



UNIVERSITY OF AMSTERDAM



Faculty of Science Safety Guidelines

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## Colofon

This booklet was written on the basis of existing texts from different Health and Safety websites and brochures from universities, FOM Institutes and suppliers, IAVM reports, Health and Safety information sheets from the Ministry of Social Affairs and Employment.

Many thanks to all that contributed in whatever way to making this booklet possible.

The editors would greatly appreciate any constructive criticism and will include it in any subsequent edition.

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## Introduction

Health and safety in the workplace is the responsibility of each and every individual. The following health and safety guidelines have been put together by the UvA Faculty of Science as a general guide for all Faculty of Science employees, students and guests.

These guidelines outline in broad terms how you can – and should – ensure that you have a safe, healthy and pleasant working environment. These general guidelines are supplemented by the more detailed guidelines developed by your own institute, which are tailored towards the requirements of each institute's field of research. Each institute also has its own safety officer, who acts as a point of contact for all health and safety related issues.

The first part of this booklet (chapters 1 to 4) is of general interest and applies to everyone. Chapters 5 to 16 describes the general health and safety guidelines applicable to those working in the laboratories and experimental rooms. Next to this booklet about the safety guidelines the UvA intranet contains more information about health and safety in the faculty. This information is available in the A-Z list, subject Buildings, Health and Environment (Gebouwen, Arbo en Milieu).

## Opening hours Science Park 904

### Monday – Friday

The building is open from 07:00 to 22:00. Office and laboratory work may be carried out during these hours.

#### Limitations:

Laboratory work between 18:00 and 22:00 may only be carried out under the following conditions:

- at least one colleague must be near the laboratory zones;
- health and safety measures must be observed;
- bachelor and master students may only work in labs and experiment areas under supervision.

Risky experiments may not be carried out after 18:00. It is up to the institute or department's safety advisor to determine the risk limits.

The building is closed from 22:00 to 07:00. No office or laboratory work may be carried out during these hours.

#### Exceptions:

- prolonged experiments which require analysis/low risk handling etc.;
- experiments involving animals and/or plants which need to be cared for;
- night-time experiments.

Under the exceptions outlined above, the following details must be provided in advance:

- the details of the person carrying out the work, the safety advisor and the person responsible for the experiment;
- a description of the experiment;
- the duration of the experiment.

### Saturday and Sunday

The building is open from 10:00 to 18:00. Only office work may be carried out at this time. The conditions for carrying out lab work on the weekend are the same as those for carrying out lab work during the workweek (see above). Risky experiments may not be carried out on Saturdays and Sundays. The risk limits must be discussed with your safety officer.

### Public and mandatory holidays

This means absolute closure of the building. Technical Services are not present and will only take action in case of an emergency. There will be no company emergency response officers or security in the building. For that reason it is not allowed to work on risky experiments.

Employees who have urgent reasons for gaining access to Science Park 904 during a public or mandatory holiday must get permission from the institute's operational manager. The operational manager will determine whether access to the building is necessary.

07.00 - 22.00 uur  
10.00 - 18.00 uur  
10.00 - 18.00 uur

07.00 am - 10.00 pm  
10.00 am - 06.00 pm  
10.00 am - 06.00 pm

## General safety guidelines

### General guidelines

- Everybody is strongly urged to ensure that work is carried out in a safe manner.
- Use common sense when performing your work. Take all reasonable measures for guaranteeing your own safety, as well as that of other people.
- If you notice anything dangerous or careless or a negligent act, you are obliged to take action in order to prevent an accident or mishap.
- Anyone aware of unsafe working practices or working situations, which cannot immediately be rectified, is obliged to notify their supervisor immediately.
- The supervisor has the task of ensuring that everyone in his/her group works in a safe manner and that new employees are made aware of any possible dangers related to the work.
- Every accident or near-accident must be reported to your supervisor and/or Health and Safety Coordinator.



### Information and instructions

Be well prepared, and you are halfway there. This is why every employee receives information, and training if necessary, on health and safety matters when they first start work.

Make sure you get the information you need and that you are up to date on essential issues such as:

- alarm numbers in case of emergency (first aid and fire);
- alarm signals and what you are supposed to do;
- emergency routes and exits;
- the safety regulations that apply to your own work station.
- familiarize yourself with the risks associated with neighboring departments.

## Emergency

- Always remember: do not undertake action on your own, warn others (call out), and do nothing that could endanger your own safety.
- In case of an emergency (fire, injury) dial 2222. State your name, roomnumber and the nature of the incident and follow the relevant guidelines. In case of a fire break the glass of the fire alarm and press the button.

 UNIVERSITEIT VAN AMSTERDAM

WAT TE DOEN BIJ	WHAT TO DO IN CASE OF
 <b>BRAND</b>	<b>FIRE</b>
 <b>020 - 525 2222</b>	
 GEEF INFORMATIE OVER DE BRAND - WAAR - WAT - OMVANG	GIVE INFORMATION ABOUT THE FIRE - LOCATION - OBJECTS INVOLVED - EXTENT OF THE FIRE
 WAARSCHUW MENSEN IN DE DIRECTE OMGEVING	WARN PEOPLE IN THE IMMEDIATE AREA
 SLUIT DEUREN EN RAMEN VERLAAT KALM DE GEVARENZONE	CLOSE DOORS AND WINDOWS LEAVE THE DANGER AREA CALMLY
 GEBRUIK GEEN LIFTEN	DO NOT USE ELEVATORS
 GA NAAR DE VERZAMELPLAATS	GO TO THE ASSEMBLY POINT

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 <b>ONGEVALLLEN</b>	<b>INJURY</b>
 <b>020 - 525 2222</b>	
GEEF INFORMATIE OVER - LOCATIE - TOESTAND SLACHTOFFER - UW NAAM - EHBO EN/OFF AMBULANCE GEWENST	GIVE INFORMATION ABOUT - LOCATION - CONDITION VICTIM - YOUR NAME - FIRST AID AND/OR AMBULANCE NECESSARY

versie 2014 - Facility Services

## Evacuation

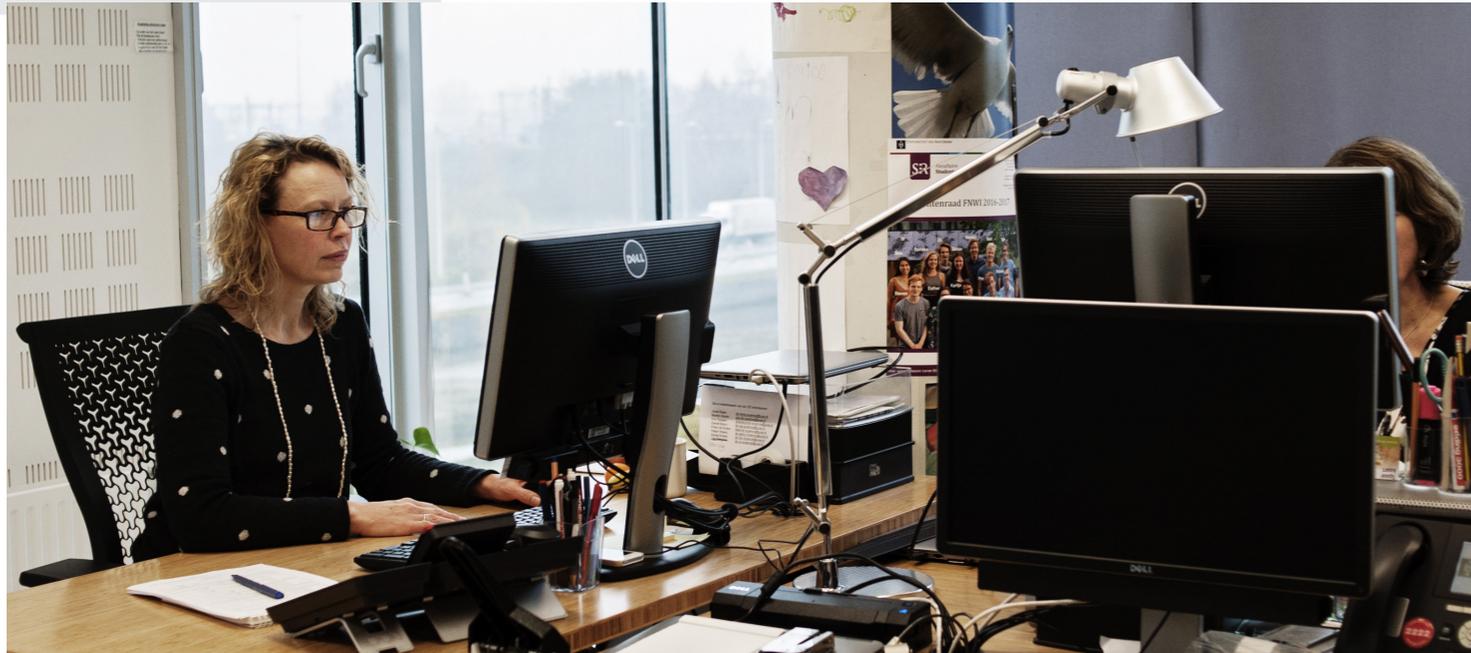
- You are alerted by the Slow-Whoop signal and broadcast message.
- When possible and without wasting time, switch off instruments and machines.
- Leave the lights on and close all doors.
- If possible take your personal belongings with you.
- Never use the elevator.
- Use the nearest evacuation staircase to descend to ground level and leave the building.
- In all cases, follow the instructions of the Emergency Response Officers (BHV). They can be recognized by their orange or yellow vests.
- Go to the meeting point in front of the sport-center USC.
- Wait there for further instructions.

## Personal health

Regular use of computers, pipettes or other instruments means you have a greater chance of picking up health ailments – something that is often underestimated.

Complaints caused by excessive use of computers or other instruments are a sign that something is wrong. If you do not act in good time, incidental symptoms may develop into a chronic condition.

These complaints are known collectively as CANS (Complaints of Arm, Neck and/or Shoulder). They could also be caused by work stress, staying in the same position for a long time, or a combination of both.



### How to prevent complaints

Being aware of the health risks will help recognize the symptoms at an early stage and perhaps prevent them.

If you work regularly with computers or instruments, you should pay attention to the following:

- the content and organisation of your work;
- the equipment you work with;
- the surroundings and furnishings of your work location;
- use of accessories;
- your posture;
- being able to see properly when using a computer or instruments;
- user-friendly software.

For more information you can contact the Faculty of Science Health and Safety department. Always seek medical advice from your company doctor or general practitioner if you suffer recurring symptoms with your hands, wrists, neck or back.

*More information is available on intranet in the A-Z list, subject Buildings, Health and Environment.*

## General laboratory safety guidelines

### *Common sense*

Safety is an important issue in a laboratory, both for you and for the people around you. Good common sense is needed for safety in a laboratory. It is expected that all lab-users will work in a responsible manner and exercise good judgment and common sense. If at any time you are not sure how to handle a particular situation, ask your supervisor. Do not touch anything if you are not completely familiar with the handling or operating procedures. It is always better to ask questions than to risk harm to yourself or damage the equipment.

### *Introduction on safety rules*

All new users need to follow an introduction on the safety rules applicable to the lab of their research institute.

### *Laboratory access*

Working in isolation in the laboratories is not allowed at any time (see chapter 2 Opening hours Science Park 904).



### *Work and safety wear*

- Wearing a laboratory coat is mandatory at all times while you are working in the laboratories and climate chambers. Employees can exchange their dirty laboratory coat for a clean one at the desk of the central warehouse until 12:00 in the morning from Monday to Friday (B0.132/B0.132A).
- Wear safety glasses or face shields when working with hazardous materials, biological agents and/or equipment.
- Wear gloves when using any hazardous materials. Be aware of the one glove policy and replace the gloves regularly.
- Never wear gloves outside the laboratory.
- Never wear lab-coats outside the laboratory zones.
- Leave your coats and bags outside the laboratories.
- If you have long hair or loose clothes, make sure they are tied back or confined.

### *Eating and drinking*

- Never eat or drink in the laboratory.
- Food and drink are not allowed in the labs and cool/freeze rooms.
- Wash hands before leaving the lab.

### *Working with instruments*

Do not touch any instruments before you have had clear instructions from the responsible person on how to operate it.

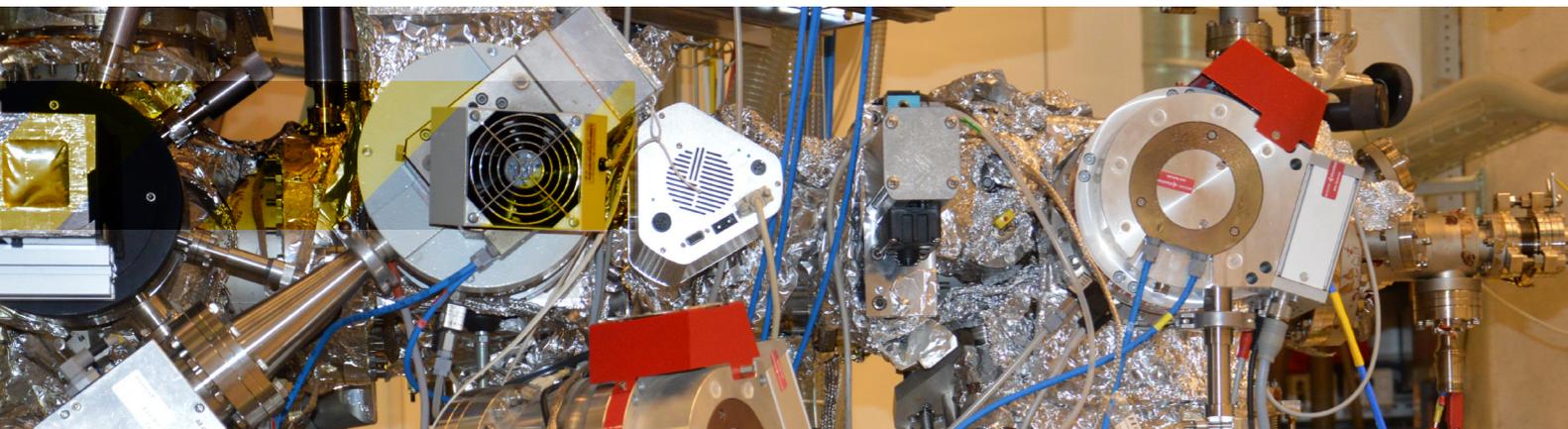
*More information is available on intranet in the A-Z list, subject Buildings, Health and Environment.*



## Equipment

General guidelines for working with instruments and other equipment:

- working with equipment is only allowed when you have the required expertise. Otherwise, you should leave it to someone else or obtain proper instruction. Ask your supervisor about the rules that apply;
- if equipment breaks or stops working while being used, report it immediately to the appropriate person. Never try to fix the problem yourself;
- take care when working with pressure and high temperature equipment like autoclaves;
- always clean equipment after use and store properly;
- when using compressed air, use only approved nozzles and never direct the air towards any person;
- avoid using extension cords whenever possible. If use cannot be avoided, obtain a heavy-duty one that is electrically grounded, with its own fuse, and install it safely. Extension cords should not go under doors, across aisles, be hung from the ceiling, or plugged into other extension cords;
- take care when working with or near hydraulically or pneumatically-driven equipment. Sudden or unexpected motion can inflict serious injury.



## Chemicals

Many chemical substances are hazardous (irritating, flammable, corrosive, toxic, carcinogenic, etc.). To be able to work with these substances safely, it is important to be aware of the specific dangers posed by each. A useful source of information is the Netherlands Institute for Working Conditions chemistry chart book. Safety sheets known as Material Safety Data Sheets (MSDS) can also be obtained on the internet. Suppliers are obliged to issue MSDS. You can also ask your supervisor or safety officer about these matters.

General guidelines for using chemicals are:

- assume that all chemicals are potentially hazardous;
- proper labeling is obligatory for all packages that contain chemicals. There are standard warning symbols. Solutions should also carry name and contents;
- work in a clean and orderly manner;
- lock chemicals away in a safety cabinet after finishing work;
- the use of personal protection items is particularly important when working with chemicals. This includes a labcoat, gloves and safety glasses;
- in spite of working with great care and taking safety precautions, something may nevertheless go wrong. Make sure you know where to find an eye wash, emergency shower, fire blanket, suitable fire extinguisher etc. in case of an emergency;
- there are special neutralizing and absorbing packages for spills. Ask where they are and how to use them;
- it is important to know where to dispose the chemical waste you produce while you are working in the laboratories;
- always report incidents with chemicals or injury to the local safety officer and the Faculty of Science Health and Safety Department.

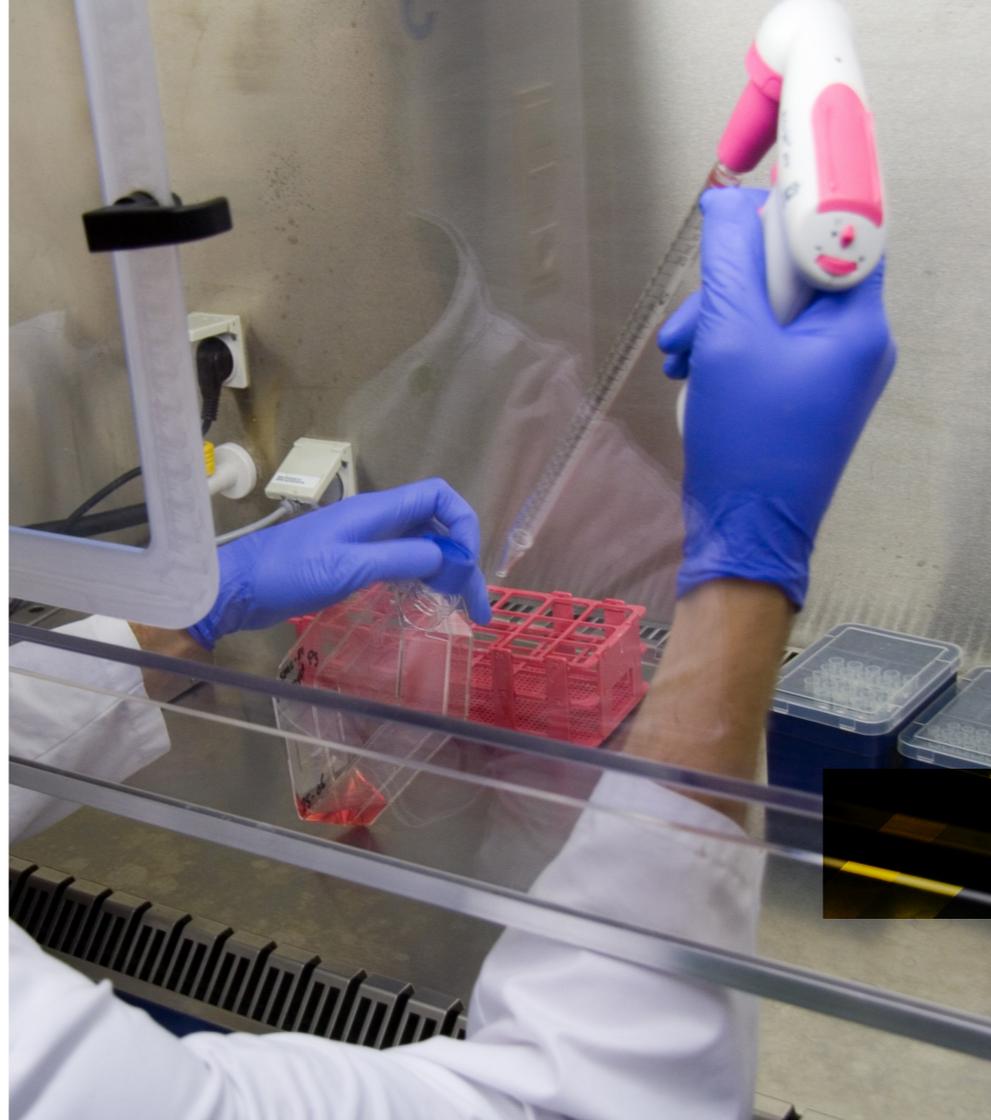
More information is available on intranet in the A-Z list, subject Buildings, Health and Environment

## Genetically modified organism (GMO)

Working with genetically modified organisms (GMO), biological agents, patient material and pathogens generate a number of health risks in themselves. These risks are conditional on the nature and the quantity of the materials used and the skills and the manner of work of the employees and students and moreover by the equipment of the laboratory.

In molecular-biological work, recombinant-DNA containing organisms are frequently used. These activities must be carried out with great care. In research with GGO, different measures are required to ensure the safety of the employees and students and to prevent contamination of GMO's into the environment.

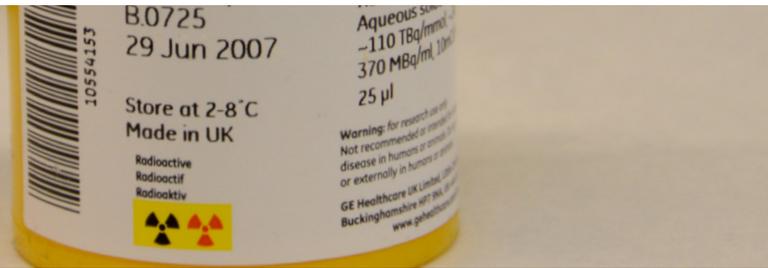
The Dutch version of the Faculty of Science GMO handbook " Veilig werken met genetisch gemodificeerde organismen en biologische agentia" gives an overview of the basic principles and official regulations that are important for the safe use of genetically modified organisms (GMO's) and/or pathogenic organisms.



If you want to work with GMO's, you should contact the Responsible Worker (in Dutch: Verantwoordelijk Medewerker, VM) of your department. The responsible worker is responsible for local supervision at the laboratory, the GMO-permit and the specific workplace regulations. He or she will inform you of the local workplace regulations.

*More information is available on intranet in the A-Z list, subject Buildings, Health and Environment.*

## Ionizing radiation



Particle radiation and electromagnetic radiation above a certain level of energy is called ionizing radiation. Ionizing radiation is harmful to the body. The greater the dosage i.e. the greater the amount of radiation energy that is absorbed, the greater the harm to the body.

### Enclosed and open radioactive sources

To maintain the best possible working conditions, attention should be paid to the following points:

- keep the quantity of radioactivity used as low as possible;
- keep exposure to a minimum (and/or work as fast as possible);
- keep as far away from the source as possible;
- take protective precautions (such as lead shield when working with gamma emitters, perspex protection for beta emitters);
- use personal protective devices whenever it is obligatory to do so (lead apron, lead gloves, etc.).

### Radiation from x-rays

Radiation from x-rays occurs when electrons or ions collide with matter. It is important to know that, when the beam intensity is constant, the rate of dosage rises strongly with increasing energy; for loads of several dozen kilovolts, a doubling of the accelerated voltage can cause an increase in the rate of dosage by a factor of more than a thousand.

In order to be able to work safely, keep the following points in mind:

- with energies higher than 5 keV and/or currents greater than 1 mA, there is a risk of inadmissible radiation intensity in vacuum;
- If this situation can occur, for example with new installations, the radiation expert must be informed as soon as possible, so that he/she can take the necessary measurements;
- only experts may carry out x-ray measurements; the information on the various radiation monitors needs to be properly interpreted;
- experiments with a possible inadmissible radiation intensity should be indicated by being properly shielded off and signposted with radiation monitors and warning lights. A permit is required for experiments of this nature.



## Non-ionizing radiation

### Laser equipment

Non-ionizing radiation (NIR) is the collective name for electromagnetic, static electric and magnetic fields with frequencies of 0 to 300 GHz.

NIR does not penetrate deeply into tissue but does increase the risk of harm to the skin and the eyes. Depending on the energy and the exposure, NIR can lead to localized heating, or it may lead to photo-chemical reactions with possible permanent harm.

Exposure should therefore be restricted as much as possible. Incorrect or improper use and incorrect design increase the chance of physical harm.

To minimize the risk of working with lasers please read the instructions carefully, and try to adhere to these rules and guidelines at all times.

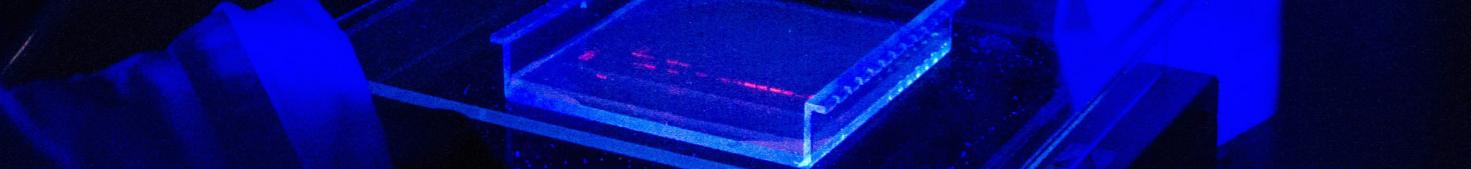
### General measures

Ensure that the equipment has been properly constructed and that it has been well maintained.

It is the responsibility of the employer to ensure employees are qualified, and to provide clear instructions and regular information updates. These can be requested if necessary.

In order of importance, a number of general measures for reducing risks are given below:

- only qualified people have permission for aligning the laser beams or modification of the laser equipment;
- the Institute laser safety officer will only give permission to work with lasers after the user has received proper instruction by the supervisor or their colleagues;
- laser safety rules from the institute and/or lab need to be followed at all times;
- protect the source: enclosed cupboards, block off reflections (collective protection takes precedence over personal protection);
- keep as far away from the source as possible;
- whenever working with laser sources, appropriate safety glasses should be worn ( $OD > 5$  for the right wavelength);
- take off wrist watches and rings during alignment;
- never lower your eyes to the level of the laser beams. Shield your eyes when you have to pick something up from the floor;
- laser warning lamps should be on when lasers are switched on;
- risk analyses of each piece of laser equipment are available;
- for more information you can contact the Faculty of Science Health and Safety Department



## Ultraviolet light

Excessive exposure is primarily dangerous to the skin and the eyes. Never allow the skin or eyes to be exposed to UV radiation sources. In addition UV-light is almost invisible. Acute effects are burns and inflammation of the cornea (arc eye). Long-term effects are skin cancer, swelling of the skin, premature aging of the skin and cloudy vision (cataracts).

### *Biological Safety Cabinets*

- Never work in a biological safety cabinet when the UV light is switched on. If possible, close the cabinet while the lamp is on.

### *UV Transilluminators*

- Never use a transilluminator without the protective shield in place.
- Shields must be kept clean and replaced when damaged.
- Wear (safety) glasses or face protection that block UV light.
- Wear disposable gloves to protect exposed skin on the hands.
- Ensure wrists and forearms are completely covered.

### *Crosslinkers*

- Make sure that the door is closed properly.

More information is available on intranet in the A-Z list, subject Buildings, Health and Environment.

## Sound

When working with equipment or other activities that produce noise (> 80dB(A)\*), make sure you're wearing appropriate ear protection. Take extra care when working with ultrasonic sound. Ultrasonic sound can lead to ruptured eardrums. Warn other people in the room before starting the 'noise producing activities'



\* Source: Arboportaal.nl

## Gases and gas cylinders

Gas cylinders are potentially dangerous. When handled incorrectly, they can shoot off like a rocket or explode.

Working with gas cylinders is only allowed when you have the required expertise. Otherwise, leave it to someone else, or obtain proper instruction. Ask your supervisor about the rules that apply.

The gases themselves are generally not user-friendly: flammable, harmful, aggressive and/or toxic. Great care is therefore required. Special ordering procedures, working regulations and good management are the key to proper safety.



### Storage

- Gas cylinders with a content bigger than 5 liter that are being used must be stored in the red fire-cabinets for gas cylinders near the laboratory.
- The installation of a gas cylinder in the laboratory for a short period of time is only allowed with permission from the Faculty of Science Health and Safety Department.
- The gas cylinders should be protected from falling over (secure them with a chain).
- The gas cylinders must be kept apart according to the type of gas.
- Full and empty gas cylinders, not being used, must be stored outside the building in a dedicated storage area.
- A proper protective cap should always be fitted to gas cylinders that are not in use in order to prevent the master valve breaking off or being damaged.
- Empty gas cylinders should be stored separately from full ones, or at least be labeled 'leeg/empty'. They should be treated with the same care as full cylinders.

*More information is available on intranet in the A-Z list, subject Buildings, Health and Environment.*

## Cryogenic liquids

Cryogenic liquids are mostly used as cooling agents. The best-known one is liquid nitrogen with a temperature of  $-196\text{ }^{\circ}\text{C}$ . Liquid helium, oxygen and carbon dioxide are also used extensively in laboratories.

- Contact between cryogenic liquids and the skin causes burn-like injuries. Wear closed shoes, safety glasses (preferably a face mask) and, if necessary, special gloves when transferring cryogenic liquids.
- D0.160 is the fill station of cryogenic nitrogen. After instruction you are allowed to enter this room (your UvA-ID card will be upgraded). This room is monitored by an oxygen detector. Don't enter the room when the alarm is activated. If the alarm is activated call 2222 for help.
- Dewars being transported by elevator should not be accompanied by any persons.



## Electricity



Accidents involving electricity can result in three situations: you receive a minor shock or you are seriously injured or even instantly killed (electrocution).

The dangers associated with electricity are, unfortunately, often underestimated. Electricity is perhaps at its most dangerous for people working with equipment in a laboratory.

For that reason, electrical installations and electrical appliances must comply with legal regulations (NEN 1041 and NEN-EN 3140 during use of both high and low voltage installations and appliances). In addition, electrical work involving installations on the building (and equipment) may only be carried out by qualified personnel.



## Vacuum

Implosions often have the same effect as explosions. Vacuum machinery is used with a variety of projects. In general, manufacturers of vacuum machinery incorporate safety measures and provide guidelines for its use. Working with a vacuum pump or other machinery is only allowed when you have the required expertise.

- Vacuum systems at risk of implosion must be properly protected (from noise and splinters).
- Personal protective devices should always be readily available.
- The safety provisions should be monitored and regularly tested.
- If there is any danger of explosion, install an outflow valve and use protective masks or safety glasses.
- The combination of vacuum, localized heating and glass can cause an implosion
- Monitoring the pressure must be possible at all times.
- Install the pumps in such a way that the noise is kept to a minimum.



## Magnetic field

In some laboratories machines are operating that create strong magnetic fields.

- Before entering those rooms, first ask permission to the responsible person and note the warning signs attached on the laboratory doors.
- People wearing a pacemaker, medicine pump (e.g. insulin pump) or metal prostheses are not allowed to go into rooms where magnetic fields can occur.
- Also be aware that when you are in these rooms bank cards and other magnetic sensitive stuff (mechanical watches, disks etc.) can be destroyed.
- Do not leave metal equipment (keys, nails, screwdrivers etc.) close to the magnetic fields, they can be attracted to the magnetic field, which causes harm to the machine or even worse, a person.

To cool magnets cryogenic liquids (N<sub>2</sub> and He) are used, please refer to chapter 13 which handles about these liquids.



