UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

CHEMISTRY DEPARTMENT

OCCUPATIONAL HEALTH AND SAFETY AND ENVIRONMENTAL PROTECTION

Some important things that you must known if you work at the Chemistry Department of the University of Fribourg

English Version of October 4, 2024

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1. LEGAL ASPECTS

The Swiss legislation on occupational health and safety stipulates explicitly that the employer (in our case the University) should take all measures to prevent work-related accidents and illnesses, insofar as these measures have proven necessary by experience, are technically applicable and are adapted to the local conditions.

The collaborators are in turn required to act according to the instructions given to them by the employer. In particular they must respect the safety rules, make correct use of the safety appliances, and use appropriate equipment to protect themselves.

Swiss Laws and Regulations concerning safety at the workplace:



The French and German versions of this brochure list some laws and directives that pertain to occupational health and safety. Only few of them exist in officially translated English Form, such as the:

- **Federal Act on protection against dangerous substances (ChemA)** http://www.admin.ch/ch/e/rs/c813_1.html
  - **Ordinance on protection against dangerous substances (ChemO)** http://www.admin.ch/ch/e/rs/c813_11.html
  - **Ordinance on good laboratory practice (OGLP)** http://www.admin.ch/ch/e/rs/c813_112_1.html

A very important instance in connection with our work is the Federal Coordination Committee for Work Safety, known by its German acronym, **EKAS** (or the French equivalent. CFST). This committee has issued rather detailed directives, many of which are relevant for us, and some of which will be quoted in this brochure (unfortunately, these directives do not exist in an official English version).

At the level of the **State of Fribourg**, an officer is responsible for the occupational health and safety of all personnel working for the State of Fribourg, which includes everyone working at our department.
Véronique Détappe, veronique.detappe@fr.ch, Phone 026 305 32 57

By his function, the President of the Department of Chemistry approves the rules published by the Safety Commission, undertakes to enforce them and to take the necessary sanctions in case of non-compliance with safety instructions.

2. ORGANIZATION OF SAFETY AND HEALTH PROTECTION IN THE CHEMISTRY BUILDING

2.1. The Safety Committee

This organization is centered on the *Safety Committee* where the professors, the assistants, the undergraduate students as well as the technical and administrative staff are represented.

At present (fall 2024) the Safety Committee is composed of the following members.

Prof. Marco Lattuada	president of the Safety Committee representative of the physical chemistry	☎ 9525
Anne Schuwey	vice president, safety responsable representative of the technical and administratif staff	☎ 8779
Prof. Fabio Zobi	representative of the inorganic chemistry	☎ 8785
Prof. Andreas Kilbinger	representative of the organic chemistry	☎ 8713
Maja Ivanovic	secretary of the Safety Committee and	☎ 8700
Dr. Priscilla Brunetto	representative of the Bio lab and the Fromm group	☎ 8786
Yan Berset	representative of the graduate students and Bochet group	☎ 8760
Dr. Jules Valentin	representative of Salentinig group	jules.valentin@unifr.ch
Dr. Patrick Fritz	representative of Coskun group	☎ 8704
Heng Zhao	representative of the graduate students and Vuckovic group	heng.zhao@unifr.ch
Brigitta Chierico	representative of the undergraduates	brigitta.chierico@unifr.ch
Karine Bassignot	head of security for the university	☎ 7116
Nicolas Hoyler	safety officer of the science faculty	☎ 8680

The committee meets ca. every 6 weeks, discusses past events, current problems and watches over the correct implementation of decisions taken by the department council and the University administration concerning safety and health and environmental protection.

If you have any questions or problems related to health protection, security and environmental protection, do not hesitate to contact one of the above persons.

2.2. Emergency intervention group

If an alarm is triggered anywhere in the science faculty, the members of the emergency intervention group receive a signal and a message on a special cell phone that they all carry. The members of this group in our house are: **Anne Schuwey, Aurélien Crochet, Olivier Graber, Krzysztof Piech and Nicolas Hoyler.**

2.3. Pregnancy

If you are pregnant, or if you plan to be pregnant, please contact **Anne Schuwey** (Lab 216/217, ☎ 8779), who will advise you, *strictly confidentially*, on appropriate measures and precautions to take.



If you are pregnant, you will be sent for a medical consultation to an occupational doctor, who will perform a risk assessment of your working activity. In order to fix an appointment, please contact Anne Schuwey (☎ 8779) or Aline Scherz (☎ 7083).

3. IMPORTANT TELEPHONE NUMBERS AND HOW TO USE THEM

Central switchboard of the Science Faculty	☎ **111**
International urgency call	☎ **112**
Cantonal police, general emergencies	☎ **117**
Fire brigade alarm center	☎ **118**
Medical emergencies (ambulances, hospital)	☎ **144**
Swiss Center for Toxicology, Zürich	☎ **145**
Minor accidents	☎ 8779 / 9132 / 8708 / 8781 / 8680

Which phones can you use for emergency calls?

The above emergency numbers **117-145** can be dialed on all phones in the department, even without a zero in front

4. EMERGENCY PHARMACY, FIRST CARE

To treat minor injuries (burns, cuts etc.), there are emergency pharmacies on floors 1-4 (to the right when you come up the stairs), as well as in room 0.114 in the basement. The content of these boxes is regularly checked and updated. In case of need, contact Anne Schuwey (☎8779), Aurélien Crochet (☎9132), Olivier Graber (☎8708), Krzystzof Piech (☎8781) and Nicolas Hoyler (☎8680),, permanent janitors (☎7300).

The pharmacy is not there to replenish your private stocks! **In case of serious injuries or medical problems, proceed as follows:**

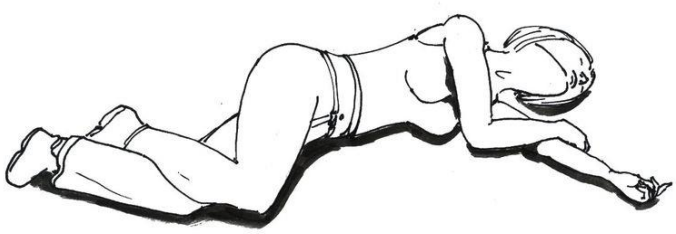
1. REMOVE THE INJURED PERSON FROM THE AREA OF DANGER

2. CALL THE EMERGENCY SERVICE (☎ 144)

Some specific cases:

After calling the emergency service

Fainted persons: Always turn fainted persons on their side to avoid danger of suffocation. In case of suspected spine injury avoid unnecessary movement of the injured person.









Lack of respiration: immediately start cardiopulmonary reanimation: Kneel next to the injured person, place one hand on its forehead, the other under the chin and strongly tilt back the head. Breathe deeply and fill the lungs by blowing air through the patient's nose or mouth (if necessary, remove obstructing objects). While you catch air for a second blow, observe the exhalation of the person (lowering of chest, hissing noise).

Then cross your hands and press 30 times sharply against the breastbone (each time releasing the pressure completely, so blood can flow back into the heart).



Then return to two further air puffs, then back to heart massage. About three such cycles should be done per minute. Repeat until the patient begins to breathe autonomously or until professional medical personnel takes over.

Never leave the injured person until professional care is assured.

Electrocution: First cut the electric power! If the injured person has fainted or does not appear to breathe, immediately apply cardiopulmonary reanimation (see above) and keep this up until professionals take over (see above).

5. BASIC RULES TO FOLLOW WHEN WORKING IN A LAB

→ *Never* eat or drink in the laboratory.

→ *Never* store food or drinks in chemical refrigerators

→ *Never* run experiments without supervision (except in night labs, see below)

→ *Never* wear headphones to listen to music in the lab

→ *All* anomalies, incidences or accidents must be announced to your assistant, advisor, professor, or to a member of the safety committee.

6. THE VENTILATION SYSTEM IN OUR BUILDING

6.1. How it works

Ventilation of the laboratories is assured by the aspiration of air through the 120 hoods, the 30 yellow or orange solvent cabinets, and the circular vents above the central lab benches. In this way, a maximum of 40'000 m^3/h of air can be extracted from each wing of the building. To avoid a vacuum, heated, and humidified air is injected through the prisms on the ceilings of the labs. The amount of withdrawn and injected air is equilibrated by an electronic control system the setting of which depends on the number of hoods that are simultaneously operative.

In order for this system to work properly, the windows and the doors of the laboratories must be closed



6.2. The purpose of the hood ventilation

The primary purpose of the hood ventilation is not to air the labs, but to protect the persons who work in the lab. This protection is considerably improved when the window of a hood is lowered (when a 50 cm opening remains, a draft of 0.25 m/s should be assured, which corresponds to an adequate protection).

When it smells badly in a lab (especially if the odors come from outside the lab), turning up the hood ventilation does not help, because the resulting temporary vacuum sucks even more of the smelly air into the lab, especially if the doors are open. In such a case you should close the doors and open a window (in this order!)

6.3. Control of the hood ventilation

Underneath each hood there is a control panel with a red pushbutton and two lights. If the red light on the pushbutton glows, this indicates a technical problem that should immediately be reported to the technical services (Daniel Egger, Tel. 7294, or François Zosso, Tel. 7291).

Upon pressing the red button:



once: the ventilation of the hood goes into low speed (450 m^3 or 6-12 times the volume of the hood are extracted per hour). The green light goes on.

twice: the ventilation of the hood goes into high speed (900 m^3 or 12-24 times the volume of the hood are extracted per hour. The orange light goes on.

three times: the ventilation of the hood is turned off (ventilation of the lab continues at a rate of 150 m^3/h through the solvent cabinets or the ceiling vents). All the lights go off.

When the hood ventilation is turned off, the hood should always be closed (window lowered)

6.4. Saving energy at night and during weekends

Especially during the winter, enormous amounts of energy can be saved if the ventilation of all hoods in which no chemical reaction is taking place and where no chemicals are stored is turned off.

Although the laboratories continue to be ventilated at a rate of 150 m^3/h through the ceiling vents, it is advisable to let one hood per lab run at low speed during nights and weekends, in order to prevent bad odors from accumulating.

The command of the ventilation system is in room 0.114. It can be programmed to create reports on the use of the hoods. This information can be made available to the research group leaders

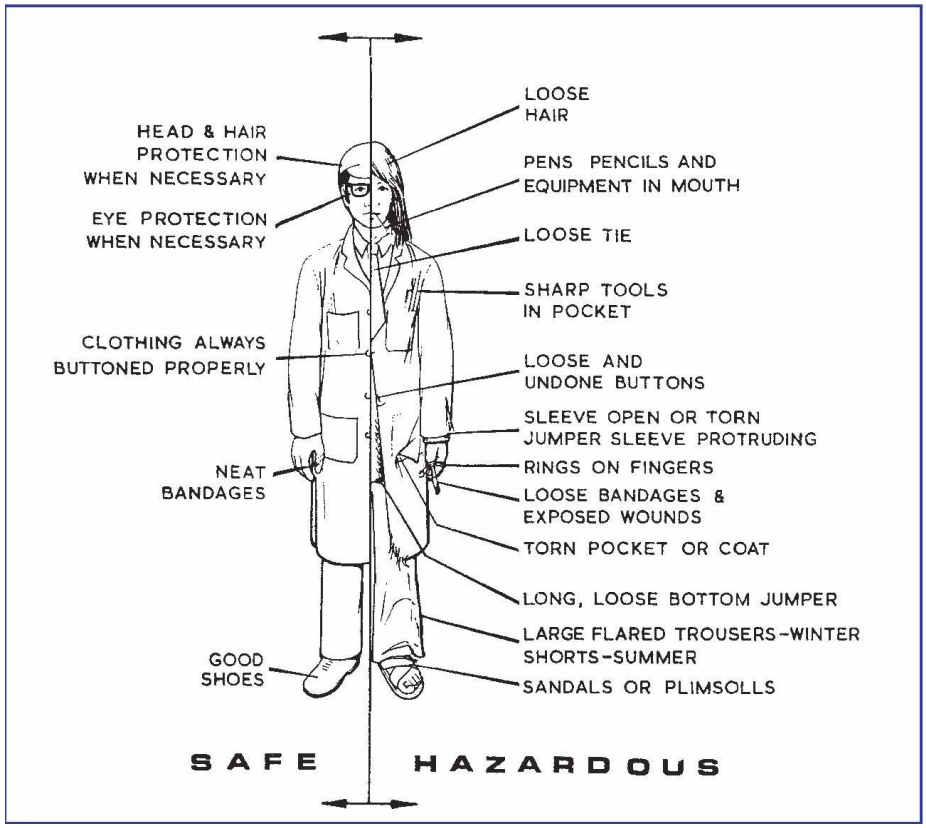
7. PERSONAL PROTECTION

While working in the laboratory it is mandatory to wear:

1. **safety goggles** (it is forbidden to wear contact lenses in labs!)
2. **a special lab coat** from fire resistant fabric.
3. **protective gloves** which offer protection against burns, small cuts and aggressive chemicals..

   Attention: depending on the solvents you work with, different gloves should be worn (see next page).
4. **protective footwear** (sandals and flipflops are prohibited in the laboratories !)

additional personal protection measures are shown below:



gas masks fitted with multipurpose filters ABEK 2-P3 are available in the middle of every corridor (please take note of the location of the closest gas mask!). Note that gas masks only offer protection in air that contains at least 17% oxygen, so do not use them in case of fire. Special filters (e.g. CO) are available in the shop in the basement. Every used filter must be returned to the shop where it will be replaced

Personal protection: laboratory gloves

it is important to choose the right gloves



vinyl for: acids
bases
amines
peroxydes

not suitable for nonpolar solvents !



latex for: aqueous solutions
dilutes bases and acids

not suitable for nonpolar solvents and HF



nitrile for organic substances
and solvents

not suitable for chlorinated solvents

Important: After finishing a task that involves contact with chemicals the gloves should be removed, to avoid contamination of tools, keyboards, door handles etc. which will be touched by others with unprotected hands.

In case of questions, see the collaborators of the chemistry shop in the basement.



8. WORKING OUTSIDE OPENING HOURS OF THE CHEMISTRY BUILDING

Laboratories are open from 6:30 am to 8:00 pm on working days. Access badges are personal and non-transferable.

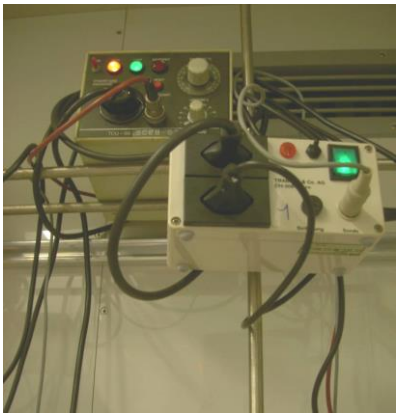
During the night (8 pm to 6:30 am), public holidays and weekends, **alarms are sent directly to the fire department and the police**. The following requirements must be observed.

1) Any work in the laboratory presenting a risk of accident (risk of contamination of person, risk of fire or explosion, etc.) requires a written authorization from the responsible professor, who will decide cases by case if special precautions, and which ones, must be organized.

2) The work can only be performed if a second person has been forewarned, he/she is nearby and within earshot, so as to be able to intervene if necessary.

8.1. Unattended experiments

Only reactions that do not present a risk of ignition or explosion may be run without supervision. They will be installed in your own laboratory if there is no heating, or in night laboratories if they require heating. The requirements of section 8.3 must be strictly followed. These experiments must be launched during opening hours, before 8 pm. Reactions and temperature must be stable for at least 1 hour before you leave your workplace.



8.2. Night laboratories

In the south wing of the building, on each floor (except the 4th) are specially equipped laboratories equipped with automatic shutdown. These laboratories are:

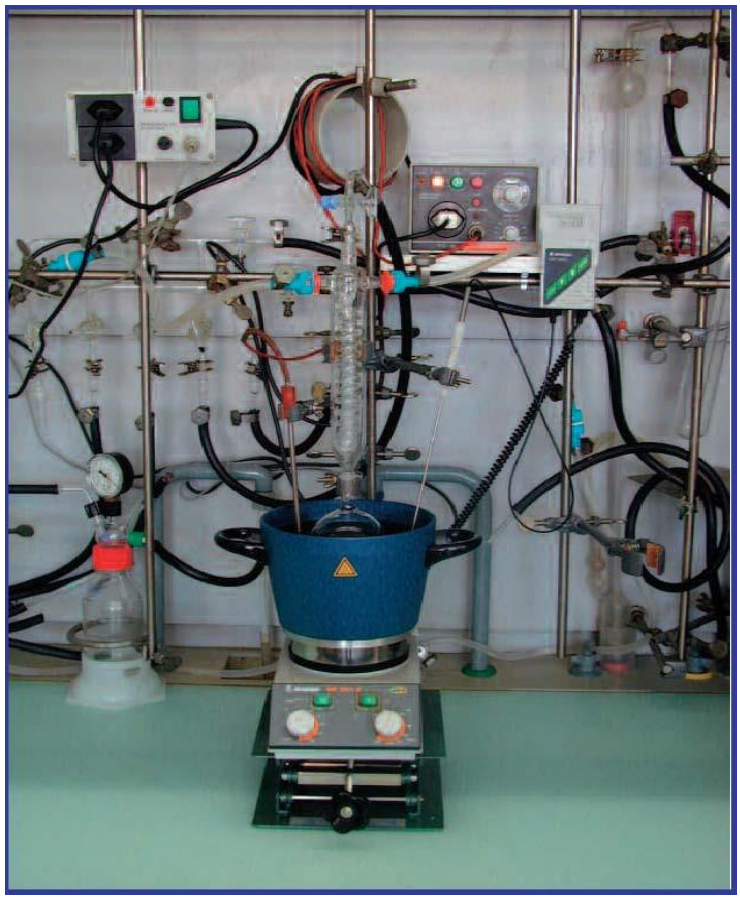
– on the first floor: laboratory No. 120

– on the second floor: laboratory No. 214

– on the third floor: laboratory No. 326

In case of non-compliance with the above requirements, the costs associated with any intervention (especially in case of alarm) will be charged to the budget of the research group of the responsible professor.

8.3. How to install an unattended reaction that requires heating



- Work in a hood in one of the three night labs
- Use a HEIDOLPH MR 3001 or an MR3002 heating plate
- Use the Pt sensor of the heating plate (EKT 3001), fasten it correctly with a clamp such that it is always immersed in the oil bath
- Select the desired temperature on the dial of the heating plate.
- To avoid overheating of the oil bath in case the first Pt sensor fails, fix a second Pt sensor in the oil bath that you connect to a SYSTAG safety relay and choose a temperature on that relay that is a few degrees above the desired temperature which you set on the heating plate
- Install a device that controls whether water is circulating through the condenser and breaks the heating circuit if the water flow falls below a threshold. Fasten all cooling water tubes with appropriate clamps.

9. STORAGE OF CHEMICAL PRODUCTS AND SOLVENTS

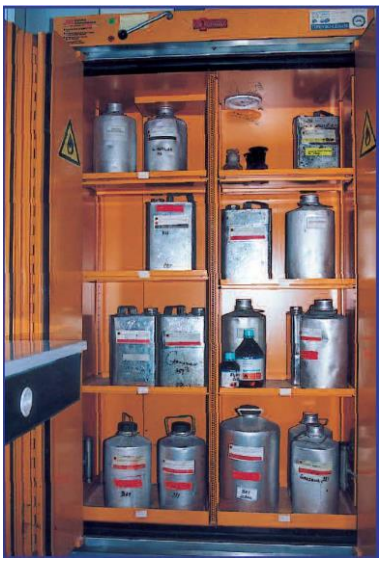
9.1. Legal constraints

EKAS directives, Art. 5.2.1 «*Admissible quantities in the workplace*: Only such quantities of dangerous substances may be stocked at the workplace as are required for the normal practice of work.».

Explanations to 5.2.1. «At each workplace*a)* easily flammable liquids should be stored in containers of maximum 3 liters *b)* and in a total quantity of at most 15 liters. If needed, higher quantities may be stored in fire-safe vented cabinets equipped with liquid retention basins.».

a) In our department, each central laboratory table counts as a workplace

b) In academic research laboratories, a limit of 1 liter is customary. We also stick to this rule.



9.2. Solvent cabinets

In each research lab, there are yellow or orange solvent cabinets (Düperthal, see picture on the left) which are built to safely hold up to 100 liters of solvents (fireproof doors, ventilation with fire valve) All volatile and flammable solvents must be stored in these cabinets. However *no other chemical products* should be stored in these cabinets, in particular not volatile bases and acids, oxidants and reductants.

9.3. Storing chemicals in hoods

Hoods in which experiments are done must not be used to store chemicals.

9.4. Internal transport of chemical products

Chemical products and solvents must always be transported in adequate containers (original packages, aluminum cans), and in the freight (not the passenger) elevator. Caddies used to transport chemicals and solvents must be equipped with liquid retention basins.

10. THE GHS SYSTEM

GHS = Globally Harmonized System of Classification and Labelling of Chemicals

Accompanied by « **H & P codes** » **H =** description of hazard
P = precautionary advice

Pictograms for physico-chemical dangers



explosive flammable oxydant compressed gas

pictograms of dangers to the human and environmental safety and health



corrosive toxic irritant CMR, STOT*) harmful to the environment

*) CMR : Carcinogenic, Mutagenic, toxic to Reproduction ;
STOT : Specific Target Organ Toxicity

11. HANDLING GAS CYLINDERS



EKAS-directives, Art. 5.7 «*Securing pressurized gas cylinders*: Upright standing gas cylinders must be secured in an appropriate fashion against toppling over. Gas cylinders that are stored horizontally must be prevented from rolling away.»

Explanations to 5.7: «Gas cylinders can be retained with chains, braces, or on suitable trolleys.»

Gas cylinders should never be placed in the vicinity of heat sources.

11.1. Transport of gas cylinders

Gas bottles must be moved around by means of the appropriate trolleys (see picture on the left). The manometers must be dismounted and the bottles must be fitted with their protective caps during transportation to avoid breakage during falls. (if a cylinder topples over, the manometer constitutes a predetermined breaking point!)

12. SOME SPECIAL RISKS

12.1. Working with glassware

Numerous accidents which happened during the last few years and required emergency medical attention involved profound cuts or severed tendons which occurred during work with laboratory glassware.

To insert a tube or a thermometer into the hole in a rubber peg, surround the glass by a towel and hold it between your thumb and your index close to the end which you want to insert. Lubricate the end and insert it carefully while twisting it gently.

If the tube is curbed or angular, never place the palm of your hand over the bent part!

12.2. Working with liquid nitrogen

In working with liquid nitrogen the greatest risks are those of *burns* (by freezing skin) and *suffocation*.

When you transport or pour liquid nitrogen, you should always wear protective gloves (sturdy work gloves will do), and make sure that the room in which you work is well vented. When you fill transport dewars from the big tank, always leave the door open

Liquid nitrogen must be transported in the freight (not the passenger) elevator.

13. CLEANING OF LABORATORY GLASSWARE



The dishwashers for laboratory glassware are on the basement floor, room 0.120

It is strictly forbidden to

- Take the dishwasher baskets with you to the lab
- To disassemble (or remove) dishwasher baskets
- To leave glassware in the dishwasher for more than a day.
- To let the machines run during the night or on weekends

In case of a malfunction, or if the red lamp at the bottom right which indicates that the machine should be regenerated is on, please inform Anne Schuwey lab 216/217, Tel. 8779

14. COLLECTING AND SEPARATING LABORATORY WASTE

For detail see the green posters in each laboratory



If you have a mixture of different types of waste, the order or priorities is red > green > yellow plastic can.

- Highly toxic products must be rendered harmless at the place of their production, so they can be transported.
- Never mix radioactive substances with the other garbage. Such substances must be treated by specialists according to the rules and laws of the Federal Health Office If you have radioactive waste, you must contact **Nicolas Hoyler** ☏ 8680.
- Heavy metals, or compounds that contain heavy metals (in particular transition metals) must be disposed of separately.

Laboratory waste must be eliminated at least once every week (especially the content of the white plastic containers).

14.1. Labelling

All containers of chemical waste products must carry a label which mentions:

1. the content of the container
2. the name of the person who produced the waste and who is in a position to furnish further information on its composition
3. the laboratory from which the waste originated
4. the date

14.2. Waste collection facility

The waste collection facility is open each **Wednesday 10:00 11:00 and Friday 13:30 14:30**. Please schedule the disposal of your waste for these hours.

15. FIRE PROTECTION

15.1. How the fire detection and alarm system works

All rooms in our building and all hoods are equipped with smoke- and heat detectors. During work hours (7 am to 7 pm), these detectors automatically transmit alarms to the members of the emergency intervention group of our faculty (cf. 2.2)

Outside these hours, the alarms from these detectors are *directly transmitted to the city's fire brigade*, and the sirens and the rotating alarm light in front of the building go off. At the same time the elevators are sent to the ground floor and the vent flaps above the lab doors are shut.



If you witness a fire, but the alarm has not yet gone off (the light on the detector does not blink), run to the nearest of the alarm buttons, that are situated at both ends of each hallway, knock in the protective glass and press the button. By doing that you automatically alert the fire brigade, so exercise this option with circumspection.

15.2. What to do in case of fire

The proper way to act in case of a fire is explained on the information sheets that are posted in all three languages in every lab (reproduced on the next page). Please read this information carefully!

In particular, you should learn how to face a fire in a way that does not aggravate its consequences.

15.3. Fire extinguishing equipment

a) *in each laboratory there is*

- 1-2 CO_2 fire extinguishers, each containing 3 kg
- a shower above the door
- an ocular shower



b) *In the middle of each hall you find*

- a CO_2 fire extinguisher
- a sandbox

c) *at the east end of each hall there is*

- a fire extinguisher with "powdered water"
- a faucet for the firemen

d) *in the central hallways there is on each floor*

- a fire extinguisher with "powdered water"
- a sandbox
- a blanket to choke fires
- a fire extinguishing post for the fire brigade

16. ALARM AND EVACUATION OF THE BUILDING



If a detector senses heat or smoke during working hours, it transmits a signal to the alarm control central across the hall from the chemistry shop in the basement. The central will in turn alert the members of the intervention group (cf. 2.2), without activating the sirens.

If no member of this group acknowledges the alert within three minutes, the central launches a **big alarm**, i.e. **the sirens will emit a continuous sound**, and the fire brigade will be alerted.

If you hear this sound:

- alert colleagues who may not have heard the sirens
- see if the incident, which caused the alarm, originated in your vicinity (in the halls, next to each lab door, there is a little red light which will blink if a detector in this lab issued the alarm)
- if yes, go and help, within your possibilities (see points 4 and 14 in this document.
- prepare yourself and your lab for a possible evacuation of the building (stop the heating of running reactions, vacuum pumps, gather up your personal belongings, save data on computers ….).

The intervention group or the fire brigade may give the order for the **evacuation of the building** which manifests itself by the sirens emitting an **alternating (two-tone) sound**.

At this moment you should proceed as follows:

- leave the building, without undue hurry, but by the shortest path, or according to the instructions by the firemen.
- do not use the elevators!



- proceed immediately to the gathering place in between the Physiology building and the automatic teller machine (see logo on the left).
- Do not leave the gathering place without informing your direct superior (assistant, professor) or a member of the Safety Committee

  The department president or his deputy, the research group leaders, and those responsible for the technical personnel will then;
- Make sure that all members of their groups are present (or their whereabouts are known).
- inform the head of the firemen about particular hazards in their lab
- tell their collaborators if and when the alarm is over.

IN CASE OF FIRE

stay calm, act thoughtfully

ALARM find one of the red alarm buttons at the end of each corridor and press it (automatic call to the fire brigade!)

SAVE evacuate persons who are in danger

SECURE avoid drafts by closing all windows and doors Including those at the ends of the corridors

EXTINGUISH

FLAMMABLE MATERIALS	EXTINGUISH WITH
- wood, paper - organic solvents, gases - light metals (Na, K, Mg ...) - electrical equipment	water powder, CO_2 dry sand CO_2, powder

INTERDICTION



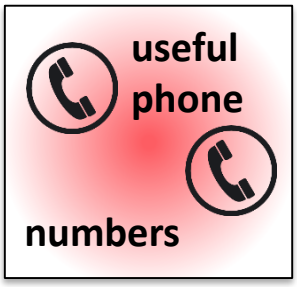
do not use the elevators

DANGER TO LIFE !

evacuation of the building: alternating siren signal or oral order



gathering place in case of evacuation:
in front of the physiology/MED3 building, next to the automatic teller machine



international urgency call	**112**
police	**117**
fire brigade	**118**
emergency services / ambulance	**144**
toxicology center Zürich	**145**
minor accidents / injuries	8779, 9132, 8708, 8781, 8680



Address of the department Chemin du Musée 9