

# Health and safety in the laboratory



UNIVERSIDAD  
DE LA RIOJA

# GENERAL HEALTH AND SAFETY RECOMMENDATIONS IN LABORATORY PRACTICE

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Work carried out in laboratories may entail a number of risks with a wide range of causes and consequences: related to the laboratory facilities, the chemicals being handled and the work being done.

The aim of these recommendations is to make you aware of these risks and how to avoid them, so that you fully understand prevention issues from the moment you begin laboratory practice. You will need to follow these important basic rules for your health and safety.

## PERSONAL HABITS

1. You must keep lab coats and clothing properly fastened, as this will protect you against chemical splashes and spills.
2. In the laboratory it is always advisable to secure long hair behind the head as it can get caught in the assemblies and equipment and is also easier to contaminate with the chemicals that you use.
3. Do not leave personal items (coats, backpacks, folders, etc.) on work tables or laboratory benches as they can hinder your work and be the cause of accidents.
4. Do not eat or drink in the laboratory, nor is it advisable to chew gum while at work, as food or beverages can be contaminated by laboratory chemicals.
5. Smoking is prohibited in laboratories as there are areas containing considerable quantities of flammable chemicals and therefore there is a high risk of fire.
6. Do not wear bracelets, pendants or wide sleeves that could catch on the equipment.
7. It is advisable to wash your hands whenever you have had contact with a chemical and before leaving the laboratory.
8. Avoid wearing contact lenses, since the effect of chemicals is much greater if trapped between the lens and the cornea.
9. For routine work in the laboratory, standard safety goggles should be worn as they protect the eyes against chemical splashes. Prescription glasses do not provide sufficient protection; there are special goggles that may be worn over prescription glasses.
10. When working in the laboratory is advisable not to wear: shorts, short skirts, sandals, open-toed shoes, etc.: i.e. uncovered areas of skin that may be exposed to chemical splashes.
11. Gloves must be used when handling chemicals that can be absorbed through the skin.

## WORK HABITS

1. When working, each student must have the materials indicated by the teacher for their personal use, in addition to a lab coat and safety goggles.
2. Note that you must always, before starting an experiment in the laboratory, know and analyse all of its contents, in order to understand the "why" of everything that will be done later. It is therefore important that, if you do not know or remember something or have any questions, you ask your teacher.
3. Experiments must not be conducted without the express permission of the teacher.
4. The laboratory must be kept tidy and clean because order and cleanliness prevent accidents.
5. Test tubes must never be filled more than two or three centimeters, to avoid spillage of the liquid when shaken or heated.
6. Never work alone in the laboratory.
7. Only heat test tubes using a test tube holder. Clamp the test tube above the level of the liquid and tilt the tube. Never hold it by the bottom as this may cause the liquid to be ejected through the mouth of the test tube.
8. Do not point the mouth of the test tube at your face or that of your lab partners.
9. Liquids must not be heated in glass containers that are not heat-resistant, such as beakers, flasks, bottles, etc., as they may break.
10. Never carry test tubes and chemicals in your pockets, as if they break and spill they may cause accidents.
11. Chemicals should never be smelled by placing the nose over the mouth of the container in which they are kept, but should be "fanned" by hand, gently directing the vapors toward the nose, thus avoiding irritation of the respiratory tract.
12. Never touch or taste chemicals.
13. Never pipette chemicals by mouth as this may cause irritation or burns to the mouth. Use a rubber bulb.
14. You must not work away from the table or bench top, but always over it, so as to provide a solid support for the materials you are using.
15. Always use the fume hood when working with substances that give off noxious fumes (toxic or irritating) and when hazardous fumes or vapors are generated by your activity.

16. In the fume hoods the air is drawn out by an extractor fan and thus any harmful vapours are expelled outside of the building via a duct. When you have to dilute acid, never add water to the acid; instead add the acid to the water, slowly and stirring all the time.
17. If you do not, a large amount of heat is produced, which may project the acid outwards and even break the container.
18. When you finish a task or operation the table must be cleaned, the reagents tidied away, equipment unplugged and the water and gas turned off.



## IDENTIFICATION

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In the laboratory it is very important to know the chemicals that you are going to use and their risks. It is therefore essential that you can identify them correctly in their corresponding containers.

Check the labels of the chemical containers, on which the following must always appear:

- The name of the supplier.
- **Hazard pictograms** (explosive, flammable, oxidising, pressurised gas, environmental hazard, toxic, corrosive, irritant/sensitiser, health hazard).
- **Signal word (Danger or Warning)** to warn of danger and indicate the severity thereof.
- **Hazard statements (H phrases)** that describe the nature of a hazardous substance or mixture, including the degree of hazard.
- **Precautionary statements (P phrases)** that describe recommended measures to minimise or prevent adverse effects caused by exposure to a hazardous substance or mixture during its use or disposal.
- **Name and identification number** of the product.



EXPLOSIVE



INFLAMMABLE



OXIDER



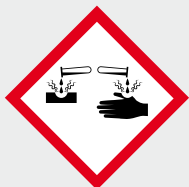
PRESSURISED GAS



ENVIRONMENTAL  
HAZARD



TOXIC



CORROSIVE



IRRITANT/  
SENSITISER



HEALTH HAZARD

Therefore, in the laboratory it is important to not reuse containers for other products without first having removed the original label. Do not place one label over another, because this might cause confusion.

## WHAT TO DO IN THE EVENT OF AN ACCIDENT

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*Remember, your safety comes first.*

*Use common sense. Do not put yourself at risk needlessly, do not do anything foolish.*

In chemical laboratories, accidents generally occur because of one of three causes::

### FIRE

Caused mainly by:

- Flammable liquids, especially liquid compounds with a low boiling point, such as organic solvents (ether, benzene, methanol, etc.).
- Certain chemical reactions, e.g. those which release hydrogen or highly flammable gas.

Therefore you must **keep flammable liquids away from the flames of the burners and even away from hot surfaces.**

When you have to heat them, place the flask containing the liquids in a bath or heating mantle and never directly on the heat source.

### IN THE EVENT OF A SMALL FIRE:

- Immediately report the situation to the teacher.
- Close the gas taps.
- Remove all flammable liquids from the surrounding area.
- If you are trained and your actions will not entail risk, try to extinguish the fire with appropriate means.
- If the containers containing these products ignite, cover them with a fire blanket or cloth.
- If these liquids spill over the table, extinguish them with a fire extinguisher. Do not forget that to minimise damage to equipment and facilities it is preferable to use fire blankets and CO<sub>2</sub> fire extinguishers before resorting to powder extinguishers.
- If clothes catch fire, roll on the ground or use a fire blanket to extinguish the flames.
- If you cannot control the fire, raise the alarm immediately using the alarm buttons and report the situation to the Concierge so that they may request external aid (EMERGENCY: 112).
- Evacuate the laboratory, closing doors and windows when leaving.

## CONTACT WITH HAZARDOUS CHEMICALS

The most common accidents are burns caused by chemicals: acids or bases, in contact with skin.

### 1. If a large area of skin and clothes is contaminated:

- Go to the nearest safety shower and remove clothing, if necessary, once under the running water, avoiding contact with the eyes.
- Wash the affected area for fifteen minutes or more.
- Do not use creams or other products.
- Go quickly to A&E, and describe the toxic product as accurately as possible.

For all the above reasons, it is extremely important that you always wear a lab coat in the laboratory.

### 2. If the liquid enters the eyes:

- Wash them as well as possible with water for at least fifteen minutes.
- Cover with a sterile gauze and seek medical advice.

This is why you must always work with safety goggles in the laboratory.

### 3. If there is an accident involving inhalation, ingestion or absorption through the skin:

- If the accident is serious, immediately call EMERGENCIES: 112.
- Remove the patient from the danger zone.
- Place the patient in a well-ventilated area.
- If unconscious lie them down.
- If there has been ingestion – which is very unusual – go to A&E as soon as possible.
- Give the most accurate information possible about the chemical product to the medical service.
- If in doubt, call the Toxicology Hotline 91-5620420.

## MECHANICAL ACCIDENTS

- 1. Cuts or punctures with glass:** most frequently occur when cutting glass rods or inserting them into bored corks. When this occurs, wash the wound with water and stem the bleeding by pressing on it with a clean cloth or sterile gauze. Then seek medical advice.
- 2. Burns:** these occur when touching hot glass. You must therefore make sure that it has cooled. When this occurs, wash the wound with cold water and cover with a sterile gauze without applying creams or ointments.
- 3. Explosions:** may result from an unexpected chemical reaction.
  - Never hermetically seal a container for reactions that produce vapors, because the increased pressure causes explosions
  - Never look into the mouth of the flask or test tube when a reaction is taking place.
  - Never heat a closed container.
  - Never add a reagent to a container that is being heated.
  - This is why we insist on the need to use safety goggles.
- 4. Electrical shock:** may occur through contact with equipment.
  - Disconnect the power supply immediately.
  - Avoid skin-skin contact with the patient if wet.
  - Immediately notify EMERGENCIES: 112



## WORK WITH GLASSWARE

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You will see that glass is the material that is most commonly used in laboratories and, because of its fragility, it can cause accidents if not used properly. It is therefore important to observe the following guidelines when working with glass:

1. Discard all materials that have the slightest defect.
2. Do not work with material that has sustained impact, even though there are no visible cracks or chipping.
3. You should always carefully check the temperature of the receptacles, connectors, etc., which have been subject to heat before touching them directly to avoid burns because it is impossible to distinguish hot and cold glass from its appearance.
4. Never forcefully separate vessels or containers which have been sealed one inside the other.
5. If flask or bottle seals, valves, connectors, etc., have become stuck, do not force them directly with your hands.
6. Carefully check the work table after using coverslips.
7. Place defective parts or fragments of broken parts in specific containers for glass, never in the bins, as this could cause accidents to others.

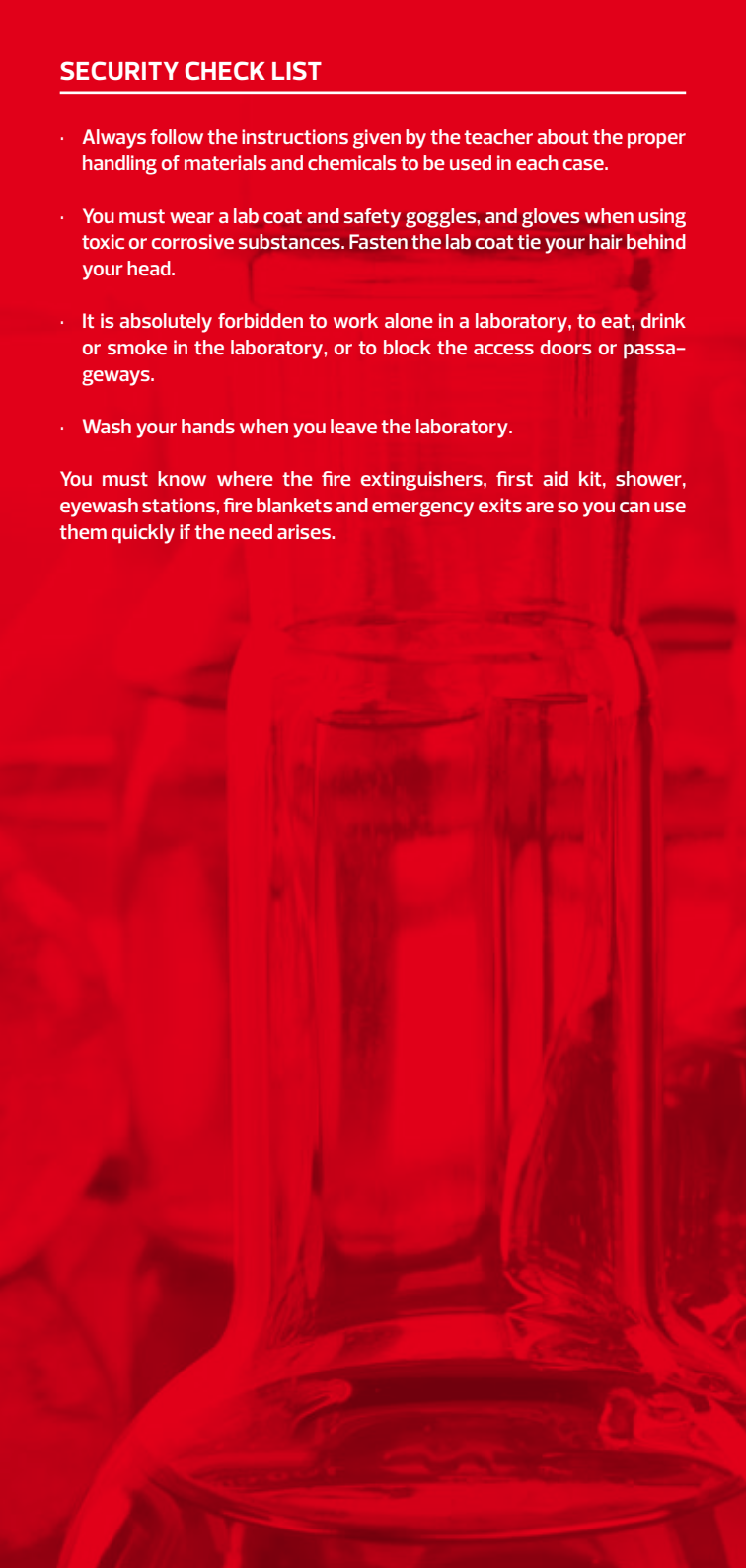


## SECURITY CHECK LIST

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- Always follow the instructions given by the teacher about the proper handling of materials and chemicals to be used in each case.
- You must wear a lab coat and safety goggles, and gloves when using toxic or corrosive substances. Fasten the lab coat tie your hair behind your head.
- It is absolutely forbidden to work alone in a laboratory, to eat, drink or smoke in the laboratory, or to block the access doors or passageways.
- Wash your hands when you leave the laboratory.

You must know where the fire extinguishers, first aid kit, shower, eyewash stations, fire blankets and emergency exits are so you can use them quickly if the need arises.







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