Safety Guidelines

Institute of Organic Chemistry

University of Vienna

Währinger Straße 38

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Introduction

These guidelines outline the most elementary responsibilities and conduct with regard to working safely in the organic chemistry laboratories. This summary is provided to help you work safely and avoid accidents by offering a framework in which a safe method of work can be established. It is therefore important that you read and understand the advice given herein and take it into account when working in the laboratories.

In addition to the University regulations – which can be found in the section "Laboratory and Workshop Regulations" (Labor- und Werkstättenordnung) in the University of Vienna intranet via https://wiki.univie.ac.at/display/AR/Downloadportal → Labor- und Werkstättenordnung → General Laboratory and Workshop Regulations (2021).pdf (in English) and Labor- und Werkstättenordnung (2021).pdf (in German) – our Institute also applies the guidelines and regulations described in this document.

If you do not understand any part of these guidelines, you must ask your academic supervisor for help.

Accident prevention is mainly common sense, tidiness and forethought, but safety within laboratories requires a great deal of vigilance and care. Remember that a little planning and thought can save a great deal of trouble and regret. Always seek expert advice when in doubt.

You are required to sign and return the declaration issued with these guidelines stating that you have read the latter and are satisfied with your own and the university's responsibilities with regard to safety.

Suggestions for inclusion, corrections or revisions to these guidelines can be addressed at any time to the institute head.

Important phone numbers:

- **Police: 133**
- **Fire brigade: 122**
- **Ambulance: 144**
- **EU-wide emergency number: 112**
- **Poison control: +43-1-4064343**
- **Doctors on call: 141**

- **Portier: Telephone: + 43-1-4277-128 53**
- **Portier: Mobile: + 43-664-817-6211**
- **Raum- und Ressourcenmanagement Security Control: +43 1 4277 14974**

- **Crisis line: 142**
- **Emergency number for women: +43-1-71719**
- **Immediate psychiatric help: +43-1-31330**
- **Emergency number for victims of a crime: 0800-112112**

When calling from a landline, dial 0 followed by the phone number. **NOT NEEDED FOR 3-DIGIT EMERGENCY NUMBERS.**

1. Access to the Institute

a. Opening hours

For obvious reasons of safety and security, the doors to the building are locked at night and at weekends. The doors are unlocked between 06:00 hrs and 20:00 hrs Monday to Friday and 07:00 hrs to 19:00 hrs on Saturdays (during term only). Access can be gained to the Institute by key-holders at all other times.

Normal working hours for technical and administrative staff usually range from 08:00 hrs to 18:00 hrs Monday to Friday.

b. Work outside opening hours

Regulations governing the use of laboratory facilities outside normal working hours are as follows:

Experimental work during closing hours Monday to Friday and on Saturday and Sunday is only allowed on the understanding that researchers never work alone in the laboratory; there must be at least one other person within easy call in the event of a mishap.

Keys/i-buttons to access the Institute/Faculty and the laboratories can be obtained from ibutton.chemie@univie.ac.at, with written consent of the academic supervisor and the Head of the Institute. Keys are not transferable.

c. Visitors

Short-stay visitors to the Institute should not be taken into the laboratories unless it is for the specific purpose of discussing the scientific work in progress, or to operate and maintain equipment. Visitors to a laboratory must be supplied with a pair of safety glasses and a lab coat and be made to wear them.

Children visiting the Institute must be under the immediate and close supervision of a responsible adult at all times. Children are NOT permitted into laboratories or workshops under any circumstances (other than during events organised by the University or Faculty) and must not be unaccompanied in any other part of the building.

An unauthorized person is someone who does not have authority, expressed or implied by appointment or position, to be in the area in question. Unauthorized persons are not allowed to have access to workshops or laboratories and may not use tools, offices or other equipment wherever situated in the Institute. A member of the Institute, like any other visitor or person legitimately on University premises, may be an unauthorized person if they are in a part of the premises where they have no legitimate reason to be.

d. Avoidance of theft

It is the responsibility of all individuals working within the Institute to reduce to a minimum the likelihood of theft, and to reduce to a practical minimum the loss should a break-in occur. This can be done by:

- Ensuring that all doors and windows are locked securely whenever rooms are unoccupied, and especially outside normal working hours.
- Keeping valuables out of sight whenever possible. Do not hang coats and jackets, or place handbags and cases near doors. It should be noted that personal property is not covered by University insurance.
- Reporting sightings of any stranger, furtive or suspicious behaviour to the security staff, phone number p. 2.

e. Lone working

Lone work is work which is specifically intended to be carried out unaccompanied or without immediate access to another person for assistance. It is not the same as the chance occurrence of finding oneself on one's own. An individual who has visual and audible communication with another person (important: this person must be able to access the room) would not be considered as working alone. To decrease the possibility of lone working at the end of each day, each laboratory member should indicate in a clear way to their colleagues working in the same room that they are leaving the laboratory for that day and that the remaining individuals should take this into account.

In addition, especially when one finds oneself alone, it should be ensured that the laboratory can be accessed from outside in case of emergency.

Lone working can occur when working outside normal working hours.

Lone working is not permitted in laboratories; there must be at least one other person within easy call in the event of a mishap.

f. Reactions left unattended

It is accepted that experiments and apparatus may have to be left running overnight. However, in some instances, either because of the nature of the experiment or equipment or because of a failure of a service, such as water or electricity supply, a hazardous situation may arise. In these circumstances it is essential that adequate instructions are left to ensure that the equipment can be made safe. These instructions must be displayed visibly outside the laboratory and must include safety precautions as well as clear guidelines for safe shutdown procedures. Display cases have been installed on every laboratory door for this purpose.

All equipment that is left running unattended must be designed to 'fail to safety' if sudden loss of mains services (water, gas, electricity, and ventilation in rooms and fume hoods) should occur. Care must be taken to avoid dangerous situations developing when lost services are restored.

Precautions should also be taken to avoid flooding caused by faults in water cooling circuits, such as perished hoses. Such precautions include regular inspections of all components, replacement of perished pipes, the use of materials that are not likely to be subject to rapid deterioration, and the use of appropriate clips (not wire tightly twisted around hoses).

If any flooding should occur, the persons attending to the problem must be aware of the possibilities that flood water may have penetrated electrical circuits and the electrical supply to the area must be isolated before entering to begin remedial work.

If it is necessary to leave an experiment unattended for any length of time during normal working hours, all water leads must be clipped on, there must be an adequate flow of water* and stirrers must be running smoothly. Exothermic reactions and reactions under reflux must have reached a stable state before being left.

* Please note that the flow of water is not constant over time due to the difference of pressure in the system. The flow thus tends to decrease after some time and water pressure needs to be repeatedly adjusted accordingly.

Fume hood sashes have to be/remain closed whenever the fume hood is not actively occupied.

g. Overnight Equipment

At the end of every day, the equipment of each laboratory that is not required for overnight experiments should be turned off, including Rotary Evaporators, Sonicator Baths, unused Hot Plates, etc. This list is not exhaustive and should be adapted to each laboratory; it should be indicated at the entrance of each laboratory.

It is the responsibility of each laboratory member to check that the equipment is turned off at the end of each day.

2. General conduct

a. Safety notices

You must obey all safety signs and warnings. Maximum loading and restricted area notices, danger, no entry, illuminated signs and alarms are installed only after careful consideration and for your safety. Their message must not be ignored.

Ignorant manipulation of apparatus and machinery can have disastrous results. You must not use anything for the first time without proper instruction in its use. Do not attempt to repair or modify any apparatus unless you are competent to do so. Faulty or damaged equipment must not be used.

Keep your work area tidy and in a safe condition. You must ensure at the end of each day that the area is safe and secure. At the end of an experiment or project, you are responsible for ensuring that everything is cleared away and that unidentified substances are not left behind to create a potential hazard or disposal problem for others.

b. General conduct

Smoking is strictly forbidden within the Institute and in any chemical laboratories.

Running, throwing, and similar acts are strictly forbidden. Even in an emergency, it is usually safer to walk quickly than to run.

Eating and drinking is not permitted in laboratories or workshops where chemicals and other potential contaminants such as lab coats are present.

Used lab coats should not be brought into or stored in offices. Chemicals can only be brought into offices (for a short period of time) if they are non-toxic and completely unopened.

c. Emergency exits, fire doors and corridors

Fire doors must not be wedged open or otherwise fastened in the open position (other than designated magnetic mechanisms). If they fail to close of their own accord, this must be reported to Raum- und Ressourcenmanagement (https://rrm.univie.ac.at/, ticket system: https://rrmcafmapp.rrm.univie.ac.at/). Fire doors that are held open by a magnetic device must be able to close of their own accord. No objects should be placed in a position that would prevent the closing of these doors.

Emergency exits, corridors, and staircases must provide safe circulation and routes of escape in an emergency. They must not be used as working or storage areas or as improvised cloakrooms.

Firefighting equipment must be kept free of obstruction and readily available. It is an offence to use it in any circumstances other than a fire.

d. Office safety

For routine office activities there will be no significant health or safety risk and no further assessment of the work is necessary.

Falls are the most frequent cause of injury in offices. Other causes include: the handling and lifting of goods, materials and equipment; falling objects; stepping on or striking against objects. The maintenance of high standards of housekeeping is essential in offices. Care should be given to the layout and storage of items to minimize possible hazards.

e. Safety training

Training is an essential part of maintaining a healthy and safe environment. Training and instruction in routine matters must be given, as required, by academic supervisors. In particular, the immediate supervisor, or another competent person designated by the supervisor, will inform new members of staff and students on their first day of joining about:

1. Action in the event of a fire.
2. Action in the event of an accident or near miss.
3. Their responsibility for following Institute procedures, including responsibility for reporting health and safety problems and how this should be done, and for cooperating with colleagues.
4. Any specific responsibilities they have in relation to health and safety.

Training must also be given on all pieces of apparatus and equipment.

Remember, everyone in the Institute has duties concerning health and safety and as a legal minimum, you must take reasonable care for your own safety and that of others who may be affected by your actions.

Fire training (particularly the use of fire extinguishers) is organized on a regular basis by the University. You are strongly encouraged to attend one of these trainings as soon as possible. You should enquire with your supervisor. In addition, the general fire safety and fire protection regulations of the University are available on the intranet:
https://wiki.univie.ac.at/display/Brandschutz/Allgemeine+Brandschutzvorschriften

The safety training should be repeated on a regular basis (at least once per year).

3. Personal Protective Equipment

The term Personal Protective Equipment (or PPE) refers collectively to equipment such as safety glasses, goggles, lab coats, protective shoes and gloves, respiratory protective equipment, ear defenders, and similar equipment used to protect the person during their work. PPE is the last resort and only protects the wearer from harm. Alternative methods for controlling the hazards must have been considered. PPE is the protective measure which is most likely to fail as a result of being damaged, poorly maintained, misplaced, forgotten, misused or as a result of it being an inappropriate or ineffective choice in the first place. The use of appropriate PPE is mandatory (see below).

a. Eye protection

The eyes are very easily damaged, and injury to them is likely to be more serious than to any other organ. Different degrees of protection are afforded by:

- Safety glasses with side shields.
- Over-glasses with side shields which will fit over ordinary prescription glasses.
- Protective goggles, which can be worn on their own or, if necessary, over ordinary prescription glasses.
- Face shields.

The form of protection required depends on the possible dangers arising from the work being done. Eye protectors which are damaged, lost or destroyed must be replaced immediately.

All members of the academic and technical staff – including facility maintenance personnel – and all research workers are issued with safety glasses or over-glasses which must be worn at all times in the laboratories. All visitors must be provided with a pair of safety glasses when visiting the laboratory areas. It is the responsibility of the person escorting the visitor to ensure that safety glasses are worn where required.

ORDINARY GLASSES DO NOT PROVIDE ADEQUATE PROTECTION

SAFETY GOGGLES HAVE TO BE WORN BY ANY PERSON ENTERING A LABORATORY OF THE INSTITUTE

Wearers of contact lenses must take precautions to prevent any material entering the eye, as any liquid which enters the eye tends to get behind the contact lens and irrigation is almost impossible without removing the contact lens. Thus, the use of contact lenses is strongly discouraged whilst working in a laboratory.

It should be remembered that safety glasses provide a standard, basic level of protection against impact injuries to the eyes. They do not afford 100% protection against chemical splashes or protection against vapours. Safety goggles will protect against splashes, vapours, dusts and mists, whereas full-face shields provide protection for the whole face against chemical splashes and flying particles.

b. Laboratory coats

Clean, fastened lab coats must be worn in all laboratories and workrooms where hazardous substances are being used. They should be laundered regularly and whenever they become contaminated. Lab coats must not be worn outside the work area, in refreshment areas, libraries and offices (where they must not be stored) and must not under any circumstances be taken home to wash.

Remember, lab coats are intended to serve as a barrier between a hazardous substance and your body and clothing by protecting against minor splashes and spills. It is essential that they are regularly cleaned in order to prevent the spread of contamination to personal clothing and skin. Lab coats should be changed

regularly, especially if they become contaminated. A clean lab coat is a matter of basic hygiene. Lab coats must be replaced when exhibiting signs of significant deterioration (i.e. holes).

c. Gloves

Appropriate gloves should be worn when handling cryogens and substances that may be absorbed through the skin or that are corrosive, harmful, irritant or otherwise damaging to the skin. Users should be aware of the limitations of their gloves. Safety data and information should be supplied with any gloves purchased, such as chemical resistance, breakthrough time, etc. If in doubt as to the suitability of any gloves you have or require, help and advice can be sought from colleagues or the manufacturer.

Latex allergy is becoming more widespread. If you have a tendency towards dermatitis or have sensitive skin, powdered latex gloves should be avoided. If you have been diagnosed with a latex allergy, you must notify your fellow lab workers to ensure that latex gloves are not worn when handling communal equipment.

Gloves should be inspected for tears or punctures prior to use and should be removed when they become contaminated or damaged, or immediately after finishing the task at hand.

Disposable gloves are single use only and should not be reused under any circumstances. It should be noted that the chemical breakthrough time may well be exceeded long before the gloves visibly degrade.

Contaminated gloves must not be worn when using the phone or opening doors. Gloves must not be worn outside the laboratory except to transfer a sample from one room to another, provided that an ungloved hand is used to open the door or operate keypads, etc.

Heavy-duty or household rubber gloves worn to protect the hands must be washed prior to removal.

d. Footwear

Footwear that adequately covers the feet and offers protection against spillages and falling objects should be worn at all times in the laboratory. No open-toe shoes are allowed in the laboratories of the Institute.

4. Risk assessments

Hazard can be defined as a potential source of harm or damage, or a situation with a potential to cause harm or damage. Risk is a function of the probability of that harm occurring and the severity of its consequences should it occur.

Before performing an experiment, each person should think about the problems that could occur, the toxicity of the materials used and the precautions to take in order to perform the experiment safely:

- What are you going to do? What is the process? (For complex procedures it can be useful to break down the activity into its component parts.)
- What dangers are associated with it, i.e. what are the intrinsic hazards and risks (those attached to the way it should work, and those attached to foreseeable failures)?
- What could go wrong and where is there likely to be a problem?
- What is the likelihood of foreseeable accidents, injuries or near misses occurring, i.e. high, medium or low?
- Who is likely to be exposed to the hazards, i.e. who might be hurt?
- Why might it happen and when could it happen?
- How are you going to control the risk to an acceptable level, using engineering control, procedural control, etc.? How could all this be avoided?

If all of these questions are answered, then the risk assessment should be adequate.

For a more detailed list see: https://osha.europa.eu/en/legislation/directive/directive-200437ec-carcinogens-or-mutagens-work.

There is only one thing more important than assessing the risk, and that is controlling (reducing) the risk. All risks must be reduced to the lowest level reasonably practicable (which means balancing the reduction in risk against the time, cost and trouble of achieving it). There are various different measures that can be taken to reduce (or control) risk, which are known as control measures. Some types of control measure are more effective and less likely to break down than others, and these should always be used in preference.

Below is a list of control measures, with the best (most effective) ones listed at the top.

- Getting rid of specific hazards completely
- Substituting a less dangerous alternative (e.g. replacing benzene with toluene, diethyl ether with MTBE, ...)
- Removing or controlling hazards in a way that will protect everyone in the vicinity, for example by engineering design (perhaps fitting a guard to machinery, or using a fume cupboard)
- Controlling hazards by safe working procedures (e.g. systematically checking for peroxidation when ethereal solvents are used)
- Personal protection for individuals, which should always be the last resort

Having carried out the risk assessment, it is then necessary to make sure that the methods to control the risk or hazard identified in the risk assessment are implemented.

5. Emergency arrangements

a. Fire precautions

The Institute has fire wardens ("Brandschutzwarte") who can inform and help in case of doubt. The list of current fire wardens can be consulted at: https://orgchem.univie.ac.at/en/ and https://ufind.univie.ac.at/de/pvz_sub.html?id=521&more=true.

All persons working at the Institute are expected to familiarise themselves with the different types of fire extinguisher, their locations, how to use them, and what to do in the case of a fire, including the location of assembly points and the nearest fire escape/exit routes.

When using any potentially flammable reagents, the relevant extinguisher should be ascertained from the material safety data sheet or safety data book (e.g. the Sigma-Aldrich Library of Chemical Safety Data). This must be done as part of the chemical hazard risk assessment.

Fire blankets are also provided in laboratories and can be used to smother any fire.

When deciding to fight a fire, it is important to avoid taking personal risks. Be sure you know how to use the fire extinguishers—read the instructions. Fire safety training is recommended.

All fire extinguishers must be recharged after use, even if only partially discharged. If a fire extinguisher is discharged, this must be reported immediately after the incident. Every extinguisher carries a label that gives information on whom to contact so that the extinguisher can be replenished.

b. Fire procedure

We must differentiate between two different events:

1. *In the event of a fire in the working laboratory:* if the fire alarm system is not automatically activated, immediately operate the nearest fire alarm.

   ATTACK the fire, if possible, with the appliances provided, but without taking personal risks. If possible, close fume cupboard sashes, turn off gas supplies and make safe any critical apparatus and equipment.

   Call the **fire brigade** at **122** and the **Portier** at + 43-1-4277-128 53 or **+ 43-664-817-6211**.

   Evacuate the building by the nearest available exit route (routes are indicated near each staircase and emergency exit signs are present) and assemble outside the building.

2. *Upon hearing the fire alarm (even without visible signs of fire)*, all individuals must promptly evacuate the building using the nearest available exit route. Routes are marked near staircases, and emergency exit signs are clearly displayed. Assemble at the designated area outside the building. Before evacuating, ensure, without taking unnecessary risks, that apparatus, equipment, fume cupboards, and other services are turned off or made safe.

CLOSE DOORS AND WINDOWS

DO NOT USE LIFTS

DO NOT STOP TO COLLECT PERSONAL BELONGINGS

DO NOT RE-ENTER THE BUILDING

c. Ill/injured persons

If someone is ill or injured, immediately call 144 (in case of poisoning also +43-1-4064343) and ask for a First Aider. Make sure that you give clear instructions on where to find the casualty. The First Aider will decide on appropriate treatment and further action if necessary. Following treatment, the accident should be reported via the accident report form:
https://rrm.univie.ac.at/fileadmin/user_upload/d_rrm/Downloads/Unfallmeldung_Studierende_September_2014.pdf

Never risk your own safety.

Never move a casualty unless absolutely necessary; always bring the First Aider to the casualty.

If there is more than one person in the vicinity, one person should stay with the casualty whilst another goes for help.

Once the First Aider arrives, do what they tell you. Be prepared to answer questions and give assistance as requested. Do not interfere with treatment.

Institute of Organic Chemistry Safety Guidelines - Declaration

Name:

Date:

I hereby confirm that I have read and understood all paragraphs of the Safety Guidelines. I certify that I have received the introductory training described therein (§ 2.e.).

I have further followed, or am enrolled in, the following trainings:

Fire extinguisher training

I am aware that these guidelines must be strictly adhered to, and that any failure to do so will be reported to the competent authorities.

Signature (with mention "read and understood"):