SAFETY REGULATIONS
for student lab courses
These safety regulations were drafted by HEALTH and SCIENCE and cover the general rules. This means that local deviations may apply. In case of deviations, the instructions of the instructor will always take precedence. The target audience for these safety regulations is students in training laboratories in connection with teaching. In addition, guidelines for exercises involving work with specific substances and materials, such as GMO, isotopes, animals and test subjects, are provided in separate supplements to the safety regulations.


Knowledge about safety and working environment is a qualification in its own right. If you know what you are doing, you contribute to creating a safe teaching environment and making the University of Copenhagen a safe place to work for all of us.

When you graduate, there is a good chance that you will be the one responsible for keeping not only yourself but also others safe. For this reason, it is important to develop good habits from the beginning. These safety regulations set out the most basic rules of the lab.
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Work in the lab involves a number of risks which you must consider if you and your fellow students are to work safely and avoid injury. Your instructor has planned the experiments in such a way that they are as safe as possible, and will instruct you on how to perform the experiments safely. You are responsible for knowing and complying with safety instructions.

In time you will also learn how to identify and prevent risk factors in the lab.

**The most basic guidelines for safe lab work are**

- **Be prepared.** You must have read the exercise instructions and safety regulations
- **Keep the lab tidy**
- **Observe the ground rules** for lab work (see the next chapter)
- **Understand hazard labels** for chemicals – use Kemibrug.dk (see the chapter ‘Labelling of chemicals’)
- **Ask** if in doubt.

**REMEMBER**

- Only perform experiments approved by your instructor
- Always tell your instructor if you are pregnant or breast-feeding in order to take the necessary precautions
- You should have your own full-time accident insurance
- Accidents and near-misses must be reported to your instructor to prevent them in future
- Participate actively in the evaluation of the course and tell your instructor if you have any suggestions for safety-related improvements
- If you repeatedly break the rules, you may ultimately be expelled from the course.

TAKE CARE OF YOURSELF – ACQUIRE GOOD LAB HABITS FROM THE WORD GO
GROUND RULES FOR LAB WORK

How to dress
Your apparel must be suitable for lab work.
• Stable and closed footwear to avoid spilling chemicals on your feet
• No loose sleeves, coats or scarves
• No jewellery or watches on hands or wrists
• Tie back long hair. If you wear a headscarf, it must be worn under your lab coat.

Use personal protective equipment – and use it correctly
• Use lab coats whenever necessary, and REMEMBER that the lab coat must be buttoned up when you are working and taken off when you leave the lab area
• Use goggles whenever necessary
• Use gloves whenever necessary, and REMEMBER to take them off when you are done with the activity; do not wait to the end of the day.

Personal behaviour
Your behaviour in the lab is important for your safety and the safety of others.
• Keep the lab tidy – a tidy lab is a safe lab
• No bags or coats in the work area (you may trip over them if they are left on the floor)
• Always wear the stipulated personal protective equipment
• Do not drink, eat, chewing gum, apply lip balm and the like in the lab
• Do not lick your fingers or pencil tips or similar
• Do not run or make sudden movements
• Limit the formation of aerosols, which are generated, for example, by shaking liquids
• Always wash your hands after the exercise.

Working with chemicals
• Familiarise yourself with chemical hazards before starting work. You can find regulations for the use of specific chemicals at www.kemibrug.dk
• Make a risk assessment by assessing the entire work process – is there a risk involved in handling the chemicals, and can you do something to reduce it
• Always work in fume hood, if required
• Do not mix unknown chemicals – you must know how they react together
• Do not taste chemicals, and do no put your nose close to them
• Be careful when decanting chemicals
• Hold the label when pouring to avoid spill damage to the label
• Wipe off any drops on the bottle
• Notify your instructor if you spill
• If you produce chemical compounds, you must label them immediately; see the chapter on labelling of chemicals
• Do not return chemicals to their bottles
• Always clean the scales and table when you have weighed chemicals
• Chemicals must be transported in closed and labelled containers, and large volumes of chemicals on a trolley.

Waste
Ask your instructor how to dispose of the different waste types correctly. Chemical and biological waste must not be disposed off down the drain or in waste bins.
• Waste containers must be labelled, stating the maximum content, before they are used
• Always collect chemical waste in the appropriate containers
• Syringes and other sharp objects must be placed in special yellow containers
• Bottles must be placed in special containers for glass waste
• Always render biological material inactive or dispose of it as clinical hazardous waste (yellow bags).

Get your bearings
In case of an accident, you must know the location of:
• Emergency exits
• Emergency showers
• Eyewash bottles
• First aid kit
• Defibrillators (AED)
• Fire extinguishers
• Fire blankets
• Location of call point
• Absorbents for chemical spills
• Your location.

In case of an accident, it is important to react quickly with due consideration and to summon your instructor.
SAFETY EQUIPMENT AND PERSONAL PROTECTIVE EQUIPMENT

Protect yourself – use appropriate safety equipment and personal protective equipment.

Protect your fellow students by not contaminating your surroundings with chemicals from your gloves or lab coat.

Use of fume hoods
• Use fume hoods for any work resulting in hazardous or noxious gases, vapours or dust
• Check that the fume hood is working – check that the indicator light is green
• Always use the smallest opening possible
• Keep your face (the breathing zone) above the edge of the fume hood
• Open lab doors and windows may impair the function of the fume hoods
• If the fume hood alarm sounds, respect it and correct whatever is wrong
• Keep the fume hood clean and tidy – do not use it for storing chemicals
• Always leave the fume hood with its cover down – this saves energy.

Use of extraction vent
If you are working on dangerous substances beneath a local vent please note that local vacuum extraction vents only operate properly if the opening is 15 centimetres or less from the item to be extracted from.

Goggles
Use goggles whenever necessary.
The goggles protect your eyes and eyesight against hazardous and caustic chemicals, and against infection. The mucous membranes of the eyes are infection paths for both HIV and hepatitis. If you normally use glasses, they may afford some protection. However, use of goggles is recommended as they afford better protection. You can buy goggles with correction.

We do not recommend the use of contact lenses in the lab. Contact lenses make it difficult to flush the eyes in case of accidents. If you choose to wear them, you should, of course, also wear goggles.

Lab coat
Lab coats must be worn for all relevant exercises. The lab coat will prevent that you get chemicals or biological agents on your clothes. To avoid contaminating other areas, the lab coat may not be worn outside of the lab area.

For many exercises, it is your responsibility to bring a lab coat.

Gloves
Gloves are there to protect your skin from chemicals and microorganisms – but use them with consideration. Sometimes it is better to work without gloves.

Gloves may give a false sense of protection. If chemicals penetrate the glove, the conditions are ideal for the skin to absorb the chemical concerned, because the glove ensures close contact between your skin and the chemicals, and because the skin in the glove is warm and moist. As a rule of thumb, gloves must therefore be changed in case of spills.

All gloves may cause allergies. Take allergy symptoms caused by gloves seriously, and try changing to a different type of glove. Do not use powdered gloves. Perhaps use a cotton glove beneath the protective glove.

Use gloves properly
• Gloves should be worn as briefly as possible but as long as necessary
• Working without gloves is recommended if you are NOT in direct contact with hazardous substances
• Rings, watches and bracelets must be removed
• Your hands must be clean and dry before you put on your gloves. Do not use creams just before putting gloves on
• Change your gloves frequently
• Change contaminated gloves immediately. Do not put others at risk – always use a gloveless hand to handle your phone, use a computer, etc.
• NEVER touch door handles when you are wearing gloves
• Your skin also serves as protection if it is intact and well-cared-for. If you have cuts or scratches on your hands you should wear gloves, as your natural barrier is not intact
• Always wash your hands before leaving the lab.

The protective powers of chemical gloves are defined by their permeation time which is the time from the moment they meet the chemical to the moment the chemical reach the skin. The instructor will instruct you on which glove to use. Kemibrug.dk contains suggestions for glove choice.

1 Under Section C: Precautions when using substances
USE KEMIBRUG

Use Kemibrug when working with chemicals

Kemibrug is the University of Copenhagen database of safety data sheets. These tell you the physical properties of the chemical, the risks involved in working with specific chemicals, how to dispose of them, etc.

Safety data sheets must be available for any chemical used at the University of Copenhagen. If you cannot find the necessary safety data sheet, inform your instructor, so that he or she can order it from Kemibrug. In the meantime, you can use the supplier’s directions for use. Your instructor can also order an English translation of the safety data sheets.

Some chemicals have a standardised label, while others are classified and labelled based on an assessment. The Kemibrug labels may deviate from those employed by the producers. You must always adhere to the Kemibrug labels.

Special precautions

• Volatile flammable chemicals may form a flammable fume above the liquid surface, which may be ignited by sparks
• Carcinogenic substances are hazardous even in small concentrations
• Basic chemicals are more aggressive to the skin than acidic chemicals
• Oxidizing chemicals may cause a serious reaction when coming into contact with other chemicals
• Allergens and adjuvants may be harmless outside of the body, but dangerous if they are injected into the bloodstream by accident.

REMEMBER that Kemibrug can only be accessed from a computer at the University of Copenhagen for the time being.

Most information can be found at kemibrug.dk

2 With the exception of chemicals produced by synthesis
LABELLING OF CHEMICALS

All chemicals must be classified and labelled, and you must know what the labels mean. For the moment we are in a transition phase, and therefore two parallel labelling systems exist.

**CLP – The new system**
Black pictograms against a white background enclosed by a red diamond frame. The CLP scheme is an EU version of the United Nations GHS system.

**THE NEW CLP LABELLING SYSTEM**

| HEALTH | Carcinogenic, mutagen, harmful to reproduction |
| PHYSICAL CHEMICAL | Corrosive to metals |
| ENVIRONMENT | Toxic to aquatic life |

| HEALTH | Corrosive to skin/eyes |
| ENVIRONMENT | Explosive |

| HEALTH | Skin/eye irritation |
| ENVIRONMENT | May intensify fire |

| ENVIRONMENT | Contains gas under pressure |

**The old system**
Black pictograms on orange squares and refers to Danish EPA (Environmental Protection Agency) directive on classification and labelling. From June 2017 is the old system no longer legal and all chemicals must have a CLP label.

*CLP = Classification, Labelling and Packaging
GHS = Globally Harmonised System of Classification and Labelling of Chemicals*

Labels carry H (Hazardous) and P (Precaution) statements. H statements explain the message conveyed by the symbol and provide more details. P statements state the precautions to be observed when handling the chemical concerned.

**H = Hazardous statement**
All relevant H statements must appear. H statements cover the following:

- H200 – Physical and chemical hazards
- H300 – Health hazards
- H400 – Environmental hazards
- EUH statements are H statements applicable throughout the EU.

**P = Precautionary statement**
A maximum of six P statements may appear on the label. P statements cover the following:

- P100 – 199 General, e.g. storage
- P200 – 299 Safety
- P300 – 399 Safety responses
- P400 – 499 Storage
- P500 – 599 Disposal
All chemicals must all be labelled.
When you decant, mix or dilute chemicals, the new container must be labelled. Just writing the chemical ingredients with a marker on the bottle is not enough.

The container must be labelled according to CLP with the following information:
- Contents
- Concentration
- Name of user
- Date
- Pictograms, and H/P statements if necessary.

You can use Kemibrug.dk to print the correct labels with the required information.

Kemibrug does not yet have a solution for classification and labelling of chemicals mixtures after CLP, so in the meantime the old labelling system is accepted.

If your chemicals are diluted so highly, that they are no longer hazardous, you can make a handwritten label just stating content, user and date.

June 2015 – Printing labels with CLP pictograms and statements is not yet fully implemented in Kemibrug

THE OLD EPA LABELLING SYSTEM

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>Very toxic Tx</th>
<th>Toxic T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Harmful Xn</td>
<td>Irritant Xi</td>
</tr>
<tr>
<td></td>
<td>Corrosive C</td>
<td></td>
</tr>
<tr>
<td>FIRE EXPLOSION</td>
<td>Oxidizing O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extremely flammable Fx</td>
<td>Highly flammable F</td>
</tr>
<tr>
<td></td>
<td>Explosive E</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>Dangerous for the environment N</td>
<td></td>
</tr>
</tbody>
</table>

Example of label printed from Kemibrug

For labelling R (risk) and S (safety) statements are used. Risk statements explain the message conveyed by the symbol and provide more details. S statements state the safety precautions to be observed when handling the chemical.
Good conduct when working with biological agents
When working with biological agents, the work must be planned to prevent reaction from and spreading of microorganisms as far as possible.

The most important prevention principle is to encapsulate/enclose the biological agents to ensure that they do not contaminate the lab and the environment. In addition, a high state of cleanliness, hand washing and use of personal protection equipment help prevent spreading and infection.

- Always check the health risk of the biological agent before starting the work
- Always wear a lab coat
- Use gloves and goggles if there is a risk of exposure of hands and eyes
- The work must always be performed in biological safety cabinets if there is a risk of aerosols forming and you are working with infectious microorganisms
- If you spill on your hands, wash them thoroughly with water and soap, and then disinfect them with an appropriate disinfectant, if necessary
- Keep a high state of cleanliness and wipe up any spills and disinfect the area with an appropriate disinfectant
- Collect waste in labelled containers
- All waste must be inactivated by means of autoclaving, chemical disinfection or disposal as clinical hazardous waste (yellow bags). The instructor will provide instructions
- Be careful when handling sharp objects such as microscope slides, cover glass, disposable and glass Pasteur pipettes
- Always report puncture wounds as occupational injuries
- Always wash your hands after the exercise.

Stricter rules apply to work with genetically modified biological agents. Refer to the supplement about genetically modified organisms (GMOs).

Use of biological safety cabinets
- It is recommended using biological safety cabinets (usually called LAF benches) when the work requires both a sterile environment and personal protection, for example for infectious microorganisms where there is risk of aerosol formation or large volumes or high concentrations are used
- Check that the bench is ready (usually indicated by a green light). Older safety benches must warm up for some time before they are ready for use (approx. 5 minutes)
- All unnecessary equipment must be removed, as it may disrupt the flow in the bench
- Always clean the bench before and after use
- Set up equipment appropriately in consideration of the flow. The bench is partitioned to separate the equipment and material to be worked with
- Open lab doors and windows may impair the safety benches from working properly
- If the safety bench alarm sounds, respect it and correct the error
- Keep your face above the opening
- The holes in the front of the bench may not be covered when working
- The work must be performed inside the bench, as the area around the opening is not sterile or safe
- Move quietly to prevent turbulence which will drag material in or out of the bench
- Turn off the bench, if no one else is using it.
In case of accident in the lab the appropriate reaction is vital. React quickly but calmly and with due consideration.

Occupational injuries and near misses must always be reported via your instructor. Occupational injuries and near misses must be investigated in order to prevent similar incidents.

**THE FOUR PRINCIPLES OF FIRST AID**
1) Stop the accident
2) Preserve life
3) Summon assistance
4) Provide first aid

**If you call emergency services via 112**, ensure that somebody can help the paramedics to locate the site of the accident.

**CORROSION**
Water is a universal remedy. Flushing with water always helps. In the case of acid or base burns flush, flush, and flush again until help arrives.

Corrosive burns are irreversible destruction of the tissue.

Acid burns often cause superficial, scab-like lesions. Base burns are deep.

Hydrofluoric acid is one of the worst hazards as this acid can attack bone tissue.

**Eyes**: Flush immediately with the eye washer, or what is available. Open the eye wide. Remove contact lenses immediately. Continue flushing until medical treatment arrives. Do not try to neutralise using acid or base.

**Skin**: Flush with water immediately, using the shower if necessary. Remove contaminated apparel. Flush thoroughly. Do not stop. Do not try to neutralise using acid or base.

**Inhalation**: Fresh air. Consider medical assistance.

**Swallowing**: Administer water. Do not provoke vomiting. Do not try to neutralise using acid or base.

**BURNS**
- Flush the affected area immediately, using cold water
- Remove loose clothing covering the affected area
- Continue to flush
- Get somebody else to fetch supplies of cold water in a bowl
- Immerse the affected area in the water. Keep it there until the pain recedes or for at least half an hour
- Wrap the affected area in a cold, wet rag
- If necessary, transfer the victim to Accident & Emergency (call 1813).

**PUNCTURE WOUNDS OR SPLASHES ONTO MUCOUS MEMBRANES**
If you are exposed to blood or tissue fluids resulting from punctures, cuts, abrasions to your skin or splashes onto your mucous membranes there may be a risk of infection with hepatitis B, hepatitis C, or HIV. Always visit Accident & Emergency (call 1813) as soon as possible and at least the same day. Accident & Emergency will decide on further procedures. Remember that your eyes are an infection path for HIV and hepatitis. Protect yourself by wearing goggles.

**Skin lesions**: In case of cuts and abrasions caused by objects contaminated with blood or tissue fluids.
- Wash thoroughly with soap and water
- Desinfect the lesion twice with a 0.5% chlorhexidine solution, 70% ethyl alcohol, or 2.5% iodine.

**Splashes onto your mucous membranes**: If blood or tissue fluid gets into your eyes, mouth, or open lesions, flush with plenty of eyewash, saline solution or clean water.

**ACCIDENT & EMERGENCY AND 112**
If the Accident & Emergency is needed, you must call 1813 in advance. **ALWAYS** call 112 if needed.
FIRE

You need to know the general principles for extinguishing fires so you do not make the fire worse by pouring water on an oil fire, for example. Before laboratory work commences note where the fire fighting equipment is stored and how to use it.

Always dial 112. Do not put yourself at risk and do not try to act like a hero.

Fighting fires of different kinds
- **Persons:** use fire blankets and water. Carbon dioxide must not be directed at human beings as they may cause frostbite.
- **Solid materials that may cause embers such as wood or textiles:** use water, fire blankets and/or carbon dioxide.
- **Liquids or materials that can melt, such as benzene and plastic:** use sand, a “lid” or fire blanket, and/or carbon dioxide.
- **Fats (in the kitchen):** use a “lid” or a fire blanket, sand, possibly carbon dioxide.
- **Gasses:** turn off the source, use carbon dioxide.
- **Electrical:** turn off current at source if possible. Use carbon dioxide extinguishers. Use water only if the current has been switched off.
- **Metals:** use sand, a “lid” or a fire blanket, NEVER water or carbon dioxide.

These recommendations take the available means into account.

Learn about fire fighting and test yourself
Visit the Trygfonden Fire-fighting School [http://ku.powerlearn.dk/](http://ku.powerlearn.dk/) which was specially developed to teach users about fire safety in laboratories.

<table>
<thead>
<tr>
<th></th>
<th>WATER</th>
<th>CARBON DIOXIDE</th>
<th>POWDER</th>
<th>FIRE BLANKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Solid materials</td>
<td>YES</td>
<td>NO</td>
<td>Usable</td>
<td>YES</td>
</tr>
<tr>
<td>(paper, textiles, wood)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Gas</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>-</td>
</tr>
<tr>
<td>Electrical</td>
<td>NO</td>
<td>YES</td>
<td>Usable</td>
<td>-</td>
</tr>
<tr>
<td>(computers, motors)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal</td>
<td>NO</td>
<td>NO</td>
<td>NO*</td>
<td>YES</td>
</tr>
</tbody>
</table>

* May be extinguished using a metal fire extinguisher containing a special dry powder
The Faculties at the University of Copenhagen all adhere to the same standards for security and safety. In an emergency the procedures are as follows:

- **Evacuation**: You will be alerted by alarm bells, by loud-hailer or by shouting.

- **Familiarise yourself with the green emergency exit signs in your vicinity and the route to the nearest exit.** Also note the location of the nearest fire fighting equipment.

- **The EVACUATION LEADERS will assist you in an emergency.** They ensures that people leave the building, and will be wearing yellow vests for identification.

- **In case of evacuation leave the building at once!** Follow the emergency escape routes indicated by the green signs to the assembly point where you will receive further instructions from the ASSEMBLY POINT LEADERS wearing orange vests.

The evacuation procedures are based on the assumption that in an emergency there will always be somebody to take command. The Faculty leadership has therefore NOT appointed special evacuation staff. It is up to individual staff to put on the yellow vests and become evacuation leaders on their own initiative. **During courses, the teacher is always the evacuation leader.**

The University of Copenhagen buildings are divided into evacuation zones of a manageable size. There are holders in each building or zone containing a yellow vest and an orange vest and evacuation instructions. The instructions are in Danish and English.

The instructions indicate what the evacuation and assembly point leaders should do and the location of the nearest assembly point etc. It is recommended that you familiarise yourself with the evacuation instructions, so you are ready in case of evacuation.
ERGONOMICS

Muscular and skeletal problems account for 50 per cent of all reported occupational complaints in Denmark.

- Look after your body
- Adjust your chair to fit you
- Take breaks
- Vary your work posture
- Turn the chair instead of the body and neck. Also when you attend classes
- Place materials, so that you shorten the distance for the things you use a lot or that are heavy.

FULL-TIME ACCIDENT INSURANCE

Students are not usually covered by the insurance provisions of the Occupational Injuries Act. We recommend that you take out a full-time accident insurance, and that you make sure it applies when you are studying, working in the lab, on field studies etc.