.
2. Getting laboratory keys is not part of the natural procedure. It may be possible to obtain the keys only if the student will work out of working hours during the weekdays or at weekends, after the requirement is documented by the student, by the assessment of the Head of the Department. For this purpose, the student who will start to work in the laboratory must first take the 'Laboratory Usage Permission Form' from the Department Administrative Office and after completion the necessary signatures, the student must submit the form to the Administrative Office.
3. Unauthorized reproduction of laboratory keys is strictly prohibited.
4. The students who will work in the laboratory should consult with the Laboratory Technical Staff and obtain the necessary information and forms (Laboratory Safety and Working Rules).
5. During the thesis studies, if there is a cabinet request to place the materials in the laboratory where the students are allowed to work, they should consult with the Laboratory Technical Staff.
6. During the thesis studies, students should be labeled the names of the cabinets and materials they use. The materials like unlabeled bottles etc. will be discarded during routine cleaning.
7. During the thesis studies, permission must be taken from the Head of the Department for the instruments and laboratories that are not in general usage. If the device has been taken within the scope of a project and is not available for routine use, permission must be obtained from the relevant instructor.
8. After completion of the laboratory work, it is necessary to empty the cabinets and inform the Laboratory Technical Staff. These procedures must be completed within one week after the thesis defense. 'Discharge Certificate' must be obtained from the department secretariat and delivered to the secretariat after the necessary signatures have been completed.

Laboratory Managers: *Anaerobic Lab. (Prof. Dr. Tuba Hande Ergüder Bayramoğlu), *Unit Lab. (Prof. Dr. Ülkü Yetiş) *Pollution Hydrology Lab. (Prof. Dr. İpek İmamoğlu)* Microbiology Lab. (Z-16 and Z-18) (Prof. Dr. Bülent İçgen) *Air Lab. (Assoc. Prof. Dr. Yasemin Dilşad Yılmazel Tokel) *Chemistry Lab. (Prof. Dr. Dilek Sanin)

IMPORTANT PHONE NUMBERS

Laboratory Technical Staff: (Office: Z-35)

Melek Özdemir, Mehmet Hamgül, Esra Gül **Internal telephone:** 0312 210 2640

Head of Department phone number: 0312 210 2641

Duty Officer Tel No: 0312 210 2113 and/or 0312 210 2114

AMBULANCA CALLING: 210 4142 (for METU internal ambulance calling).

FIRST AID CONSULTING: 210 4960 (This phone number is used for counseling and information about first aid.)

Fire Brigade: 110

Ambulance: 112

I have read the document named "Laboratory Safety and Working Rules" which is prepared for our safety and I have understood the rules. I agree to abide by all the rules. I declare that if I fail to comply with the rules, I take the responsibility and I accept that I can be removed from the laboratory.

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Name – Surname:

Phone number: e-mail address: Signature:

Mobile phone number:

Laboratories in which to work:

□ Chemistry Lab. □ Unit Lab. □ Microbiology Lab. (Z-16) □ Microbiology Lab. (Z-18)

□ Anaerobic Lab. □ Air Lab. □ Clean Room □ Pollution Hydrology Lab. □ Hot Room

Advisor Approval: