

Safety instructions



Department of Biomedicine

June 2020

Contents

Introduction	6
The occupational health and safety organisation (AMO).....	6
Emergency numbers	7
Call the emergency call center: 1-1-2.....	7
AU Emergency number: 87 15 16 17.....	7
Emergency room.....	7
Reporting of work-related accidents	7
Insurances.....	8
First aid.....	9
Defibrillator	10
Burns	10
Chemical burns	10
Internal chemical burns or ingestion of organic solvents.....	10
External chemical burns.....	10
Chemical burns in the eye.....	11
Use of eye washers (available in all labs).....	11
When working alone	11
Standing or sitting patient	11
Patient lying down	11
Eye washer as an integrated part of the water tap	11
Poisoning	13
The poisoned person is awake.....	13
The poisoned person is unconscious	13
First-aid kits	13
Respirators.....	13
Spills alert	13
Reporting the accident/spill.....	14
Fire instructions	14
In case of fire	16
Evacuation.....	18
Escape routes.....	18
Breakdowns.....	19
Regarding ventilation, fume cupboards, water, plumbing and heating	19
Regarding lab equipment/instruments	19
Regarding IT equipment/IT breakdown	19

General code of conduct in standard (non-classified) laboratories	20
General rules in laboratories	20
General rules when leaving the lab	20
Flow benches	20
Fume cupboards	21
Use of gloves	21
Ten tips on skin protection when doing “wet work”:	21
Clothing:	22
Lab coats	22
Washing of coats	22
Outdoor clothes.	22
Handling of notes, etc.	22
Standard (non-classified) labs	22
Classified labs	22
Instruction in the use of centrifuges	23
Instruction in the use of ultracentrifuges	23
General code of conduct in classified laboratories.....	24
GMO Class 1 laboratory	24
General rules in class 1 laboratories	24
Transport of class I material	25
Class 1 waste handling	25
Class 2 laboratory	26
General rules in class 2 labs	26
Transport of class 2 material	26
Class 2 waste handling	26
Procedure for upgrading from class 0 to class 1	27
Procedure for downgrading from class 1 to class 0	28
Instructions for workmen	29
Cleaning directions for cleaning staff	30
Code of conduct in microbiological work	31
Before the microbiological work commences	31
Safety	31
Precautions for microbiological laboratory work	32
In-house transport of microorganisms	32
Handling of waste, etc.	33
Before you leave the laboratory	33
Code of conduct in work with human biological material.....	34

Guidelines for working with human biological material *	34
Accidents	35
Needlestick injuries	35
Code of conduct for work in an isotope laboratory	37
Accidents with radioactive material	37
Spills or loss of radioactive material	37
Radioactive contamination of persons	38
Intake of radioactivity	38
In case of major accidents with radioactive isotopes please contact	38
Scintillation counting	39
Instructions in working with hazardous substances	40
Working with carcinogenic substances	41
Instructions in weighing of chemicals/hazardous substances	42
Waste	42
Instructions in the use and storage of flammable liquids and chemicals	44
Definitions	44
Flammable and explosive chemicals	45
ATEX workplace assessment	45
Instructions in working with dry ice and liquid nitrogen	46
Dry ice	46
Liquid nitrogen	46
Transport of animals outside the animal facilities	47
Physical and Psychological working environment	48
Physical working environment	48
Department of Biomedicine's policy for a good psychological working environment	48
Aarhus University's policy for a good psychological working environment	49
Physical and psychological workplace assessment	49
Psychological counselling	50
Referred counselling	50
Anonymous counselling	51
Handbook on psychological working environment	51
Special guidelines for pregnant women	52
Rules for working with radioactivity during pregnancy and nursing	53
References	54
Rules for work involving genetic engineering in class 1 laboratories	54
Code of conduct in microbiological work:	54
Code of conduct for work in an isotope laboratory	54

Test of gloves	54
Instructions in working with hazardous substances	55
Flammable liquids and chemicals	55
Appendix 1 Radioactivity	56
Units of activity	56
The following isotopes are used at the Department of Biomedicine	56
Radiation protection	56
Storage of radioactive agents	57
Maximum limits for work with radioactivity	57
Guidelines for working with isotopes ^3H, ^{14}C, ^{33}P and ^{35}S	58
Waste and cleaning after working with ^3H, ^{14}C, ^{33}P and ^{35}S	58
Guidelines for working with isotope ^{32}P	59
Waste and cleaning after working with ^{32}P	59
Guidelines for working with the isotope ^{125}I	60
Waste and cleaning after working with ^{125}I	61
Appendix 2. Flammable and explosive chemicals	62

Introduction

Everyone who works in labs at the Department must be familiar with the contents of these safety instructions. The instructions are intended as help to employees and students of the Department as they provide guidelines as to how to relate to work safety.

Labs can be hazardous workplaces. Therefore, think through the working procedure, seek information on substances and safety, and keep the lab tidy. Safety instructions and workplace instructions (APB) must be available in the lab or the immediate vicinity. In the APB, you can read about the hazards of the substance, how to protect yourself and how to handle spills and accidents. At all times, the person responsible for the project has the overall responsibility for ensuring that the project is carried out in a safe and responsible manner. In the event of accidents, the project manager, in consultation with the working environment organisation, if necessary, is responsible for taking the necessary measures. In case of emergencies, Daily Head of Occupational Health and Safety Committee, Peder S. Madsen can be reached at mobile 23 38 22 55.

New employees and students are to be thoroughly instructed in working procedures and safety regulations. When in doubt, please ask - just for safety's sake.

Do not consume food and beverages in the labs – please use the canteen/coffee rooms on each floor (Lab coats are not allowed there).

Smoking is not allowed anywhere in AU buildings.

Further information is available on the Department's website:
<http://biomed.medarbejdere.au.dk/arbejdsmiljoe/>

The occupational health and safety organisation (AMO) consists of:

Health and safety group Department of Biomedicine

<http://biomed.medarbejdere.au.dk/arbejdsmiljoe/amo-og-referater/>

Local Occupational Health and Safety Committee (LAMU)

<http://biomed.medarbejdere.au.dk/arbejdsmiljoe/lamu-og-referater/>

FAMU (Faculty Health and Safety Committee)

<http://health.medarbejdere.au.dk/organisation/moedefora-og-referater/fakultetsarbejdsmiljoeudvalg-famu/>

HAMU (Main Occupational Health and Safety Committee)

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/organisation/hamu/>

Emergency numbers

In case of fire, accidents or other life-threatening situations at Aarhus University,

stop or contain the accident if you can do so without putting yourself at risk.

Call the emergency call center: 1-1-2

(When dialling 1-1-2, it is not necessary to dial 0 to get a line out. When using a mobile phone it is recommended that you use the 1-1-2 app)

State:

- Name
- The location you are calling from
- What has happened
- Which telephone number you are calling from

Evacuate if necessary

The next step is to call the University's emergency phone number, which is staffed day and night all year.

AU Emergency number: 87 15 16 17

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/beredskabogassistancer/intro/>

Emergency room

You are not allowed to show up at the emergency room at the hospital without having called first. See instructions below.

Weekdays between 8-16: Call your own doctor

On weekdays between 16 and 8, as well as weekends and public holidays:
Call the doctor on emergency duty on 7011 3131

<https://www.rm.dk/sundhed/akut-sygdom/>

Reporting of work-related accidents

1. All accidents/injuries **MUST** be reported immediately to the local occupational health and safety representative.
(See the list of occupational health and safety representatives of the department of Biomedicine on the website

<http://biomed.medarbejdere.au.dk/arbejdsmiljoe/amo-og-referater/>)

2. You can find the form to fill in details regarding the injury on
<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/anmeldskade/>
3. Please send the form to: arbejdsskader@au.dk or by post to AU HR, development and work environment as soon as possible with a copy to your local head of the working environment committee

Insurances

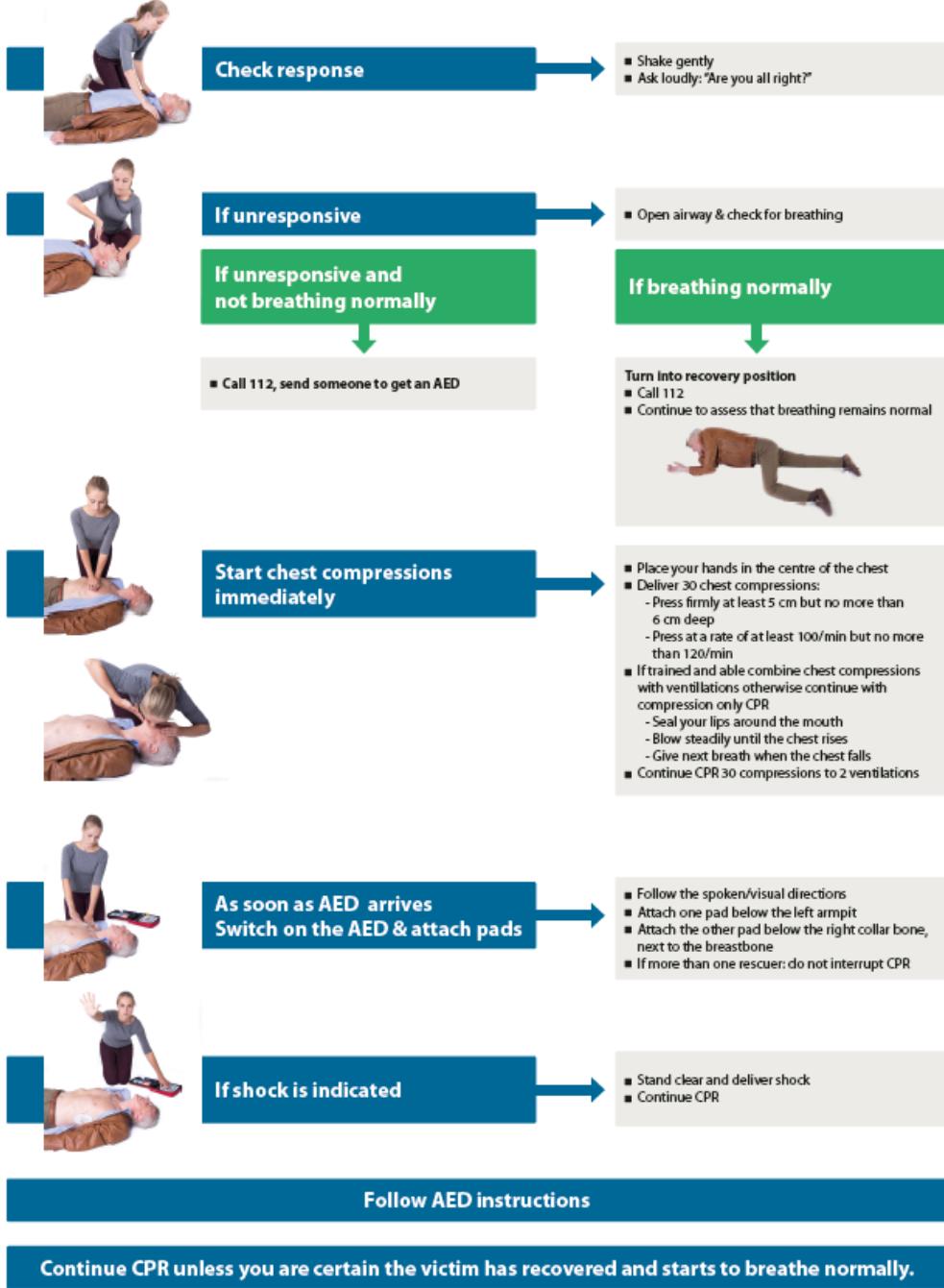
University staff is insured. The university does not have insurances customized for students. It is recommended that students take out private accident insurances.

Bear in mind that you must always bring your insurance card on business travels. Find out more on AU Finance's website

[http://medarbejdere.au.dk/administration/oekonomi/reisebestilling-
ogudgiftsaftregning/rejseforsikring/](http://medarbejdere.au.dk/administration/oekonomi/reisebestilling-ogudgiftsaftregning/rejseforsikring/)



Basic Life Support with the use of an Automated External Defibrillator (AED)



Defibrillator

A defibrillator is a portable, battery-powered machine. By administering an electric shock, the defibrillator can get a heart which has stopped pumping blood around the body to start pumping normally again. It is not possible to use a defibrillator incorrectly, and it is easy to use. Aarhus University has purchased and installed 60 defibrillators. At Aarhus University, the defibrillators are positioned in busy areas, but there is no point in having them unless you know where they are. Click on the link below and enter Aarhus in the search field.

<https://hjertestarter.dk/find-hjertestartere/find-hjertestartere>



Burns

- Immediately rinse the affected area with cold water.
- Remove loose-fitting clothes from the burned area.
- Temper then water so it feels comfortable but cold.
- Continue to rinse until the pain is gone – at least for 30 minutes
- Place a cold, soaked pack (i.e., towel, dish towel or a clean lab coat) on the burned area and take the injured person to the emergency room.

Chemical burns

Internal chemical burns or ingestion of organic solvents:

Note! Vomiting is in these cases NOT to be provoked.

- Immediately give plenty of fluids to drink (milk or water).
- Call an ambulance or bring the injured person to the emergency room – bring information about the cauterant (name, chemical formula, container).

External chemical burns:

- Rinse immediately with excessive amounts of water.
- Remove clothes – continue rinsing for 10 minutes.
- If the pain continues, keep rinsing for another 10 minutes.

- If the chemical burn is substantial, bring the injured person to the emergency room, e.g. by ambulance and bring information about the cauterant (name, chemical formula, container).

Chemical burns in the eye:

- Rinse immediately with excessive amounts of water in a low pressured water jet.
- Rinse from the root of the nose and outwards.
- Continue rinsing for 5 min.
- Always seek doctor afterwards - bring information about the cauterant (name, chemical formula, container).

Use of eye washers (available in all labs)

You can find eye washers either fixed to the sink fixtures or as disposable bottles. Find out where they are situated before you actually need to use the eye washers.

When working alone:

- Be certain that the solution is clear and the bottle is sealed.
- The liquid in the eye wash bottles must always be sterile – see instructions on the bottle.
- The bottle is opened by turning the lid.
- Bend down over the bottle
- Open your eye wide with your thumb and index finger.
- Gently press the eye cup against the eye – the eye is kept open.
- Rinse thoroughly by squeezing the bottle repeatedly.
- In case of severe burns, the eye will shut on reflex which means that the injured person cannot rinse sufficiently, and the nearest person must therefore step in and help.

Standing or sitting patient:

- The assisting person opens the eye with her/his thumb and index finger.
- The eyecup is held a hand's breadth from the eye.
- Rinse thoroughly by squeezing the bottle.

Patient lying down:

- Remove the vertical plastic tube in the bottle.
- The eyecup is held a hand's breadth from the eye.
- Rinse thoroughly by squeezing the bottle.

Eye washer as an integrated part of the water tap:

- In most labs, eye washers are also available by the sink as an integrated part of the water tap. This eye washer is used by turning on the cold water, the switch on the back of the eye washer is pushed in and the protective hood is then automatically pushed off. Place the eyes in such a manner that both eyes can be rinsed thoroughly. Remember to remove glasses or contact lenses before rinsing the eye.

- In some fume cupboards, an emergency eye wash fountain is available. The emergency eye wash fountain is used by taking it out of the holder. The safety cap is removed, and the red button on the side is pushed in. After that, it is placed on the eye to rinse.

Poisoning

The poisoned person is awake:

- Attempt to induce vomiting by putting your fingers to the back of your throat, e.g. after drinking a glass of water.
- Place the poisoned person in the recovery position.
- Take the poisoned person to the emergency room, e.g. in an ambulance and bring the vomit.

The poisoned person is unconscious:

- Place the poisoned person in the recovery position.
- Take the poisoned person to the emergency room, e.g. in an ambulance and bring information about the poison (name, chemical formula, container, if any).

Poison helpline: 82121212

First-aid kits

First-aid kits are placed in selected places, in labs or in the rooms with the weighing scales and are marked with this sign. Make yourself familiar with the positions of the first aid kits before you need them.



When something is removed from the kit, every employee is obligated to refill the kit. The most common things are available in the storeroom.

Respirators

Respirators are placed in cupboards marked with this sign. Make yourself familiar with the positions of the respirators before they are needed.



Spills alert

Emergency kits for collection of minor spills as well as spills alerts in connection with more extensive accidents are placed in selected areas marked with this sign.



Familiarise yourself with the spills alert kits' location before you need it.

Reporting the accident/spill

All accidents – large or small – must be reported to the occupational health and safety representative or manager. In case of accidents that cause absence due to illness, the report must be submitted asap and within nine workdays.

In cooperation, the form regarding work-related injury (Arbejdsskade) is filled in via this link:

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/anmeldskade/>
(to be found under "Forms" to the right).

Even though the injury is not required to be reported to the Danish Working Environment Authority or The National Board of Industrial Injuries in Denmark, you must register the injury. For more information, please follow the link above.

Fire instructions

By all emergency exits, fire instructions are situated. You **MUST** study the instructions thoroughly. The instructions may be specific to each building. Make sure to make yourself acquainted with the buildings you frequent.



Fire alarm



Fire-fighting equipment is in the hallways and are marked by signs. Make yourself familiar with the location before it is too late.



Fire blankets hang right by the door in all labs.



Showers are situated by most fume cupboards and in the toilet facilities or in the hallways.



In case of fire

1) Call the fire department:

Phone: 1-1-2

Mobile 1-1-2 (It is recommended that the 1-1-2 app is used)

Inform them of

- your name
- where you are calling from (address)
- what has happened
- which phone number you are calling from

https://medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/Medarbejdertilfelle/beredskab/Beredskab_2016/alarm-med.pdf

- 2) Make certain that the two vests in the holder by the evacuation point are handed out. **The evacuation leader is to have a yellow vest** and the **meeting point leader is to have an orange vest**.
- 3) **The evacuation leader** will spread the alarm to all employees throughout the building, and make sure that they are guided to the evacuation meeting place. **Use the stairs - never the elevators!**
http://medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/Medarbejdertilfelle/beredskab/Beredskab_2016/Evakueringsleder_dec16.pdf
- 4) If possible - close all doors and windows before leaving the building
- 5) **The meeting point leader** receives the evacuated persons in the evacuation meeting place and advises the fire department about:
 - a. The location of the fire
 - b. The scope of the fire
 - c. Persons, if any, left behind in the fire threatened area

http://medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/Medarbejdertilfelle/beredskab/Beredskab_2016/Samlepladsleder.pdf

- 6) Take no chances and do NOT participate in any rescue work
- 7) Inform the alarm call number at Aarhus University:

87 15 16 17

<http://medarbejdere.au.dk/administration/bygninger/beredskab/akuttesituationer/brand/>

<http://medarbejdere.au.dk/administration/bygninger/beredskab/>

<http://biomed.medarbejdere.au.dk/skou-bygningen/brandsikring/>

Evacuation

Evacuation drills are held once a year at Aarhus University. It is important that you participate in evacuation drills so you are as well-prepared as possible, if necessary. Read more about evacuation at AU here:

<http://medarbejdere.au.dk/administration/bygninger/beredskab/akuttesituationer/evakueringssplan/>

Evacuation instructions

http://medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/Medarbejdertilstand/bere/medarbejdertilstand/Beredskab_2016/evakueringssinstruks_030117.pdf

Escape routes

Escape routes are marked with this sign hanging from the ceiling by stairwells, emergency stairs, etc.



Follow the arrows to the nearest staircase exit.

Do NOT use the elevators when there is a fire or other emergencies.

Breakdowns

Regarding ventilation, fume cupboards, water, plumbing and heating

Contact:

1) Poul Kaarsberg Christensen	Tel: 28 99 22 42	Building 1115
2) Dan Kimborg	Tel. 21 62 68 88	Building 1115
3) Annette Gils	Tel: 28 99 22 46	Building 1233 (South)

Regarding lab equipment/instruments

Contact:

Claus Bülow Gamst	Tel. 87 16 76 07 / 24 85 87 64	Building 1116
Erling Melchior Dammand	Tel. 93 52 15 64	Bygning 1116/1233
Peter Bjerge	Tel. 87 16 77 91	Building 1116

Regarding IT equipment/IT breakdown

Contact:

IT Support:	Tel. 87 15 09 22
Arne Christensen	Tel. 23 38 21 50 (South)

General code of conduct in standard (non-classified) laboratories

General rules in laboratories:

- Each lab has a room number that is to be applied in connection with wash-up and handling of waste.
- Each employee is allocated a basic workstation that consists of at least one table section.
- A lab has many users, and it is, therefore, important that you are flexible and considerate of others.
- You must wear a white lab coat when working in the lab. You must wear disposable gloves when the work requires it.
- Mouth pipetting is prohibited.
- Food and beverages are NEVER allowed in the lab.
- Syringe needles, scalpels and other sharps must be placed in special waste containers for sharp objects.
- Chemical spills or liquids on the floor must be wiped up.
- When you leave the work area, it must be tidied and cleaned.
- Handbooks, folders, notes (all paper) in the lab must be kept separately from chemicals, biological material, utensils, etc.
- When glassware is dropped on the floor/sink, always leave a note to warn the cleaning staff against glass fragments.

General rules when leaving the lab:

- Put a lid on the steel containers (when the container is full, fold the plastic bag loosely in the container before placing the lid. Bring the steel container to be autoclaved).
- Wash hands – disinfect them.
- Turn off gas burners.
- Close the windows.
- Turn off the light.
- Close the doors to the labs and offices. In that way, the smoke and heat development of a potential fire is slowed down, and the risk of damage to the equipment is reduced.

Flow benches:

Flow benches are used when work in a sterile environment is required. This way both you and your reagents are secured against contamination.

Flow benches are **NOT** to be used when working with chemicals.

Fume cupboards:

Fume cupboards are used when working with chemical agents and reactions that develop harmful or foul-smelling gasses or steam.

Use of gloves:

1. You are **not to wear gloves when:**

- in the hallways, elevators and on stairs, one hand must be without a glove for opening doors, etc
- touching door handles
- touching computer keyboards (unless it has a protective plastic cover)
- speaking on the phone
- in offices

2. Nitrile gloves can be used to protect yourself and the material when:

- working with human and other potentially infectious material (blood, cell lines, etc.)
- working with hazardous substances (see working place directions)
- working with radioactive materials
- you are attentive to the fact that centrifuges, microscopes, etc. can be contaminated
- you always change gloves if you suspect that your gloves are contaminated.

3. Latex gloves/everyday gloves are used when you only want to protect your material:

- cell work in LAF benches
- genetic engineering

4. Disposal of gloves

- Dispose of the clean gloves in the ordinary wastebins in the lab
- **ALWAYS** dispose of non-clean gloves in the square steel containers or the hazardous waste containers.

http://medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/hr/Arbejdsmiljoe/Arbejdsmiljoe/Health_arbejdsmiljoe/handsketest.pdf

Ten tips on skin protection when doing “wet work”:

1. Wear gloves when doing wet work.
2. Wear gloves for as long as necessary, but not longer than necessary.
3. Wear only intact, clean and dry gloves.
4. Wear cotton gloves underneath protective gloves.
5. Wash your hands in cool water, rinse and dry them well.

6. Alcohol-based disinfectants may be used instead of soap when hands are not visibly dirty.
7. Do not wear finger rings at work.
8. Use a moisturizer with a high fat content and without perfume.
9. Apply moisturizer all over the hand, including fingers and hand backs.
10. Take care of your hands in your spare time, wear gloves when doing wet work at home and wear warm gloves outdoors in winter.

Clothing:

Lab coats:

- White coat (ordinary lab)
- Yellow/White coat (class 1 lab) Take off the coat before you leave the lab.
- Green coat (class 2 lab) Take off the coat before you leave the lab.
- Red coat (isotope laboratory) Take off the coat before you leave the lab.
- NEVER wear coats in the lunchroom/offices.
- Guests, workmen, cleaning staff and others must wear coats when visiting classified areas.

Washing of coats:

- White coats are put in a fabric bag. Place the bags for collection once a week.
- Yellow coats are placed in gelatin bags by the user. The bags must be available in the classified area. The gelatin bag is placed in a fabric bag and is to be washed as the white lab coats. New gelatin bags are available in the storeroom.
- Green coats are to be autoclaved before they are placed in the same fabric bags as the white coats.
- Red coats must be monitored before they are placed in fabric bags to be washed like the white coats.

Outdoor clothes:

- Outdoor clothes are not to be kept in the lab.
- Hang outdoor clothes on hooks in offices and hallways where hooks are available or in the lockers.

Handling of notes, etc.:

Standard (non-classified) labs

It is emphasized that handbooks, folders, notes must be kept separately from chemicals, biological material, utensils, etc.

Taking notes must only take place in areas with a defined desk pad, or on pull-out boards when these are available. As an option, window sills can be used.

Classified labs

Papers are not to be lying around or posted in the lab. Cover formulas and the like with plastic. An area just for writing must be earmarked in the lab. Cardboard boxes and wastebins are not to be kept in the classified labs.

Instruction in the use of centrifuges:

Users who have no significant knowledge of how to use the centrifuges must have a thorough instruction in the use of centrifuges before they start using them. The supervisor or work leader is responsible for ensuring that each student or employee receives the necessary information about the use of rotors and centrifuges.

(Centrifuges must be equipped with a lock that ensures that the centrifuge cannot be started when the lid is open, and the lid cannot be opened unless the centrifuge has come to a stop. The lock must be able to work independently of a power failure.)

Cleaning: The necessary, obvious cleaning must be carried out after each run. *In this way, the single user is responsible for cleaning the centrifuge and rotor.*

In case of spills, wipe up and disinfect the area. Follow the cleaning instructions of the individual apparatus.

In the event of a breakdown: Clean the centrifuge! Leave a note on the centrifuge that it has a defect, and that repair is ordered. Remember to state the date.

Instruction in the use of ultracentrifuges:

The ultracentrifuge is especially sensitive and is, therefore, to be used with caution.

Users who have no significant knowledge of how to use ultracentrifuges must have a thorough instruction in the use of the ultracentrifuges before they start using them. The supervisor or work leader is responsible for ensuring that each employee receives the necessary information about the use of centrifuges.

Cleaning: The necessary, obvious cleaning must be carried out after each run. *In this way, the single user is responsible for cleaning the centrifuge and rotor.*

In case of spills, wipe up and disinfect the area. Follow the cleaning instructions of the individual apparatus.

In the event of breakdowns: Clean the centrifuge! Leave a note on the centrifuge that it has a defect, and that repair is ordered. Remember to state the date.

General code of conduct in classified laboratories

When working with classified materials, both the project ([Notification of genetic engineering research projects](#)) and the laboratory ([Notification to the classification of genetic engineering laboratories and laboratory area and installations for the genetic engineering large-scale experiment or production](#)) must be reported to the Danish Working Environment Authority.

GMO Class 1 laboratory



In the GMO class 1 lab, staff follows the regulations of the valid "Executive Order on Genetic Engineering and Working Environment" "

<https://at.dk/regler/bekendtgoerelser/genteknologi-arbejdsmiljoe-910-sam/> supplemented with AT instruction C.0.4 <https://at.dk/regler/at-vejledninger/klassifikation-laboratorier-anlaeg-produktion-c-0-4/> and "Executive Order on Biological Agents and Working Environment" <https://at.dk/regler/bekendtgoerelser/biologiske-agenser-arbejdsmiljoe-57-sam/>.

Work with GMO includes all handling, production, application, enrichment, storing, destruction, disposal and transportation.

In the class 1 lab, the focus is on working with the biologically active material, meaning living organisms, cells or viruses containing DNA or RNA that are derived from genetic modification (GMO).

(Isolated DNA, RNA or protein that are produced by genetic modification are thus not included in this legislation.)

General rules in class 1 laboratories

- Work with biologically active material is only to take place in areas classified by the Danish Working Environment Authority – and must be marked "Genetic engineering area class 1".
- Each lab has a room number (situated at the top right of the door) that is to be applied in connection with wash-up and handling of waste.
- A lab has many users, and it is, therefore, important that you are flexible and considerate of others.
- You must wear a yellow coat when working in the lab.
- Special footwear is not mandatory.
- In work operations where you get into contact with GMO, nitrile gloves must be worn.
- The working area must be kept tidy and must be cleaned daily by the users of the lab.

- Spills of a biologically active material must be cleaned up immediately, and the area must be washed with Virkon® or 70% ethanol for at least 10 seconds. As a supplement 30 minutes of UV-lightning in LAF-benches can be applied.
- Food and beverages are never to be kept in the lab.
- Outdoor clothes and other irrelevant material are not to be kept in classified rooms.
- Access to the lab must be limited.
- Doors and windows must be kept closed at all times due to the efficiency of the ventilation system.
- Wash hands when they are contaminated with a biologically active material, and before work breaks and at the end of the working hours.
- The project managing researcher must prepare a written risk assessment for each current project that is carried out in the GMO classified labs. The risk assessment must be available to the Danish Working Environment Authority, the working environment organisation as well as the users – and must be part of the mandatory instruction of employees and visitors prior to the start of work.
- If work is carried out involving non-genetically modified organisms in the lab, the safety regulations for work in GMO class 1 must be followed. In case of accidents, you must inform the person responsible for the project and the working environment group, and they will in consultation with each other take the necessary measures.

Transport of class I material:

Transport of biologically active material outside the designated labs or areas must be carried out using containers marked with the gene technological warning sign (yellow stickers or yellow tag). As an example, closed Eppendorf tubes can be transported in the designated racks, agar plates in marked bags or plastic trays. As an example, glass flasks can be transported in designated plastic trays on a trolley as long as you make sure that every spill is collected in the tray.

Class 1 waste handling:

Collect all waste containing genetically manipulated material in square steel containers which you apply with a steel tag marked genetic engineering (obtainable in the wash-up facilities). Place the containers for autoclaving in the hallways.

Place syringe and scalpel containers in round steel containers, and apply a steel sign marked “genetic engineering” before they are sent to the wash-up facilities. After the autoclaving it can be handled as ordinary household waste or biological waste.

Class 2 laboratory:

In class 2 labs, work is carried out involving biological materials that may cause infectious diseases in humans, for example, viruses.

General rules in class 2 labs

- Do not use class 2 before you have received instruction from the person responsible for class 2, and general working rules and procedures are available in each class 2 lab.

Transport of class 2 material:

Transport of biologically active material outside the designated labs or areas must take place in a suitable container that is marked with a genetic engineering warning sign (yellow sticker). Cells cultivated and transduced in class 2 can as a rule not be moved to a class 1 lab. If a move of cells from class 2 to class 1 is required, a PCR based method must be implemented that ensures that virus no longer is present in the cells. Contact the persons responsible for class 2 for more information.

In case of spills, always wash with Virkon® first and afterwards with 70% ethanol. When working with biologically active material, aerosol generating procedures must be limited as much as possible. Aerosol generating procedures, if any, must take place in fume cupboards or LAF-benches with a ventilation duct leading outside.

Containers holding genetically engineered organisms must be marked when stored in freezers, nitrogen tanks or cold storage rooms.

Class 2 waste handling:

Autoclave all waste from class 2 labs before it is taken out of the room. There are only round containers in class 2.

See handed out waste handling forms.

Procedure for upgrading from class 0 to class 1:

Upgrading of labs must be informed to the Danish Working Environment Authority. The contact to the Danish Working Environment Authority is to go through the occupational health and safety organisation of the Department. Upgrading of laboratories can only take place if it has been authorized.

A person is appointed to be overall responsible for the classified facilities. The name of the person is informed to the Danish Working Environment Authority and entered in the log book.

In the classified lab, there is a phone list for the person responsible for the lab.

Out of regard for the cleaning, the classified room/area is arranged in such a way that only the necessary equipment is available.

Everyone in the classified area must wear buttoned-up coats.

According to the regulation of the Executive Order on Gene Technology, a log book of the classified area is kept. Date of the upgrading is recorded in the log book.

Warning signs (ArSiMa) marked Genetic Engineering Laboratory - Class 1 are placed visibly by the entrance to the classified facilities.

Bottles containing 70% ethanol and Virkon® must be available in the classified room. Lab coats are hung on hooks placed right by the entrance door inside the classified room.

Cleaning staff working in classified rooms must wear coats according to the Department's procedure for cleaning of class 1 labs. The person responsible for the room notifies the occupational health and safety organisation (secretariat) as well as the buildings manager of the time of the upgrading. The users of the lab see to the daily cleaning and disinfection of work areas and appliances.

Students' work with biologically active material must only take place when supervised by qualified supervisors.

Autoclave containers must be available in the room after the upgrading. The containers, marked with class 1-tags (ArSiMa), are used for collecting and decontamination of appliances that are used in connection with biologically active material (disposable pipettes, centrifuge tubes etc.) as well as culture media containing classified organisms.

Procedure for downgrading from class 1 to class 0:

Downgrading of labs must be informed to the Danish Working Environment Authority. The contact to the Danish Working Environment Authority is to go through the occupational health and safety organisation of the Department. Downgrading of labs can only take place if it has been authorized.

The project manager of the area ensures that qualified persons carry out below-mentioned tasks:

All coats must be placed in polyvinyl acetate bags that are closed and sent to the laundry facilities. This takes place in accordance with the usual coat procedure of the Department.

All autoclave containers must be autoclaved.

LAF-benches – including filters – are decontaminated by the company with whom the Department has a maintenance contract regarding the type of LAF-bench in question.

Potentially contaminated equipment (gyro shakers, table centrifuges, mixers, micropipettes, etc.) are cleaned with a disinfectant before they are removed from the room.

All other utensils are removed from the room.

All work surfaces (laboratory tables, sinks and sink tops, fume cupboards, etc.) are disinfected with 70% ethanol and Virkon®. Afterwards, they are washed with a neutral soap.

The project manager notifies the buildings manager about the downgrading. After this the cleaning staff cleans the area thoroughly according to class 1 regulations.

The time of the downgrading is recorded in the log book of the room and is announced in writing to the occupational health and safety organisation of the department and the Danish Working Environment Authority.

ArSiMa warning signs are taken down.

The area is now used and cleaned according to class 0 regulations until a potential renewed upgrading.

Instructions for workmen:

Workmen

Workmen must ensure that they have knowledge of the special procedures for access to the laboratory/work area, in which they are to work.

If workmen do not have a contact who is responsible for the instruction to the area in which they are to work, please contact:

Conor Leerhøy	87 15 22 41 / 28 99 22 41
Christian Bredvig	28 99 21 25
Claus Bülow (workshop)	87 16 76 07 / 24 85 87 64
Poul K. Christensen (Building Operations and Maintenance)	87 15 22 43 / 28 99 22 49

Class 1:

- There is no access when there is work in progress in the lab, so access must be arranged in advance.

Class 2:

- There is no access when there is work in progress in the lab, so access must be arranged in advance.
- Always wear a green coat and shoe covers.
- Bring as few tools/aids as possible.
- Equipment that is to be repaired must be disinfected with 1 % Virkon® and 70 % ethanol.

In the event of accidents:

When you move about in a lab, you must treat everything as if it is hazardous.

In the event of accidents, please contact one of the employees of the laboratory/department immediately. If you are in doubt about anything at all, it is better to ask once too often.

Cleaning directions for cleaning staff

Class 2 can only be accessed after a thorough instruction

Class 2: (yellow sign on the door "Genetic engineering lab area class 2")

- The cleaning staff must wear green coats and shoe covers.
- The cleaning trolley and cleaning utensils are only to be used in that specific classified room.
- Wash the floor every day Place the mops in the container for used mops. (Class 2-staff autoclave mops weekly).
- In the event of accidents, contact one of the lab's users or your cleaning manager.

Class 1: (yellow sign on the door "Genetic engineering lab area class 1")

- Weekly floor wash with wet and dry mop. The mops are washed together with mops from non-classified labs by the cleaning staff.
- Daily emptying of wastebin (not the yellow boxes).
- Wash the sink every day.
- Change gloves after cleaning.
- In the event of accidents, contact one of the lab's users or your cleaning manager.

Both in class 1 and class 2, the lab users clean the window sills, work tables, fume cupboards, sterile benches and other workplaces.

General laboratory/office:

Daily: Empty the wastebin, clean the sink (if it has been emptied of laboratory material), and clean the floor lightly.

Weekly: Wash the entrance/stairway, wash the floor (wall to wall), wipe off the window sill, radiator, board, door handles, switch, and tables/desks that are cleared.

Sanitation:

Daily: Wash the floor (wall to wall), clean the sink, toilet, mirror, shelf, door handle and switch. Supervision with soap, towels and toilet paper.

Code of conduct in microbiological work

Staff who work with microorganisms must have read the guidelines before the work commences. These guidelines are prepared for work with microorganisms and have the objective to protect staff and the departmental environment against exposure to microorganisms in connection with studies that may constitute a hazard.

Before the microbiological work commences:

Work with microbiological agents in risk group 2 or more must be reported to the Danish Working Environment Authority at least 30 days prior to commencement of work.

<https://at.dk/regler/bekendtgoerelser/biologiske-agenser-arbejdsmiljoe-57-sam/#Kapitel-4--Anmeldelse-m.v.>

Work with biological agents in risk group 2 must only be carried out in work areas with containment measures at least equivalent to class 2, i.e. work that involves low risk. Instructions for the employees must be in writing and, if necessary, they must be displayed on the notice boards. In addition, a special biological workplace assessment (APV) must be prepared before any work is carried out that may be affected by microorganisms. Guidelines are available on the Internet or obtainable from the occupational health and safety organisation.

Safety:

At the Department of Biomedicine, work is carried out involving microorganisms and samples from patients that may potentially be infectious. It is therefore necessary to observe certain precautions to avoid infection and spread of bacteria, viruses, fungi and other microorganisms.

We are working with biological agents of risk group 2 that are defined as "microorganisms or the like that can cause serious infectious diseases in humans and be a danger to the employees; there is a small risk of spread of infection to society; there is usually effective prevention or treatment" [ref.: 1, 2 and 3].

When working with GMO or biological agents in risk group 2, special regulations must be applied, and special precautions must be taken.

When working with human material it is recommended that you get a hepatitis B vaccine. The vaccination is paid by the department and you must go to your own medical physician.

http://biomed.medarbejdere.au.dk/fileadmin/biomed_medarbejdere/pdf-filer/Arbejdsmiljoe/Retningslinier_for_vaccination_for_ansatte_pa_HE_WEB_FINAL-ENG.pdf

The microorganisms can cause illness as stated above, but this risk is considered to be very poor when the following precautions are observed.

Precautions for microbiological laboratory work:

- A risk assessment must be made (including - which disinfectant/procedure is effective)
- Coming and goings in microbiological labs should be kept to a minimum, and the door should be kept closed as much as possible.
- You always work wearing the coat buttoned up. The coats may only be used in labs and exercise rooms. Leave the coats in the lab or exercise room when leaving.
- Wear gloves when working with human samples such as blood or spinal fluids or if you have wounds or scratches on your hands.
- Avoid wearing rings, watches or bracelets, as it makes it difficult to clean and disinfect the skin.
- It is prohibited to eat, drink or smoke in microbiological labs, and you ought to refrain from putting things in your mouth (e.g. bite a pencil) or rubbing your eye.
- Keep books, instructions, notes, etc. separate from all biological material. Do not carry out office work on work tables that are intended for microbiological work.
- Do not sit on laboratory work tables.
- Wash and disinfect hands immediately upon contamination or before you leave the lab. Method: Wash your hands thoroughly with soap and water and dry them with a disposable towel. After that apply disinfectant (located by the sinks). Rub the disinfectant into your skin until the skin is dry.
- Avoid spills and contamination of the environment when working with live cultures. You can avoid, for example, aerosol formation when working with liquid cultures correctly and by flaming the lips of test tubes and flasks that contain bacterial cultures. In the event of accidents, immediately limit the contamination as much as possible and carry out a thorough cleaning and disinfection.
- Each employee must tidy up and clean the workplace upon completion of work with microorganisms.

In-house transport of microorganisms:

In-house transport of microorganisms must take place in a special container with a tight-fitting, clamped lid. The container is lined with an absorbent material. Containers must be labelled clearly stating that they contain microorganisms and risk material (class 2).

Handling of waste, etc.:

There are no wastebins in the microbiological labs, as all waste is considered to be contaminated.

Place all single-use material and infectious material (e.g., plastic test tubes, slides with your preparations, agar plates, rubber gloves, Pasteur pipettes, pipette tips, capillary tubes) in the yellow hazard container (cardboard boxes lined with yellow plastic bags).

Plastic pipes (cylinders) with plastic bags that are placed on the work tables are used for occurring minor waste in the category single-use material (inoculation needles, slides, etc.). Do not overfill the bags. When replacing the plastic bags in the plastic pipes on the work tables, you place the filled bags in the yellow boxes for hazardous waste.

Dispose of the yellow cardboard boxes with the infectious material by closing the box properly using tape and writing name and room number. Place the box on a pallet in the corridor to the animal facilities and the box will be disposed of by incineration.

Place contaminated recycled materials (flasks, etc.) in steel containers and send them to be autoclaved.

Before you leave the laboratory:

Tidy up on the work tables.

Wipe the tables thoroughly with a disinfectant using a coarse paper napkin that you dispose of in an autoclave container.

Code of conduct in work with human biological material

Guidelines for working with human biological material *:

According to Danish law, all research projects in Denmark involving humans or any form of tissues, cells, blood, etc., from humans must have permission to do so from a regional ethical Committee. If the tests involve researchers from several geographical areas, only the main supervisor must apply for permission from the regional committee, where the research project is carried out. In cases of multinational research projects, a permission from a Danish Committee is always required.

If the material or information from a biobank (i.e. "a structured collection of human biological material, which is available under specific criteria, and where the information of the biological material can be traced back to individuals") is used in a research project, an additional approval is required from the Data Protection Agency.

Standards for the collection, storage, handling and disposal of human biological material: The main researcher is responsible for ensuring confidential, safe and appropriate storage and ethical use of the tissue, respect for confidentiality of donors and the appropriate disposal of the tissue. It is recommended that you do not use your own biological material as there will be a risk of transformation and lack of antigenicity.

Collection of samples from live individuals: Only registered doctors, nurses or certified laboratory technicians, who are trained to extract human biological material for scientific or medical purposes, and who take samples, as they work under the protocols and procedures approved by the relevant regional ethical Committee, are authorised to extract human biological material. This rule does not apply to non-invasive collection of biological fluids, such as semen, saliva, milk, etc.

Storage: All human samples must be stored in a safe place. The samples must be placed in safe and leak-proof containers and stored in a manner that prevents degradation or deterioration during storage. Each container must also be labelled with the name of the biological material, the user's name and contact information. Containers for storage of samples are to be discarded as hazardous biological waste after the sample is removed.

Handling: All human samples must be handled as potentially dangerous in terms of contamination and infection. Personal protective equipment for handling of potentially contaminating substances must be selected taking the risk of exposure into account. Personal protective equipment includes gloves and coat.

Disposal: Human samples must be disposed of in closed, leak-proof containers and put into the yellow hazard containers or be autoclaved. Blood sampling equipment, scalpels and other equipment that can damage the skin must be disposed of in special yellow needle boxes.

Transport: To avoid leaks, human samples should be transported in unbreakable sealed containers marked as biohazardous material.

Accidents

Biological spills outside activity areas, such as the floor-must be removed immediately and cleaned normally. Large spills must be removed immediately, and the affected area must be disinfected with an appropriate means (1% Diversol or 70% ethanol in water, possibly supplemented with UV-light for 30 minutes).

In the event of injury involving equipment contaminated with either blood or tissue fluids:

- Let the wound bleed
- wash thoroughly with soap and water
- clean the wound with 70% ethanol or 2.5% iodine ethanol

In case of contamination with biological material in the mouth or in a wound, rinse the area thoroughly with saline or normal tap water.

In case of biological material in the eyes, rinse them thoroughly with an eye-rinse bottle that is available in all labs.

Contact the emergency room at the hospital (Aarhus University Hospital, Skejby) immediately or within two hours after the accident for a risk assessment of infection with HIV, hepatitis B or hepatitis C. There is normally no treatment 24 hours after the accident.

Contact your occupational health and safety representative in order to draw up a claim for the accident. It is important that the safety officer is informed no matter how small the accident.

If you want to learn more about the measures in general, you can read more in detail here
<https://hygiejne.ssi.dk/retningslinjer>

Needlestick injuries

In this context, needlestick injuries are accidents involving health staff or other staff, where there is a particular risk of cross-contamination from blood from a patient. It concerns, in particular, infection with hepatitis B and C and HIV. If an accident occurs, it is important to get treatment as soon as possible after the accident.

Hepatitis B vaccination

Vaccine against hepatitis B is an efficient prevention and there are few side effects. The vaccination is paid by the department and you must go to your own medical physician.
http://biomed.medarbejdere.au.dk/fileadmin/biomed_medarbejdere/pdf_filer/Arbejdsmiljoe/Retningslinier_for_vaccination_for_ansatte_pa_HE_WEB_FINAL-ENG.pdf

Post-exposure prophylaxis (PEP)

The Danish health authority recommends that PEP is offered to all that are exposed to HIV-infected blood or other material in connection with HIV-infected needlestick lesions or open wounds and scratches or in the eyes.

<https://www.sundhed.dk/sundhedsfaglig/laegehaandbogen/arbeidsmedicin/arbeidsrelaterede->

eksponeringer/kemiskbiologisk/opfoelgning-paa-stikskader/

<https://www.arbejdsmiljoweb.dk/arbejdsmiljoearbejdet/arbejdsulykker/stik-og-skaereskader>

<http://mbg.medarbejdere.au.dk/arbejdsmiljoe/godkendelser-og-instrukser/humant-biologisk-materiale/>

Code of conduct for work in an isotope laboratory

The laboratory must be classified and approved for work with radioactive material. General and practical advice on how to handle isotopes that are presently used in the labs has been prepared. The idea is to expand the collection for each new isotope that may come to use.

The Danish Health Authority's Executive Order No. 8 of 02/02/2018: The Executive Order on ionizing radiation and radiation protection forms the basis of the rules. Compared to the previous order, the limit for the maximum allowable annual dose per person is lowered to 20 mSv, and special rules for pregnant women's work with radioactive substances has also been prepared.

During the preparation, it has been taken for granted that the general safety regulations regarding work with hazardous chemicals are applied during all work with isotopes, i.e. you use coat, gloves, goggles (when required), etc.

In addition, when working with relevant isotopes you must wear a personal dosimeter (TL dosimeter-Previously film badge dosimeter).

The work is based on the following:

SIS Guidelines on radiation protection when working with open radioactive sources

https://www.sst.dk/-/media/Nyheder/2020/Vejledning_aabne_radioaktive_kilder_Endelig-Version-070220.ashx?la=da&hash=DF40DC865F5F506E750039C6005AB193D3D6FFEF:

Executive Order on the use of open radioactive sources in hospitals, laboratories, etc.
(<https://www.retsinformation.dk/Forms/R0710.aspx?id=21441>)

Executive Order on Dose Limits for Ionizing Radiation.

<https://www.retsinformation.dk/forms/R0710.aspx?id=178970>

SIS: <https://www.sst.dk/da/straalebeskyttelse>

For more information, please see appendix 1. Radioactivity

Accidents with radioactive material:

Spills or loss of radioactive material

It is the responsibility of the person who has caused the spill to ensure immediate and thorough cleaning. Clean up liquid radioactive spills with an absorbent paper (paper towel). Clean up spills of powder or other dry material by using a wet absorbent paper. Then wash it with a carrier solution, i.e. a non-radioactive solution of the labelled substance that was spilled. **However, by ^{32}P spills a potassium phosphate solution is used, by ^{125}I spills a sodium iodide solution.**

All paper towels and other things that were used for cleaning are treated as solid radioactive waste.

After cleaning the area, measure it for radioactive contamination: ^{35}S , ^{32}P , ^{33}P , ^{125}I and ^{14}C are measured directly with a monitor. Due to the poor sensitivity of the monitor for the measuring of ^{35}S , ^{33}P and ^{14}C radiation, these are also to be cleaned up with a damp filter

paper and measured in a scintillation counter, as the paper is drying, and 5 ml scintillator liquid is added. The same method is used for ^3H .

Radioactive contamination of persons

A person who works with or regularly comes close to ^{125}I and ^{32}P must carry a personal dosimeter that is replaced every three months. However, the personal dosimeter must be changed every month when working with more than 5 MBq ^{32}P or more than 1,000 MBq ^{125}I , see Executive Order 823 about dose levels. A statement of the measured results from the National Institute of Radiation Protection arrives every three months as well as an annual statement. The dose level is 20 mSv/year. However, the dose level for foetuses is set to 1 mSv/year.

Always wear gloves when working with radioactive isotopes, and wash your hands thoroughly after the work. Should your skin be contaminated, rinse the area several times with a carrier solution, and then wash the area several times with soap and water. If the contamination of the skin still can be measured by a monitor, you ought to consult the emergency room.

In the event of damage to the skin, and at the same time radioactive contamination (etching or lesion) rinse with plenty of water and if possible open the wound by pulling the edges of the wound back in order to enhance the bleeding and rinsing. Subsequently, immediately consult the emergency room.

Clothing with a heavy radioactive contamination is treated as radioactive waste.

Intake of radioactivity

If you accidentally drink radioactive solutions, induce vomiting immediately (finger in the throat) and consult the emergency room immediately after this.

In case of major accidents with radioactive isotopes please contact:

National Institute of Radiation Protection (SIS)
www.sis.dk

24-Hour service: Tel. 44 94 37 73

Scintillation counting:

Bear in mind that toluene and xylene are more hazardous to your health than small amounts of radioactivity. Scintillation counting pipes must therefore immediately after the count is completed be placed in plastic bags in wastebins in a fume cupboard and after that be brought to the waste deposit site.

Instructions in working with hazardous substances

Hazardous substances and products are defined as the substances that are hazardous to health and environment. They are labelled hazard pictograms as well as H- and P-phrases.

At Health, workplace instructions (the Danish abbreviation is APB) are prepared by selected employees.

Safety data sheets for the preparation of workplace instructions can be found in the chemical database, Kiros (kiros.dk). For SE login to Kiros, please contact your colleague, who prepares your local workplace instructions.

The safety data sheets provide instructions in how to work safely with a substance or product. The workplace instructions describe how to work with the substance or product.

If you cannot find a safety data sheet in Kiros that covers your substance/product, please contact Lina Waldstrøm Asmussen, e-mail: lina.waldstrom@biomed.au.dk, tel. 871 67608.

There is a requirement for workplace instructions in hazardous substances and products in accordance with the following:

- a) Substances and materials that meet the criteria for classification as hazardous in accordance with the rules of the Danish Ministry of the Environment.
- b) Substances and materials that are included with a limit value in the Danish Working Environment Authority's list of Limit Values for Substances and Materials.
- c) Materials that contain 1% or more (for gaseous materials 0.2 %) of a substance admitted with a limit value in the Danish Working Environment Authority's list of Limit Values for Substances and Materials.
- d) Materials that contain 1% or more (for gaseous materials 0.2 %) of a substance that is classified as hazardous or environmentally hazardous in accordance with the rules of classification of the Danish Ministry of the Environment.

For certain toxic substances, there are special requirements for safe storage. Rules and a list of the substances covered are available on the Danish Environmental Protection Agency's website: <http://mst.dk/kemi/kemikalier/fokus-paa-saerlige-stoffer/giftige-stoffer-og-blandingar/>

Working with carcinogenic substances

See the website: <http://biomed.medarbejdere.au.dk/arbejdsmiljoe/retningslinjer-ogvejledninger-for-health/tjekliste-til-arbejde-med-kraeftfremkaldende-stoffer/>

A written risk assessment must be completed before the work may begin: It must be checked whether the work requires a specific authorisation and it must be assessed whether the work involves an actual risk of exposure to the carcinogenic substance. Please fill in a form which can be found at

http://biomed.medarbejdere.au.dk/fileadmin/biomed_medarbejdere/pdf-filer/Arbejdsmiljoe/Formular_Vejledning - handtering_af_kraeftfremkaldende_stoffer - 2015.pdf

The cancer-causing substances for which a risk assessment is required is shown in a positive list that is available on

<https://arbejdstilsynet.dk/da/regler/bekendtgorelser/f/foranstaltninger-til-forebyggelse-kraeftrisiko-stoffer-og-materialer-1795>. The list can be found under Appendix 1.

The risk assessment must be kept together with the workplace instructions for the substance in question.

In cases where the risk assessment indicates that work involves an actual risk of exposure to the cancer-causing substances, or in the event of accidents, where an exposure has occurred, a **registration of the employees in question** must be carried out.

For this registration, a form must be filled in which is available at

http://biomed.medarbejdere.au.dk/fileadmin/biomed_medarbejdere/pdf-filer/Arbejdsmiljoe/Formular_Vejledning - handtering_af_kraeftfremkaldende_stoffer - 2015.pdf

The form must be filled in by the employee, who works with the substance/product and in cooperation with the responsible manager (researcher, supervisor or course manager). It is the responsible manager who is responsible for ensuring that the form is filled in.

The completed form must be sent to AU HR Team Working Environment (arbejdsmiljo@au.dk), who will store it in electronic form for 40 years.

Instructions in weighing of chemicals/hazardous substances

The injury caused by chemicals (acids, bases or special cytotoxins) depends on, in addition to the characteristic of the substance, the concentration of the substance in the tissue and the duration of time in which the substance is affecting the tissue. Therefore:

- avoid splashes on the skin, i.e. work wearing gloves and a lab coat.
- avoid inhalation of fumes, i.e. work in a fume cupboard.
- clean up spills on tables and floors immediately.
- rinse dirty glassware in plenty of water before sending the glassware to the wash-up facilities.

The employee who orders or in any other way brings a chemical into the lab, must check and take responsibility for ensuring that the necessary protective measures are taken, including labelling of the substance and the instruction of all who are to work with the material.

All substances marked with warning symbols as well as powders for media that may be allergenic must always be weighed and dissolved in a fume cupboard.

Note: Fume cupboards perform at their best with the hatches shut as much as possible.

Waste

<http://medarbejdere.au.dk/administration/bygninger/bygningsservice/affald/>

Hazardous chemical waste is sent to Nord (formerly known as Kommunekemi).

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/>

Collect fluids in UN-approved waste containers that are marked with the contents and sorted according to the waste groups.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/download-sortering-af-laboratorieaffald/>

Collect centrifuge tubes, pipette tips, gels, gloves, paper tissues and other things affected with hazardous chemical residue in a waste container marked H2-fast. When the chemical waste containers are full, they are taped up, applied with lab number and name and placed on the table for waste each Thursday (will be emptied at approx. 13.30). Outside of these hours, waste is stored in the cupboard for chemicals next to the fume cupboard.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/kemikalieaffald/>

Infectious waste and laboratory waste in general (used for human or animal materials) must be disposed of via the square steel containers. When the steel container is full, write the lab number on it and place it for autoclaving. The yellow risk containers can also be used if autoclaving is not possible.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/klinisk-risikoaffald/>

Eppendorf tubes, pipette tips, paper, gloves that are not contaminated with hazardous chemicals, human or animal material, are to be disposed of as ordinary household waste.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/almindelig-laboratorieaffald/>

Infectious recyclable material is sent in the round steel containers to the wash-up facilities. Label the steel containers with a lab number and place them by the door at the end of the day.

Non-hazardous material that needs to be washed up is to be rinsed with demineralised water and placed in the containers for wash-up. Place the container by the door at the end of the day.

Dispose of scalpels and needles in needle boxes. When a needle box is full, close it and apply autoclave tape. Dispose of it in the round autoclave containers.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvad-er-farligt-affald/kemikalieaffald/>

See also the waste handling charts that must be placed visibly in the laboratory. For further information:

http://medarbejdere.au.dk/fileadmin/www.arbejdsmiljo.au.dk/arbejdsmilj_akt_rer/arbejdsmilj_organisationen/Sikkerhedsraadgiver_dokumenter/Veiledninger/Haandtering_af_kemikalie_-_og_klinisk_risikoaffald_august_2015.pdf

The Safety Adviser unit at AU can be contacted here:

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/>

Instructions in the use and storage of flammable liquids and chemicals

Definitions:

- Liquid:* Substance that is liquid at ordinary temperatures and pressures.
- Flash point:* The lowest temperature at which a liquid emits an ignitable vapour.
- Flammable liquid:* Liquid with a flash point of less than 100°C.
- Class I:* Flammable liquid with a flash point of less than 21°C.
- Class II:* Flammable liquid with a flash point of 21-55°C.
- Class III:* Flammable liquid with a flash point above 55-100°C.

All three classes are divided into subclass 1 of liquids that are not water miscible in any respect, and subclass 2 of liquids that are water miscible in every respect.

Class	Storage unit	Maximum storage in	
		glassware	type-approved plastic or metal packing
I	1 l	2.5 l	no limitations up to 25 l no
II	5 l	5.0 l	limitations up to 125 l no limitations
III	50 l	10.0 l	up to 1.250 l

Plastic packaging of 125 ml or more must always be approved by the Danish Emergency Management Agency.

The quantities specified comprise the sum of storage, consumption and waste.

All in all, a total maximum of 25 storage units are allowed per laboratory.

Container with flammable liquids of class I-1, I-2, II-1 and III-1 are not to be placed in the building's escape routes (hallways, staircases and the like).

Flammable and explosive chemicals:

Avoid working in the vicinity of an open fire or in areas where there is a risk of formation of sparks.

NOTE:

Explosive chemicals, e.g. diethyl ether and petroleum ether, are not to be stored in an ordinary refrigerator.

Reference can also be made to Kiros chemical database <http://www.kiros.dk/Web/>, and the laboratories' collection of workplace instructions.

See Appendix 2 for list of inflammable and explosive liquids.

ATEX workplace assessment

According to the Danish Working Environment Authority Executive Order no. 478 of June 10, 2003, all areas in which chemicals are stored/handled are to be reviewed in order to assess the risk of explosion - a so-called ATEX workplace assessment.

<https://www.retsinformation.dk/Forms/R0710.aspx?id=29735>

<https://at.dk/regler/at-vejledninger/arbejde-eksplosiv-atmosfaere-c-0-9/>

Instructions in working with dry ice and liquid nitrogen

Dry ice:

There is a risk of frostbite injuries to the touch. Avoid contact with skin and eyes by wearing suitable gloves and safety glasses. Dry ice releases carbon dioxide by evaporation. Inhalation of high concentrations of carbon dioxide can cause suffocation.

In case of transport by car, the container is to be placed and fixed securely in the boot separated from the driver's cab. The driver must know the risk of the load and the precautions to take in the event of an accident or an emergency situation. In principle, dry ice should not be transported in an elevator in connection with passenger transport. In case of transport in an elevator, the dry ice must be stored in a closed container, e.g. in a polystyrene box with the lid closed.

Special rules apply to the sending of packets containing dry ice. For guidelines see this link:

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvaderfarligtgods/toris/>

Liquid nitrogen:

Liquid nitrogen can by contact with skin/eyes cause frost bites. Use gloves that protect against cold and pressure influences. The gloves must fit so loosely that they can be shaken off easily. Vaporized gas can displace the atmospheric air, and there may thus be a risk of suffocation. Avoid contact with the liquid and cold product. Ensure adequate ventilation. Avoid inhalation of cold vapours. Do work in a fume cupboard if possible.

Transport of liquid nitrogen must take place in suitable, closed containers that secure the container against tipping over, overheating and the like. Liquid nitrogen must not be transported in elevators in connection with passenger transports. There is an oxygen alarm in room 027, in which the liquid nitrogen containers are stored.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/kemi-og-biologi/sikkerhedsraadgiverfunktionen/hvaderfarligtgods/flydende-kvaelstof/>

Transport of animals outside the animal facilities

Anyone who is to work with animal experiments must complete a course in animal scientific experiments. Please note that a special set of rules applies to access to and use of the animal facilities.

All work involving live animals must take place in the animal facilities to the extent possible. Work involving live animals in ordinary labs may only take place if a special permit has been granted and a permit for Class animal has been obtained.

Please find information on the animal facilities' website:

<http://biomed.medarbejdere.au.dk/forskerstoette/core-faciliteter/dyrefaciliteter/>

If animals are taken from the animal facilities and transported to a lab, the following rules apply:

- If the animal is put down in the animal facilities, it can be transported to the lab in a plastic bag. In the lab, the bag with the animal can only be opened in a fume cupboard or a sterile bench in order to prevent the spread of allergens.
- The requested organs are removed, and the remains of the animal are placed in a plastic bag and disposed of in the freezer compartment 044 in the basement.
- If live animals are to be transported between buildings (to a lab that has been approved as a class animal), it must be in a transport box. Transport boxes can be obtained from the animal facilities otherwise transport boxes that have been used for the delivery of laboratory animals to the animal facilities can be used. The transport box must be disposed of after use.
- Animals that have been taken out of the animal facilities must never be returned alive to the facilities.

There are special rules regarding transport of live animals that can be found on the website:

<http://biomed.medarbejdere.au.dk/forskerstoette/core-faciliteter/dyrefaciliteter/>

Physical and Psychological working environment

Physical working environment:

The physical environment of the workplace is important to the employees' well-being and satisfaction. It is, therefore, important to draw attention to problems in time. There may be problems with poor indoor air quality, warm offices, poor lighting, unfavourable work positions, heavy lifting, etc. This is done by contacting a working environment representative who will be able to help solve the problem or create the necessary contact to the management.

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/fysiskarbejdsmiljoe/>

Department of Biomedicine's policy for a good psychological working environment:

Good physical and psychological working conditions are important preconditions for us to achieve our goals - and are important for the individual employee's well-being and efficiency. Department of Biomedicine must be an attractive workplace where employees and students can work in a safe and healthy environment, and the working environment is assessed positively by staff, students and government agencies and institutions.

A good psychological working environment is a significant contributing factor to our inclination to perform well in the day-to-day business, and it is contributing to the development of our workplace toward a good performance.

The individual employee must have the opportunity to use his/her abilities, have an influence on the planning of his/her work and have good opportunities for personal development, and through this strengthen his/her desire for and pleasure in the work - this is a decisive factor when it comes to counteracting stress.

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/psykiskarbejdsmiljoe/stress/>

All types of harassment including sexual harassment are unacceptable. Our daily interaction with each other must be characterised by respect and tolerance both verbally, physically, psychologically and culturally.

<https://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/psykiskarbejdsmiljoe/kraenkendeadfaerd/>

It is the responsibility of the management to ensure that there is a good psychological working environment, but it is also the obligation of all employees to contribute constructively to improving the good working environment. *We must all have a sense of responsibility for each other.*

A positive view on differences among employees has a significant impact on the psychological working environment. If everyone respects everyone's efforts in the workplace and actively engages in a dialogue about the duties to be performed, it will lead to a synergy benefit. An accommodating attitude and helpfulness are, in that connection, important for a good psychological working environment.

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/psykiskarbejdsmiljoe/>

You are always welcome to contact your occupational health and safety representative, if there is something you need to talk about.

<https://biomed.medarbejdere.au.dk/arbejdsmiljoe/amo-og-referater/>

Aarhus University's policy for a good psychological working environment:

A good psychological working environment is a prerequisite for job satisfaction and well-being in the workplace. A healthy psychological working environment means that there is a balance between the demands made on the employee and the resources and skills of the employee. In case of imbalance the risk of stress, conflict, poor well-being, increased sick leave, etc. increases.

Problems associated with the psychological working environment may be connected to, for example, a poor indoor climate or other physical loads. It is, therefore, important to consider the possible factors that may affect the psychological working environment.

On a day-to-day basis, questions concerning well-being are often handled in collaboration between the management and the union representative, and the liaison committee and the working environment organisation may also be involved.

Well-being, stress and bullying are topics within the psychological working environment, and on the pages, you can find detailed information about the various topics:

<http://medarbejdere.au.dk/administration/hr/politikkerogstrategier/>

Physical and psychological workplace assessment:

Every three years a survey of the physical and psychological working environment at AU as a whole is carried out. The survey is carried out using a questionnaire, i.e. a workplace assessment (APV). Here, the employees will be able to draw the attention of the management to problems that need to be taken care of, and propose solutions that are for the benefit of the working environment. After completion of the survey, monitoring groups are created and action plans are carried out to solve the problems.

The workplace assessment must be placed in a location that is accessible to everyone.

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/apv/>

Psychological counselling

AU has entered into an agreement with Dansk Krisekorps, a health advisory company, to provide psychological counselling for all employees of the University.

A joint scheme for psychological counselling is an important element in the University's efforts to reduce stress, cooperation issues, abuse and crises that may have a negative effect on an employee's work and performance. The scheme will give employees access to third-party psychological counselling in any situation that could affect the employee's capacity to work.

Aarhus University has chosen a plan that comprises both referred and anonymous counselling.

<http://medarbejdere.au.dk/administration/hr/arbejdsmiljoe/psykiskarbejdsmiljoe/psykologisk-raadgivning/>

Referred counselling:

Via the referral scheme, the employee can receive five consultations with a psychologist or another adviser.

To apply for referral, the employee must apply via his/her immediate superior. At this stage, the employee can choose to involve a union representative. When the immediate superior has been informed of the issue and has authorized funding of five hours of consultation, he/she will then contact Dansk Krisekorps directly (unless otherwise agreed):

- info@danskkrisekorps.dk (the employee will be contacted within 24 hours) or
- Telephone no. on tel. +45 7022 7612 (9:00-15:00 on weekdays) or tel. +45 7022 7610 (emergencies).

When contacting Dansk Krisekorps, please state the following:

- Name of employee
- Danish civil registration no.:
- Telephone number (at home)
- Main academic area and department/area/centre

Dansk Krisekorps will then contact the employee for an exploratory interview. Next, a fully confidential process with a psychologist will begin. When the five consultations are over, the employee and the manager are responsible for agreeing on a plan of action in relation to the employee's present and future work situation.

For the manager, it is important to involve the relevant HR partner at an early stage and preferably throughout the referral. AU HR recommends that the manager and employee have a meeting halfway through the counselling and again after the final consultation (about 8th or 10th week).

In the event of a referral, the referral date and number of hours are registered.

Anonymous counselling:

To obtain anonymous counselling, the employee calls Dansk Krisekorps counselling hotline on tel.: **7022 7612 (9-15 on weekdays) or 7022 7610 (emergencies)** directly. The counselling hotline is open 24 hours a day, and the employee is entitled to three consultations with a registered psychologist or other adviser.

If, after three consultations, the psychologist or advisor estimates that additional consultations are necessary, the employee can be transferred to the referral scheme. The employee will then be required to give up his/her anonymity and the employee's immediate manager will be contacted. At this stage, the employee can choose to involve a union representative or AU HR.

From this point forward, the procedure is identical to the referral scheme procedure.

Please note! All employees must bring a copy of their latest salary statement to the first appointment with the psychologist.

Psychological counselling is available in Danish and English.

If you have any questions about the scheme, you are welcome to contact the Working environment in AU HR or your HR partner, who will handle your inquiry confidentially.

Handbook on psychological working environment:

The Danish Working Environment Authority has published a handbook on psychological working environment that can be downloaded from the following link:

<https://at.dk/vaerktoej/h/haandbog-om-psykisk-arbejdsmiljoe/>

Special guidelines for pregnant women

The overall purpose of the guidelines for pregnant women is to ensure a good and safe working environment so that the pregnant employee in a safe and proper way can continue to work through pregnancy to maternity leave.

In order to ensure a safe workplace, the pregnant woman, colleagues and immediate superior must enter into a binding cooperation, which is to observe the rules for the work of pregnant women.

- Pregnant women are urged to notify their pregnancy in the early stage of their pregnancy.
- It must be possible to have a workplace in a non-radioactive lab.
- The possibility of exemption from work with substances of special hazards for pregnant women, any element of risk must as far as possible be eliminated
- Heavy lifting, wrong working positions and straining events of monotonous repetitive work should be avoided.
- A pregnant employee who feels uncomfortable in a specific work situation can be assigned to other tasks.

If you are pregnant, you have a further responsibility for checking the workplace instructions of the substances you work with. It is very important to check whether to avoid the reagent when pregnant. If you need to use a reagent that you are not allowed to handle, you can ask a colleague for help to handle the product.

Please read the AU guidelines for pregnant women:

<http://health.medarbejdere.au.dk/personaleforhold/arbejdsmiljoe/graviditetspolitik/>

Further information is available on the Danish Working Environment Authority's website (guideline a. 1.8): <https://at.dk/regler/at-vejledninger/gravides-ammendes-arbejdsmiljoe-a-1-8-5/>

Rules for working with radioactivity during pregnancy and nursing:

Pregnant women's work must be planned to the extent that there is no risk that the exposure of the unborn child exceeds 1 mSv. "The National Institute of Radiation Protection" considers this dose limit to be observed if no work is done with larger volumes than:

^{32}P :	5 MBq (135 μci)
^{3}H , ^{14}C , ^{35}S or ^{33}P :	50 MBq (1.35 mCi)

Pregnant women must not perform iodination with ^{125}I , and they must change personal dosimeter once a month. If a pregnant woman works in a lab where other staff or students work with open radioactive sources, the dose and risk of these are to be included in the overall assessment of the load. Department of Occupational Medicine may be included in the risk assessment.

If a woman is breastfeeding for a period of time when she is working with radioactive substances, the breastfeeding must be taken into account as radioactivity in the event of an accident can be transferred to the child through the breast milk. If the woman is working with activity quantities that are less than the limits of an S1 authorisation, the risk, however, is tiny.

References

Rules for work involving genetic engineering in class 1 laboratories:

The rules have been prepared on the basis of the Ministry of labour order No. 642 of 28 June 2001 "Order on genetic engineering and working environment". Reference is also made to Danish Working Environment Authority's guidelines C. 0.4, april 2004 "Classification of laboratories for genetic engineering work" and C. 0.5, april 2001, "Risk assessment of genetic engineering research projects, etc."

<https://www.retsinformation.dk/Forms/R0710.aspx?id=121099>

<http://arbejdstilsynet.dk/da/regler/at-vejledninger-mv/stoffer-og-materialer/c-0-4-klassifikation-af-laboratorier.aspx>

<http://arbejdstilsynet.dk/da/regler/at-vejledninger-mv/stoffer-og-materialer/c-0-5-risikovurd-af-genteknologisk-.aspx>

Code of conduct in microbiological work:

- Universities and research - Health and safety directory 36.
<http://arbejdstilsynet.dk/da/arbejdspladsvurdering/arbejdsmiljovejvisere/2009-36-universiteter-og-forskning.aspx>
- Exposure to bacteria, fungi and other micro-organisms-The Danish Working Environment Authority-guideline C.0.18, September 2006
<http://arbejdstilsynet.dk/da/regler/at-vejledninger-mv/stoffer-og-materialer/c-0-18-mikroorganismer.aspx>
- Executive order on biological agents and working environment, Danish Working Environment Authority's executive order 57 of 27. January 2011.
http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---ilo_aids/documents/legaldocument/wcms_202324.pdf

Code of conduct for work in an isotope laboratory:

- Danish Health Authority's Guidelines on radiation protection when working with open radioactive sources, 2005.
http://www.sst.dk/publ/Publ2005/SIS/Vejl_aabne_kilder/Vejl_aabne_kilder.pdf
- The Authority's Executive Order No. 954 of 23/10/2000: Executive Order on the use of open radioactive sources in hospitals, laboratories, etc.
<https://www.retsinformation.dk/Forms/R0710.aspx?id=21441>
- The Danish Health Authority's Executive Order No. 84 of 02/02/18: *Executive Order on Ionising Radiation and radiation protection*
<https://www.retsinformation.dk/Forms/R0710.aspx?id=197135>
- The Danish Health Authority's Executive Order No. 85 of 02/02/18: *Executive Order on the use of radioactive substances*
<https://www.retsinformation.dk/Forms/R0710.aspx?id=198333#id80e0943f-fd85-4c65-9a9c-4a17c787a878>
- The Danish Health Authority's Executive Order No. 86 of 02/02/18: *Executive Order on the use of radiation generators*
<https://www.retsinformation.dk/Forms/R0710.aspx?id=198161>

Test of gloves:

Tests have been carried out on a wide range of gloves in order to map the usability of disposable gloves as protection against various substances. An updated list can be viewed at:

http://health.medarbejdere.au.dk/fileadmin/www.medarbejdere.au.dk/hr/Arbejdsmiljoe/Arbejdsmiljoe/Health_arbejdsmiljoe/handskete_St.pdf

If you want to have a glove tested a form is available here.

Instructions in working with hazardous substances:

Reference (Danish Working Environment Authority):

<http://arbejdstilsynet.dk/da/brancher/undervisning-og-forskning/wwwforskningatdk/de-vigtigste-regler/kemi-.aspx>

Flammable liquids and chemicals:

Technical directions for flammable liquids, Statens Brandinspektion 15 June 1985 (now in the Danish Emergency Management Agency).

<http://brs.dk/forebyggelse/brand/Documents/Meddeelse%20nr.%204%20af%2016.2.2010.pdf>

Appendix 1 Radioactivity

Units of activity:

1 Bq is one radioactive decay per second

1 MBq is 1 million radioactive decays per second

1 mCi = 37 MBq

1 MBq = 27 µCi

The following isotopes are used at the Department of Biomedicine:

Isotope	Radiation type	Maximum Energy (MeV)	Half-life	Radionuclide group
³ H	beta radiation	0.018	12.3 years	4
¹⁴ C	beta radiation	0.159	5760 years	3
³⁵ S	beta radiation	0.167	87.2 days	4
³² P	beta radiation	1.71	14.3 days	3
³³ P	beta radiation	0.249	25.4 days	3
				2
¹²⁵ I	gamma radiation	0.035	60.1 days	

¹²⁵I and ³²P/³³P material must be stored until the radioactivity is below the limit fixed by the Danish Health and Medicines Authority cf. Executive Order no. 954.

Radiation protection:

For beta particles, a maximum reach is calculated which is dependent on the energy of the particle. The particle is slowed down, and the heavier the slowing agent is, the faster the particles are slowed down. A few chosen agents are specified here:

Isotope	Water	Perspex/Glass	Air	Shielding required at
³⁵ P and ³³ P	0.3 mm	0,2 mm	25 cm	> 1.3 mCi/50 MBq
¹⁴ C	0.3 mm	0,2 mm	25 cm	> 1.3 mCi/50 MBq
³² P	10 mm	5 mm*	700 cm	> 0.13 mCi/5 MBq

^{125}I	Shielding by 3 mm lead or lead glass **	> 27 mCi/1000 MBq
------------------	--	-------------------

*In practice, shielding is recommended at > 25 μCi .

** In practice, shielding made of lead or lead glass is always recommended.

The weak beta particles from ^3H will be slowed down by the passage of a few micro litres of water. For the gamma radiation, the conditions are more complicated, but the radiation from ^{125}I will be halved after the passage of, for example, 0.2 mm lead, 5 mm aluminium or 3 mm H_2O .

Storage of radioactive agents:

The stock of ^{125}I and $^{32}\text{P}/^{33}\text{P}$ must be stored in a refrigerator or freezer in building 1242, room 360.

A radioactivity warning sign must be posted on the entrance door and the repository for radioactive isotopes.

Maximum limits for work with radioactivity:

The isotope lab in building 1242, room 360, is classified as type C laboratory. The lab is distinctive in the way that it has a drain directly into the sewer.

For isotope work in S1 labs (labs with a fume cupboard, which are classified to work with radioactivity), the following maximum limits apply (MBq/mCi):

S1-laboratory (Type C)	^{125}I	$^{32}\text{P}, ^{14}\text{C}, ^{33}\text{P}$	$^3\text{H}, ^{35}\text{S}$
Stock (MBq/mCi)	500/13.5	5000/135	50000/1350
MBq/mCi in use at a time by: simple wet operations wet operations operations with dry material	50/1.35 5/0.135 0.5/0.0135	500/13.5 50/1.35 5/0.135	5000/135 500713.5 50/1.35

If you want to exceed the limits in special tests, it is possible to apply for permission in the individual cases.

Here are examples of what is meant by

"simple wet operations": Collection from stock solution, dilutions.

"wet operations": Ordinary experiments.

"operations with dry material": Work involving a risk of dust: Chromatograms, evaporation, dried gels.

The term "in use at a time" means the maximum activity that may be used in the lab at a time. If several experiments are taking place simultaneously in a lab, the volume per experiment must be reduced for the sake of the increased risk of contamination of persons by work and accidents.

The maximum amount of radioactivity that may be stored in a lab is identical to the maximum amount that may be used in a "wet operation".

Guidelines for working with isotopes ^3H , ^{14}C , ^{33}P and ^{35}S :

- (1) When collecting from rubber cap ampoules: Always stick a needle with a cotton plectget in the ampoule before use in order to compensate for pressure differences (many compounds have been dispatched in dry ice and will therefore assume considerable excess pressure when heating to room temperature).
- (2) Work with above-mentioned isotopes can only take place in approved type C labs. Naturally, a general vigilance must be demonstrated. Therefore, always use plastic trays, gloves, etc. when working.
- (3) Persons who work with more than 400 MBq at a time must submit a urine sample. Please contact your local working environment leader.

Waste and cleaning after working with ^3H , ^{14}C , ^{33}P and ^{35}S :

- (1) *Liquid waste* is diluted to less than $2.7 \mu\text{Ci/L}$ (0.1 MBq/L) and poured into the sink. Always rinse thoroughly with clean water and leave, for example, the water running in the sink for 5 minutes after discharge. You can also pour the isotope directly into the drain. Per month, the maximum discharge of ^{35}S and ^3H in the sink is 13.5 mCi (500 MBq) and 1.35 MCl (50 MBq) of ^{14}C and ^{33}P .
- (2) All solid waste must be disposed of in a yellow, hazardous waste container that you mark with the name, room number and the name of the isotope. When the container is full, contact the person responsible for radioactive waste (Ole Frandsen). The container can be sent to incineration when the total radioactivity is less than 1.3 mCi (50 MBq). Less than 0.01 MBq/kg ($0.27 \mu\text{Ci/kg}$) is considered to be inactive and discarded as general hazardous waste.
- (3) Glassware and the like that have been used for preparation soak overnight in soapy water (e.g. Decon 90) and are rinsed thoroughly before they are sent to the wash-up facilities.

- (4) Check your workplace at least once a month. Take a piece of wet filter paper (such as Whatman 3 MM, diameter 2.4 cm) and wipe table, sink, and similar places. Dry the paper and run it through a scintillation counter.
- (5) Check the lab regularly with a monitor.
- (6) Keep a record of control measurements.
If the lab is only used for work with open radioactive sources periodically, warning signs must be removed outside such periods.

Guidelines for working with isotope ^{32}P :

- (1) Always keep the ^{32}P ampoule in a lead container.
- (2) All work with isotope amounts larger than 1 mCi (37 MBq) must take place in the isotope lab 360. Keep the handling of the isotope behind plexiglass shielding or similar shielding. Work with smaller amounts of isotopes must take place in the classified labs only. These labs are clearly marked.
- (3) Always do work in plastic trays and always wear gloves during the work. (If you wish you may use thin plastic gloves on top of the rubber gloves).
- (4) Always have a monitor by the workplace.
- (5) Regularly check yourself and the workplace with the monitor – also check when you leave the workplace.
- (6) Keep a record of control measurements.
If the lab is only used for work with open radioactive sources periodically, warning signs must be removed outside such periods.
- (7) Use plexiglass or lead containers for transportation between labs.

Waste and cleaning after working with ^{32}P :

- (1) *Liquid waste* is diluted to less than $2.7 \mu\text{Ci/L}$ (0.1 MBq/L) and poured into the sink in the isotope lab. Rinse thoroughly with water. Liquid waste containing more than 0,5 mCi (20 MBq) ^{32}P , must be collected in specific containers. Per month and permit, the maximum discharge into the sink is 1.3 mCi (50 MBq).
- (2) Liquid waste that apart from ^{32}P contains organic solvents (phenol or formamide) either ought to be collected in a fume cupboard (i.e. a glass bottle with other phenol waste) until the isotope is decayed, or placed in a closed tube in the hazardous waste container in the isotope room.

- (3) All solid waste that is ^{32}P contaminated must be collected. Use the waste containers that are placed in the isotope laboratory. A measurement of less than 2.7 $\mu\text{Ci}/\text{kg}$ (0.01 MBq/kg) is considered to be inactive and is disposed of as ordinary hazardous waste. Slightly contaminated equipment (gloves and the like) are thus discarded in the regular hazardous waste containers.
- (4) Glassware and the like that have been used for preparation are washed with Decon 90 (only use the sink in the isotope laboratory). If there is no traceable contamination after the washing, send the items to the wash-up facilities. If the items are still contaminated, immerse them in the decontamination bath overnight. If this is still not sufficient, store the glassware for ten half-lives.
- (5) *Cleaning of the workplace.* Check the workplace using the monitor and clean the contaminated areas if necessary.
Have in mind that an isotope lab does not necessarily have to be contaminated! Keep a record.
If the lab is only used for work with open radioactive sources periodically, warning signs must be removed outside such periods.
- (6) ^{32}P waste from the isotope lab in room 360 is stored for approx. ten half-lives. Please send the box to incineration when the content of the box is less than 1.3 mCi (50 MBq) and radiation is less than 5 microSv on the outside of the box.

Guidelines for working with the isotope ^{125}I :

Contact the person responsible for work with radioactive isotopes in the respective sector before starting to work with this type of isotope in order to obtain detailed instructions on this type of work.

- (1) All work with the isotope ^{125}I in the free form must take place in the fume cupboard of the isotope room, room 360. An extra protection shield of lead glass must be attached to the fume cupboard.
As elemental iodine, in particular, is hazardous, you must especially take caution not to get ^{125}I on your body or internally. Work with iodinated molecules (proteins, etc.) must take place in type C labs.
- (2) ^{125}I ampoule must be stored and kept in a lead container.
- (3) Always have a monitor by the workplace.
- (4) Persons performing iodination work must submit a urine sample. Please contact your local working environment leader.
- (5) Regularly check yourself and the workplace with the monitor – also check when you leave the workplace.
Keep a record of control measurements.

If the lab is only used for work with open radioactive sources periodically, warning signs must be removed outside such periods.

Waste and cleaning after working with ^{125}I :

- (1) *Liquid ^{125}I waste* is collected in bottles in a lead container marked "liquid ^{125}I -waste" in the fume cupboard in the isotope lab. The bottle must contain 1 M NaOH. Liquid waste containing less than 2.7 $\mu\text{Ci}/\text{L}$ (0.1 MBq/L) can be poured directly into the sink. All in all, per month, 0.13 mCi (5 MBq) can be poured in the sink.
- (2) Solid waste containing ^{125}I is placed in a lead lined container in the depot at the north side of Building 1171. Solid waste containing less than 0.01 MBq/kg is considered ordinary hazardous waste.
- (3) Glassware and the like is rinsed with 0.5 M NaOH that afterwards is poured into the bottles marked "liquid ^{125}I waste" or in the sink depending on the degree of contamination. After that, rinse a couple of times with cold 1% NaI and wash with Decon 90. If the monitor cannot trace any sign of contamination after the wash, send the items to the wash-up facilities, otherwise continue the washing until no radioactivity is traceable. It is an advantage to use disposable plasticware.
- (4) *Cleaning of the workplace.* Check fume cupboards and gloves with the monitor and clean contaminated areas, if any, with 0.5 M NaOH and 1% NaI.
- (5) Waste is stored for at least one year. Each bag must contain less than 135 μCi in (5 MBq) at the most when it is sent to incineration. The dose rate must not exceed 5 microSv/h on the outside of the box.

Appendix 2. Flammable and explosive chemicals

Frequently used solvents – The Emergency Management Agency' current fire rating			
Liquid	Flash point	Fire rating	Number of litres per storage unit
Diethyl ether	-45 ° C	I-1	1
n-Hexane	-22 ° C	I-1	1
Acetone	-20°C	I-2	1
Tetrahydrofuran	-14°C	I-2	1
n-Heptane	-4°C	I-1	1
Ethyl acetate	-4°C	I-1	1
Acetonitrile	2°C	I-2	1
Toluene	4°C	I-1	1
Methanol	11°C	I-2	1
2-propanol	12°C	I-2	1
Dioxane	12°C	I-2	1
Ethanol	13°C	I-2	1
Butyl acetate	22°C	II-1	5
m-Xylene	25°C	II-1	5
Acetic acid	39°C	II-2	5
N, N-Dimethylformamide	58°C	III-2	50
Dimethyl sulfoxide	95 ° C	III-2	50

Source: <http://www.e-pages.dk/hk/1645/32>

Executive Order on the technical regulations for flammable liquids (in Danish):
<https://www.retsinformation.dk/forms/R0710.aspx?id=128847>