



GENERAL SAFETY REGULATIONS.

Preliminary considerations. In all laboratories, it is necessary to plan so incidents do not affect University operations, that they have a minimal or no effect on the persons, facilities, and/or continuation of activities. Laboratory organization must permit correct management in order to prevent risk, and be imbued in the very working procedures, experiments, and activities.

Any person who carries out activities in the laboratory must know:

- Laboratory operation regulations.
- Risks to health and safety from existing chemical products.
- Biological risk from biological agents employed.
- UMH Self-protection manual for emergencies.
- Routes and emergency exits for emergencies both general and specific.
- Location and signaling of eyewashes and safety showers, fire extinguishers (their operation and use on different kinds of fires), and circuit breakers for the electrical supply.
- Location of first aid kits.
- Environmental risks from existing chemical products.

This introduction is intended for the student to make contact with the laboratory, to indicate the general behavior regulations within it, the safety regulations that must be observed, the specific regulations in the event of an accident, as well as the general regulations for carrying out course experiments.

General laboratory regulations

1. The student is under the obligation to be informed in advance about the experiments that will be conducted in the laboratory. The theoretical fundamentals, if they are not known, must be sought in the appropriate textbooks.
2. At the beginning of the laboratory session, the student must be in the corresponding location and in their correct place. The use of a white lab coat is required. Any student not in possession of a lab coat will be prevented from participating in the laboratory session that day.
3. Nobody may leave the laboratory without permission from his or her instructor during the laboratory session.
4. Conducting experiments different from those indicated in the laboratory notebook is strictly prohibited. The student is scrupulously limited to carrying out those indicated.
5. The attitude each student adopts will be evaluated during the laboratory experiments, and be a determining factor in the final grade.

Safety regulations

When working in the laboratory, doing both experiments as well as research, one may be exposed to a series of substances whose most important characteristics, from the point of view of safety, are their toxicity and dangerousness. An attitude of vigilance and attention is essential at all times, even when not doing anything. Thinking and acting in a safe manner is an integral portion of chemical education. No experiment may be attempted before being sure of understanding what is going to be done, and only after answer these two questions: What is the worst thing that could happen? How could I remedy it?

Asking the instructors, when in doubt, is a good habit. In order to prevent accidents and unpleasant incidents, taking extreme caution is absolutely necessary. Strict observance of the following regulations will prevent the possibility of accidents in the laboratory to the maximum.

1. Keep the lab coat and all clothing properly fastened (to protect against splashing and spills).
2. Do not wear bracelets, necklaces, or wide sleeves that may tangle with the setups. Hands must be washed before and after entering and leaving the laboratory, especially when some contact with a chemical product has occurred.
3. Do not wear short pants, short skirts, sandals, open shoes, etc., for skin protection reasons.
4. Eating, drinking, and smoking are prohibited in the laboratory. No flame or lighter may be lit within the laboratory.
5. Do not connect electrical devices without being sure that no danger exists from nearby vapor solvents. Never place inflammable products near heat sources. Many inflammable organic substances produce vapors that are denser than air, and are capable of traveling considerable distances along laboratory tabletops.
6. Necessary precautions will be taken when working with acids, bases, or dangerous substances to prevent accidents. If substances in a fine powder form are used, this must be done so with a mask worn when weighing to prevent their inhalation. As a general regulation, to pipette solutions or noxious liquid substances, or when in doubt, a propipette is to be used. Organic solvents are not to be poured down the sink drains, but rather are to be stored in the recipients provided for said means. Concentrated acids and bases are to be neutralized, with the resulting saline solution disposed of while the faucets are running.
7. A general rule for the preparation of strong acid solutions is that the acid is always added to the water or aqueous solution. The reason for this is to prevent the projection of the latter due to brisk heating once both solutions are mixed together. If heating the test tube contents with a flame is necessary, this is to be done with the tube inclined, shaking softly, and with the tube opening pointed in a direction away from all people.
8. Avoid physical contact with organic solvents. Do not breathe solvent vapors. (See section regarding Risks associated with solvents). When using volatile substances (organic solvents like chloroform, ether, etc.) they are to be manipulated within a fume hood and done so, if necessary, while wearing a mask.
9. Protective eyewear is required when the professor indicates. Do not wear contact lenses (organic vapors may damage them; furthermore, caustic reagents cannot be eliminated from the eye if contact lenses are present). Learn where the emergency eyewash station locations are located.
10. Wear protective gloves when the instructor indicates. In the event of contact with corrosive or irritating products, see the indications given later on for this.
11. Laboratory material must always be used when clean and dry, without any remains of previous substances present. The residues will be dealt with in the following manner:
 - **Broken glass, paper, and other materials.** Will be disposed of into the recipients especially destined for such use.
 - **Chemical or toxic products.** Will be disposed of into the recipients especially destined for such use. Do not throw especially toxic substances directly into the sink.
 - **Liquid substances or solutions.** Those that can be dumped into the sink will be previously diluted, above all if they are acids and/or bases. Do not throw products or solid residues into the sink as they may clog it. In these cases, deposit the residues into the suitable recipients.

In the event that dangerous residues spill during an experiment, the paper that is used for their cleanup will also be deposited into the container that has been established for that group of dangerous residues. When in doubt, ask someone who is responsible about how to proceed.

12. One general rule that is added to those cited, and which contributes to laboratory safety, is that of rigor and order within the laboratory. Along with this, let it be known that cleanliness and order must be maintained within the laboratory at all times.
13. When faced with any doubt, or if any accident occurs, quickly notify the instructor.

Rules of conduct

Order and cleanliness. Order is fundamental in preventing accidents. Maintain the workstation in an orderly manner, free from books, jackets, bags, excess containers of chemical products, and things that are unnecessary or useless. Always keep the tables clean. Spilled chemical products must be cleaned up immediately. Materials and devices must be perfectly cleaned after their use.

Responsibility. Do not work in a hurried manner, always think about what is taking place, and do so with all material and reagents arranged properly. Do not play practical jokes, or run, etc., within the laboratory. Do not conduct unauthorized experiments. Irresponsible behavior may cause undesirable accidents and lead to immediate expulsion from the laboratory.

Attention to the unknown. Neither use nor clean any reagent recipient not bearing a label. Turn it in over to the instructor immediately. Never substitute, without prior authorization by the instructor, a chemical product for another in an experiment. Do not use equipment or a device without fully knowing its operation. Do not use a pipette with the mouth directly, but rather via a suction system.

Handling glass. Do not force a glass tube because if it breaks, the cuts may be very serious. Never use glass equipment that is scratched or broken. Deposit broken glass material in a container for glass, not in a garbage bin.

Handling chemical products. Chemical products may be dangerous due to their toxic, corrosive, inflammable, or explosive properties. Many reagents, particularly organic solvents, burn in the presence of a flame.

Transporting reagents. Do not unnecessarily transport reagents around the laboratory. Bottles are to be moved by picking them up and holding them by their base, never by the cap.

Actions in the event of an accident

1. **In the event of an accident, immediately inform the laboratory instructor.** If it is very serious, call **112 or the university telephone extension 8665**. Do not attempt any action you are unsure of; if first aid is necessary, be sure that this will not worsen the situation (protection). Also, be sure that performing such an action will not pose any risk to you (self-protection).
2. **Fire in the laboratory.** Evacuate the laboratory in accordance with the instructions by the individual responsible and the existing indications there. If the fire is small and its location known, put it out using the appropriate fire extinguisher, sand, or by covering the fire with a recipient of appropriate size to suffocate it. Remove inflammable chemical products that are nearby. Never use water to extinguish a fire caused by the inflammation of a solvent. In the event the fire is considerable, activate the fire alarm.
3. **Clothing fire.** If clothing catches fire, request help immediately. Lie down on the floor and roll to one side to suffocate the flames. Do not run (this will just fan the flames) nor attempt to reach the safety shower unless it is nearby. Assist someone who is on fire. Cover them with an anti-fire blanket, guide them toward the safety shower if it is nearby, or make them roll along the floor. Never operate a fire extinguisher on a person. Once the fire has been put out, attend to their needs, making sure they do not become cold, and provide them first aid until medical assistance arrives.

4. **Burns.** Small burns produced by hot materials, baths, heating plates or blankets, etc., are to be dealt with by treating the affected area with cold water for 10-15 minutes. Disinfect (for example, with iodine) and cover with sterile gauze. Do not apply ointments or substances (toothpaste, bleach, etc.) or punctures or remove blisters should they appear. Burns that are more serious will require immediate medical attention.
5. **Cuts.** Cuts resulting from glass material breaking are a common laboratory risk. They must be washed well with abundant running water for at least 10 minutes. If they are small and stop bleeding quickly, wash them with water and soap, apply an antiseptic, and cover with an appropriate bandage or dressing. If they are large and/or deep, and do not stop bleeding, request medical assistance immediately. Neither remove nor tamper with a possible embedded foreign body.
6. **Action in the event of inhalation of chemicals.** Immediately lead the affected person to a place containing fresh air. Request immediate medical assistance. At the first sign of respiratory difficulties, mouth-to-mouth artificial respiration must begin. Identify the gas responsible if possible, put on an appropriate mask, and if this is not possible, hold your breath until the vapor has dissipated (by opening windows, using fume hoods, etc.). In any case, try not to expose yourself.
7. **Action in the event of ingestion of chemical products.** Before any specific action, request medical assistance. If the patient is unconscious, lay them down with their head turned to one side. Cover them with a blanket so they do not get cold. Do not leave them alone. Do not administer them liquids nor induce vomiting.
8. **Spills or projection of chemicals on the skin.** Chemical products that have spilled onto skin must be immediately washed with abundant running water for at least 15 minutes. In the case of corrosive products, in addition to that aforementioned, remove or cut away nearby clothing as quickly as possible, preventing splashing to other parts of the body. The safety showers installed in the laboratories are to be used in cases where the affected zone is large and rinsing with the sinks is insufficient. Taking off the entire persons contaminated clothing is necessary as soon as possible while they are under the shower. Remember that speed in the washing is very important in order to reduce the gravity and extension of the wound. Provide first aid to the person affected until medical assistance arrives. Inform the instructor. If a chemical product gets into your eyes, time is essential, above all if the product is corrosive (acting in less than 10 seconds). The sooner the eye is washed, less grave will the damage be. Wash both eyes with abundant running water for at least 15 minutes in the eyewash and, if one is not available, use an eyewash bottle. It is necessary to keep the eyes open with assistance from your fingers; this will facilitate washing under the eyelids. Receiving medical assistance is necessary, no matter how small the injury seems. Be careful with the water pressure used for this, because if it is too high you may injure the persons eyes with the powerful jet of water.

General rules for laboratory experiments

1. Before beginning the exercise, make sure to review that all the material and products necessary are present, and that they are all in clean and working order. Notify the instructor in case of any anomaly. After finishing with the lab experiment, all materials are to be left as they were originally found, cleaned, and returned to their proper location. Inform the laboratory instructor when this task is finished before leaving the laboratory.
2. The pipettes must be clean and dry before being utilized. Always pipette with the suitable propipette. Never pipette with other persons.
3. All bottles, containers, etc., must be correctly labeled and sealed to avoid confusion with the stoppers. Recipients containing substances and dissolutions must be properly marked using markers, wax pencils, or labels. In every case, the substance name, concentration, date of preparation, etc., will be clearly indicated.
4. The prepared solutions, their concentration, and volume prepared for each must be recorded in the laboratory notebook.
5. All bottles and containers containing prepared solutions and reagents must be placed at the rear of the bench or worktable, never near the edges.
6. All students (independently whether they form part of a group of various persons) must present a report of the results for each experiment as indicated by the instructor.
7. Faced with any doubt, ask the laboratory instructor.
8. In order to PASS this course, you must pass the laboratory portion. The laboratory experiments are required, and missing them without an acceptable excuse implies the need to pass a THEORETICAL AND PRACTICAL EXAM IN ACCORDANCE WITH THE COURSE DIRECTIVES.

Risks associated with solvents

It is essential to be aware that most organic solvents are inflammable and will burn if exposed to a flame. Furthermore, many are toxic and/or carcinogenic. For example, many chlorocarbonated solvents will cause liver damage similar to that of cirrhosis, which is caused by excessive alcohol abuse, if they accumulate within the organism. Chloroform and ether are anesthetics, causing drowsiness and nausea. In other words, organic solvents are as dangerous as corrosive chemical compounds (for example, sulphuric acid). Here are some examples:

1. **Glacial acetic Acid:** is sufficiently corrosive to cause burns. Its vapors can irritate the eyes and nasal passages.
2. **Acetone:** is not very toxic when compared with other solvents. However, it is EXTREMELY inflammable.
3. **Benzene:** Is easily absorbed through the skin, and can affect bone marrow and provoke leukemia. It is considered a carcinogenic agent, and it affects the liver and kidneys. It is also very inflammable.
4. **Dichloromethane:** will not burn nor is it considered carcinogenic. If ingested, it can deteriorate the liver, and its vapors can cause drowsiness and nausea.
5. **Ethanol:** is known to be an intoxicating agent and is extremely inflammable.
6. **Ethyl ether:** is extremely inflammable and can cause explosions (due to the presence of peroxides). It is not particularly toxic, but in high concentrations can cause drowsiness and nausea.
7. **Hexane, pentane, petroleum ether:** these can irritate the respiratory tract and skin. They can also act as intoxicants and causes central nervous system depression. They are highly inflammable.
8. **Methanol:** is more toxic than ethanol, able to provoke blindness and death from ingestion. It is extremely inflammable.
9. **Toluene:** Is not considered a carcinogenic agent, but is as toxic as benzene, and can act as an anesthetic and affect the central nervous system.

Student

I have read and I understand the safety regulations and risks associated to the laboratory.

First name: _____

Last names: _____

DNI/Passport: _____

Academic course: _____

Degree: _____

Signature: