1. General Safety Instructions

EMERGENCY TELEPHONE NUMBERS

SOS
(0)112

Securitas
(House Security)
Tel: 046 - 222 07 00 (207 00)

Akademiska hus Jour
(Maintenance)
Tel: 046 - 31 13 10

Karl-Erik Bergquist
Head of Joint Services
Tel: 046 - 222 82 08

Sven Lidin
Head of Department, Department of Chemistry
Tel: 072 - 729 10 30

Mattias Alveteg
Head of Department, Department of Chemical Engineering
Tel: 070 - 544 17 26

Yvonne Granfeldt
Head of Department, Department of Food Technology
Tel: 070 - 569 33 75

Parantesis indicates the number dialed from the intern telephones when making extern phone calls.

NOTE:
This booklet is extracted from the webpage:
http://www.kc.lu.se/general-safety-regulations/

For the most complete/current information, please visit the webpage!
In case of emergency

1. **Rescue injured individuals.**
2. **Contact ambulance/fire department/police.** Always meet the emergency vehicles in order to give them more information and directions.
3. 
   1. **During office hours**, contact Karl-Erik Bergquist 046-222 82 08. If you are unable to reach Karl-Erik, contact Johan Ohlin 046-222 31 11.
   2. **During non office hours** contact Securitas 046-222 07 00.

If you summon an ambulance, the fire department or the police:
Inform Information desk Kemicentrum by phone 046-222 83 49 of the entrance to which the emergency personnel has been directed.

If you summon Securitas during non office hours follow this checklist:

1. Assess if the local area have to be evacuated.
2. Contact the Head of the division or the Head of Department.
3. Assess if a contact to the house maintenance (Akademiska hus) is needed.
4. Communicate information locally.

If the alarm goes off in your department, shut down any equipment, shut the doors, leave the building (don’t use elevator) and go to the nearest reassembly point. Make sure you know where this is.
2. Important phone numbers

If you are calling from an internal phone dial 0 in order to secure an external line

In case of emergency
112

Security (Securitas)
046 - 222 07 00

Maintenance (Akademiska Hus)
Jan Karlsson: 046 - 31 13 84
Thomas Hallquist: 046 - 31 14 59
Mikael Ahlgren: 046 - 31 14 53
Hans Häger: 046 - 31 14 55
After normal working hours, an on-duty contact can be reached by calling 046 - 31 13 10

Poison information (non emergency)
08 - 33 12 31

Hospital (non emergency)
046 - 17 10 00

Police (non emergency)
114 14

Environmental Health & Safety (EHS) Coordinator Johan Ohlin
046 - 222 31 11

Lund University Switchboard
046 - 222 00 00

Occupational Health Service (Företagshälsovården)
046 - 222 32 80

Radiation Physicist Hanna Holstein
046 - 222 01 93

Swedish Work Environment Authority (Arbetsmiljöverket)
Malmö: 010 - 730 - 90 00
On-duty: 08 - 454 20 12

Swedish Chemical Agency (Kemikalieinspektionen)
08 - 519 411 00

Medical Product Agency (Läkemedelsverket)
018 - 17 46 00

Environmental Management (Miljöförvaltningen)
046 - 35 52 61

Swedish Radiation Safety Authority (Strålsäkerhetsmyndigheten)
08 - 799 40 00

Swedish Civil Contingencies Agency (Myndigheten för samhällsskydd och beredskap)
0771 - 240 240

The Department of Public Health (Folkhälsoguiden)
08 - 524 800 00
3. Introduction

The safety instructions on this website apply to Kemicentrum as a whole. Safety instructions, which are common to all departments/divisions are dealt with. For more detailed instructions, the reader is referred to the individual, departments/divisions as each of these has been instructed – when deemed necessary – to compile special safety instructions for its own particular field.

Literature concerning safety issues of relevance to chemical laboratory work is located on an allocated shelf in the library for Kemicentrum, and should, if necessary, also be available in the divisional libraries.

The Work Environment Act (Arbetsmiljölagen) is applicable to both instructional and research labs within the academic facility. These safety instructions have been issued in accordance with the general provisions of this act. The aim of these instructions is to minimize the risk of illness and accidents linked to laboratory work.

Each person who is working at Kemicentrum shall:

carefully study and follow both the general instructions found in this website (http://www.kc.lu.se/safety-regulations), and the relevant special instructions for each department/division.

be aware of the safety committee (skyddsorganisationen) at Kemicentrum and know which person or persons in the division that are responsible for the working environment.

know who is local safety representative (skyddsombud)

know who is responsible for inflammable materials (föreståndare för brandfarlig vara)

Information concerning this must be available in all departments/divisions.
Signing the Affirmation

According to the central policy for work environment at Lund University it shall be verified that the employee/student have understood the safety instructions and affirms compliance.

After you have read and understood the General safety instructions for Kemicentrum you must sign the affirmation document. Click here for the document, Print it out and sign it. Leave the document to your local administrator. The document should be filed at your division.
4. General Rules

Your Workstation

The laboratory should be kept clean and tidy at all times. Broken glass and chemical spillages must receive immediate attention. Broken glass should be placed in a separate waste container.

Do not use your mouth for pipetting. Avoid skin contact with chemicals.

Never carry out hazardous work alone. The person in charge in the laboratory, in consultation with the safety representative, decides what constitutes a risk.

Specific regulations for disposal of hazardous waste have been established for Lund University. Please note that vessels and packaging that have contained chemicals must be cleaned prior to disposal as normal waste.

Prior to carrying out experiments, find out how any waste products should be dealt with.

Sinks, even in fume hoods, must always be kept free of waste.

Experiments which take place overnight or during a weekend or holiday should always be labeled in such a manner that the person responsible for the experiment can be reached by telephone.

The risk of electricity- and water interruptions must be considered.

Warning signs must always be placed on equipment, which may constitute a specific risk.

Evacuation plan and fire extinguishing equipment

Find out where the evacuation plan, alarm buttons and fire extinguishing equipment are located, and study carefully the evacuation route and assembly points. Also determine alternative evacuation routes.

The corridors are evacuation routes and should therefore not be blocked with instruments, cabinets, equipment, etc. The width of the evacuation route should be at least 1.2 meters.

Personal protection

Wear a protective coat and protective goggles in the laboratory at all times. When necessary; the correct protective gloves should be worn.

Do not eat, drink, or smoke in the lab. Do not handle snuff (snus) nor apply cosmetics (including hand cream and lip balm. Do not taste the chemicals.

Risk assessment

A risk assessment must always be carried out before starting a new experiment. Risk assessments for work with chemicals with unknown properties must be carried out in the same way as for hazardous chemicals, bearing in mind the properties they may have.
4.1. Evacuation and fire

Evacuate the premises when the alarm sounds

Diagrams showing available evacuation routes are posted in proximity to all stairwells in Kemicentrum. These show available and alternative evacuation routes and assembly points of all departments and divisions. See more info regarding evacuations.

⚠️ Do not use elevators when evacuating the premises.

RESCUE - SOUND ALARM - EXTINGUISH

Kemicentrum has an automatic fire alarm directly connected to SOS alarm. This alarm is activated by smoke detectors placed in corridors, vestibules, lecture halls, the central library, and in the students’ community rooms.

Smoke detectors are highly sensitive to all types of smoke. A candle or a sparkler can set off the alarm if the smoke detector is situated close by.

The alarm can also be activated manually by alarm buttons placed proximity to the evacuation routes. During an evacuation, the alarm bells ring and warning lights flash (where these have been installed).

![Image of alarm buttons]

The red box is to sound the alarm, the green for emergency shut off of gas

Sounding the alarm

In case of fire and/or risk of fire, explosion or gas leakage, the Fire Department must be alerted. Dial 0-112 and request fire department.

Give clear information about:
Address: Kemicentrum – entrance A - H – floors (-1 – +4)
What has happened: Fire, gas leakage, etc.

Always meet the fire fighters in order to give them more information and directions. Even if the automatic alarm has been activated, call the Fire Department to check that they have received the alarm and to give them further information about the situation.
Fire fighting equipment

Fire hydrants, fire extinguishers, fire blankets and emergency showers, are located in corridors, laboratories, equipment halls, etc.

Use carbon dioxide extinguishers for electrical fires.

Use carbon dioxide or foam extinguishers for solvent fires.

In addition to hand-held fire extinguishers, fire hoses for water are located in some corridors.

⚠️ Access to fire fighting equipment must not be blocked

Fire extinguishing

For smaller fires use a hand-held extinguisher. Clothing on fire should be dealt with using fire blankets, items of clothing, or an emergency shower. Never use synthetic material to extinguish a fire!

Fire in a laboratory

Rescue, sound alarm and extinguish

- Evacuate the laboratory at once.
- Evacuate injured individuals.
- Alert the Fire Department
- If the fire is isolated, begin attempts to extinguish the fire if this can be accomplished without risk of personal injury
- If possibly - remove gas tubes and containers of flammable solvents
- Close all doors to the laboratory if the fire proves difficult to extinguish. This reduces the supply of oxygen to the fire.
Evacuation routes

- Evacuation routes may not be blocked!
- Flammable materials may not be placed in the way of evacuation routes.
- Fire doors may not be blocked so that they will not close on activation of fire or evacuation alarms.

Reassembly points

Fire doors

Doors held open magnetically serve to limit the spread of fire and close automatically in case of fire (and fire alarm). In Building I and III all fire doors close once a week and must manually be opened the next day.

Once a month there is a silent test of the fire-alarm system. During these tests the alarm bells are silent but the fireproof doors will close.

**In Buildings I, II and III:** In case of fire, the alarm sounds only on the floor where the fire started, and the fireproof doors close only on the floor where the alarm sounds.

**In Building V:** In case of fire, the alarm sounds only on the floor where the fire started, but in these buildings the fire-proof doors close on all floors.
4.2. Personal protection

A protective lab coat and safety goggles should be worn at all times in the laboratory.

Personal protective equipment should be used if satisfactory protection against illness or accident cannot be achieved in some other manner. Employers are to provide this. (Chapter 2, § 7 Work Environment Act).

Find out what protective equipment and rescue equipment is available and where it is located.

The division head, in his capacity as the person responsible for the work environment, shall ensure that appropriate personal protective equipment in sufficient quantities is available and in good working condition.

Examples of personal protective equipment include protective lab coats, gloves, goggles, terminal glasses, ear protection, respiratory protection, protective shoes, and visors.

Lab coats may not be worn in offices and dining areas.
Lab Glove Policy

Use an UNGLOVED hand to touch common surfaces, and a gloved hand if you touch hazardous materials inside the laboratory.

Gloves should never touch door handles, elevator buttons, telephones, lavatory faucets, or other common surfaces.

Remember that sooner or later chemicals penetrate protective gloves. This can happen without any visible effect on the material and without being felt. A glove material that gives good protection against one chemical may be ineffective against another. Check with the manufacturer or retailer or in the product information sheet to find out which gloves you should choose to use for the chemicals you are using.

⚠️ Protective gloves are not allowed outside the lab.
4.3. Ventilation and ventilated workstations

Regulations for work involving fume hoods/benches

Work using fume hoods and fume benches is affected by the surroundings and by the individual work method as well as by the design of the supply and extraction air systems. It is easy to disrupt the function of the fume hood/bench by using incorrect work methods, resulting in reduced safety. The following rules mean that work can be carried out safely, reducing the risk of leakage and harmful exposure.

Fume hoods and fume benches have controls/alarm functions which warn when the extraction airflow rate is too low.

Rules:

Laboratory setups of open containers with flammable materials (ie not closed assemblies) shall be supervised by staff, if a loss of ventilation loss causes risk of forming an explosive atmosphere.

During electrical or ventilation outages, close all containers with flammable material, shut down heating in the laboratory set-up and then close the hatch. See more information here.

Electrical equipment in the fume hood should only be connected via interlocked electrical power outlets. Electrical power to these electrical power outlets are interrupted at loss of ventilation. Electrical equipment marked is an exception.

Follow the EX-classification instruction for the fume hood and laboratory. This instruction informs you regarding zones where only electrical equipment marked is permitted. No exceptions allowed.

Power sockets should never be placed inside, under and in front of the fume hood.

Acids that produce corrosive gases/fumes e.g. perchloric acid, aqua regis and concentrated hydrochloric acid must only be handled in special, flushable fume hoods. See rules for corrosives

Fume hood

Work with the hatch in the safety position, i.e. with the normal maximum of 30 cm opening. Close it as soon as you are not working in the hood.

Carry out the work as far into the fume hood as possible.

Do not store chemicals or anything else which is not required for the work being carried out in the fume hood.

Save energy by closing the fume hood hatch when no work is being carried out.
Fume Bench

Fume benches should only be used for cold work (≤50 °C).

2/3 of the perforated surface should be free.

The source of contamination should be placed at least 10 cm behind the perforations.

Fume benches can be supplied with protective covers, which increase safety.

If protective covers are not used, any source of contamination should not be placed higher than 15-20 cm above the work surface.

A protective cover increases safety heights and a larger proportion of the perforated surface can be used as a work surface.

It is critical that the perforated benchtop surface be held clean and free of dirt/dust and chemical debris because such debris could impede the airflow and lead to poorer protection.

Local exhaust ventilation

Place the local exhaust ventilation point as close as possible to the source of contamination. Maximum distance equals diameter of the extraction tubing.
Open LAF benches are used for product protection (sterile work) and closed LAF benches are used for product and operator protection. The LAF bench should be connected to the exhaust ventilation system.

Note: If you only require personal protection, a fume hood/bench always provides the best protection.
4.4. Laboratory equipment

Electricity
Do not connect too many multiway sockets to one electrical socket. Secure all multiway sockets! No contacts or multiway sockets should remain on the floor. No contacts should be inside, in front of or under a fume hood due to the risk of fire.

Do not wind too many cables on the same coil. If the cable is overloaded, it may overheat, resulting in the risk of fire.

Ovens and drying chambers
Ovens and drying chambers must not be used for flammable or hazardous substances due to risk of explosion and emission of hazardous gas.

Hotplates

Electric hot plates, which have been placed inappropriately or left turned on, have caused damage or nearly resulted in fires on numerous occasions.

Electric hot plates should always be placed securely on a fireproof base. There should be a free space of at least 50 cm in height above the hot plate.

Electrical hotplates should always be coupled to the electricity via a security timer. Water and oil baths should be metallic and equipped with overheating protection. The temperature of an oil bath should be at least 20 °C lower than the flash point of the oil being used.

It is strongly recommended to exchange oil baths for heating blocks.
Vacuum glass equipment

All glass equipment that is used under vacuum should be designed for it, made from special durable glass and assembled with the greatest care. When working with vacuum equipment, protective goggles should be worn. Remember that Dewar and Thermos bottles are vacuum vessels.

Central Vacuum System

Be aware that usage of the central vacuum system always creates condensate from liquids and the collection of particles or molecules from your solids into the central waste collector. Never use the central vacuum line for poisonous chemicals.

Never use the central vacuum line to the rotary evaporator since it can cause large amounts of solvent in the vacuum line central receptacle.

Always use a safety flask when applying vacuum to liquids or solids.

Cold water hoses

Always fasten cold-water hoses with a gear clamp. Use a PVC hose or similar for low pressure and a reinforced hose for high pressure.

More information can be found in "Plan of action for water outage".
HPLC equipment

Ventilated cabinets for solvent bottles should preferably be used.

If ventilated cabinets are not available then should the solvent bottle be sealed with a special stopper that prevent leakage of solvent vapor.

The stopper allows air flow into bottle.

Waste bottles not inside a ventilated cabinet should be sealed with a special stopper. The exhaust filter prevents solvent vapor to escape.
4.5. Risk assessment

A risk assessment must always be carried out before starting a new experiment.

Risk assessment for work with chemicals with unknown properties must be carried out in the same way as for hazardous chemicals, bearing in mind the properties they may have.

In the risk assessment you should even consider what would happen if a power outage, water outage or evacuation were to occur during the experiment and what measures should be taken as a result.

How hazardous your work is has to be assessed by you, below is a table that could serve as a reference of how hazardous your work is.

A suggested risk assessment form is available on the Lund University website: Arbetsmiljö, Miljö och Säkerhet (Work Environment and Safety).

![Risk Assessment Table]

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unlikely</td>
</tr>
<tr>
<td>Very Serious</td>
<td>Hazardous</td>
</tr>
<tr>
<td>Serious</td>
<td>Moderately Hazardous</td>
</tr>
<tr>
<td>Mild</td>
<td>Moderately Hazardous</td>
</tr>
<tr>
<td>Insignificant</td>
<td>Not Hazardous</td>
</tr>
</tbody>
</table>
5. General Rules for Work with Chemicals

Always label all preparations and reagent vessels clearly with the chemical name, use an appropriate warning symbol and state if the substance is carcinogenic or allergenic. Remember that even waste bottles should be labeled in this way. The label must be marked with the appropriate Pictogram. The labeling on bottles or jars should follow GHS. Even test tubes, beakers, etc. which will be stored should be appropriately marked.

All work with substances which are flammable or hazardous to health should be carried out in fume hood or using similar protective equipment.

Vessels used for chemicals that are hazardous to the environment should be sanitized before regular cleaning. The hazardous substance should be removed during the sanitation to prevent that the substance enters the waste water system.

Knowledge of the dangers associated with various substances, including the risk of fire or explosion, their toxicity, substances that cancel unwanted effects and various precautionary measures is essential.

Material safety data sheet (MSDS) is an important component of occupational safety and health. It is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures.

Material safety data sheet (MSDS) are available in the KLARA chemical database. Visit the KLARA system.

Look up the chemicals Risk and Safety phrases (R and S), according to KIFS 2005:7 or the Hazards and Precautionary phrases (H and P) according to CLP/GHS.

A risk assessment analysis must be carried out when working with hazardous substances and any necessary risk reducing measures must be carried out before any work begins.

In accordance with the Work Environment Act, appropriate regulations must be available at the workplace. Examples of such guidelines are:

- **AFS 2011:19** Chemical working environment hazards (Kemiska arbetsmiljörisker).
- **AFS 2011:18** Occupational exposure limit (Hygieniska gränsvärden).

Information on valid guidelines can be found online at the Swedish work environment authority’s web page.

For further information about legislation and regulations pertaining to the work environment, handbooks about laboratory work, safety leaflets, etc., refer to the allocated shelf containing work environment information in Kemicentrum library.
5.1 Storage and transport

Storage

Chemicals must be stored in ventilated chemical cupboards or in a chemical storage room.

When storing chemicals you must consider the compatibility of different chemicals. For example, oxidizing chemicals must be kept separate from flammable liquids or other flammable chemicals.

Flammable liquids must be kept in ventilated cupboards.

Toxic substances must be kept in a locked cupboard. Chemicals that are both flammable and toxic should be stored as flammable chemicals.

Chemical storage room and ventilated cupboards with flammable and poisonous chemicals must be clearly marked with the respective danger symbol. See labels here

Acids must be stored in ventilated cupboards. Acids and bases must not be stored in the same cupboard. Placing acids and bases on separate shelves in a cupboard is acceptable for small volumes less than 1 L. Do not store acids and bases on shelves that are higher than your head.

Storing chemicals in cupboards in an evacuation area is forbidden.

Storing chemicals and laboratory samples of any kind in office workspace is forbidden, no matter if harmless or not.

Storing flammable substances in a standard refrigerator or freezer is prohibited. Use approved refrigerators/freezers for storing flammable substances.

Transportation of chemicals

Transportation of volumes more than 1 L of highly flammable solvent/gases in areas outside the lab must be given the highest attention regarding security.

Use a trolley with soft rubber wheels and fence to protect the goods during transport.

Single bottles can be moved upright in a plastic bucket or a similar container. Avoid using lifts with liquid chemicals.
Transport of gas cylinders

Use a transport cart for moving gas cylinders.
Make sure that the cart is designed for the size of the gas cylinder.
Large cart for 50 L cylinders.
Small cart for cylinders up to 20 L.

If an accident occurs during transport of solvents, toxic or corrosive substances

Call for help if you are unsure.
Cordon off the area.
Put on a mask with approved filter, protective lab coat, protective goggles and approved protective gloves.
In case of solvent spilling - sprinkle vermiculite or other absorbent.
When everything has been absorbed collect it in a double plastic bag and put it in a box for chemical waste. If a container/canister is deformed, pour the contents into another suitable container. This should be done by professionals who have good knowledge of chemistry.
In case of fire/explosion or gas evolution alert emergency service immediately, 0-112, provide information about the incident and state your name and building where the incident occurred.
5.2. Flammables

The legal situation

Usage and storage of flammable liquids and gases at Kemicentrum controlled and supervised, by law, by the manager of flammables or his deputy, (Föreståndare brandfarlig vara och ställföreträdare) at each unit/department. See list here:

General explosion hazards in lab environment

| EX | Certain areas in the lab or around storage facilities and cupboards are EX-classified due to possible closeness to flammable solvents and gases. |
| EX | In EX-classified areas it is not allowed to place or use non-EX-classified electrical equipment or any other ignition sources. |
| EX | Exception is lightning of a burner that is allowed. |
| EX | EX-classification plan for lab areas is displayed on the information board and must be studied before you start using the lab. |
| EX | Areas with forced ventilation, such as in fume hoods, are the only areas that remain not classified as explosively hazardous during normal work with flammable solvent and burnable gases. |

See EX-classification plan here

Regulations on handling of/working with flammable solvents and gases

The facilities in lab, arranged for handling flammable solvents and gases, such as fume hoods and storage cupboards, has been constructed and adjusted to fulfil the requirements by the ruling authorities.

It is not permitted to alter the facilities by individual adjustments. Malfunctions and poor adjustment should be reported to authorities.

Work with flammable solvents or gases must only be carried out in fume hoods or other workplaces with forced ventilation. Exceptions require that precautions have been taken so that the working area does comply with regulations on EX-classified zones.

Use only tap water cooling instead of pump circulated cooling during reflux boiling of flammable solvents.

Electrical equipment used in fume hoods

- must only be connected to power sockets interlocked with the forced ventilation.
- marked with ☢️ symbol is accepted to connect to standard power sockets.
- power socket connectors should never be placed inside, under and in front of the fume hood.
Regulations regarding storing flammable liquids

Flammable liquids and explosive mixtures must be kept in ventilated cupboards.

When storing chemicals you must consider the compatibility of different chemicals. For example, oxidizing chemicals must be kept separate from flammable liquids or other flammable chemicals.

Chemicals that are both flammable and toxic should be stored as flammable chemicals. Chemical storage rooms and ventilated cupboards with flammables must be marked according to below.

As a general rule, the smallest possible quantities of these substances should be stored in the laboratory. The general recommendation is a maximum of 2.5 l.

A maximum of 50 l of flammable substances may be stored in ventilated cupboards in each fire limiting compartment (check fire documentation). The only exception to this is laboratories in house 1 which is equipped with fire sprinklers; in this case a maximum of 50 l of flammable liquids may be stored in ventilated cupboards in each laboratory.

Storing flammable substances in a standard refrigerator or freezer is prohibited. Use approved refrigerators/freezers for storing flammable substances.

Containers with flammable liquids must not be placed directly on the floor.

Plastic containers, larger than 2 l, must be type approved for the flammable liquid which is to be stored in the container.

Picric acid, max. 3 kg per storage room

Hydrogen peroxide with a concentration of ≥20%. Permitted storage volumes:
Max. 1 l if the concentration is 80%.
Max. 5 l if the concentration is 60% but lower than 80%.
Max. 50 l if the concentration is lower than 60%.
Special permission is required in order to handle any amounts of hydrogen peroxide in concentration exceeding 60%.

Flammable material must be marked with this label.

Cupboards and storage rooms containing flammables must be marked with these labels.
Regulations regarding transporting flammable liquids

Transportation of volumes more than 1 L of highly flammable solvent/gases in areas outside the lab must be given the highest attention regarding security.

Use a trolley with soft rubber wheels and fence to protect the goods during transport.

Single bottles can be moved upright in a plastic bucket or a similar container. Avoid using lifts with liquid chemicals.

Particular requirement on experimental work in case of evacuation and ventilation shortage

In order to take into account the possibility for evacuation of Kemicentrum and ventilation shortage the following regulations must be considered for all experimental work.

Risk assessments must include a confirmation on whether the experimental setup may or may not produce non-negligible volumes of flammable or explosive atmosphere if left for several hours without forced ventilation.

If it may produce non-negligible volumes of flammable or explosive atmosphere then:

1. The experimental setup must be supervised by staff.
2. The risk assessment must include a time plan for sealing of the setup.
3. In case of evacuation, the experimental setup must be sealed before evacuation (if this can be done without immediate risk of health).

Example 1: Flash chromatography, when using low boiling solvents that is collected in open sample tubes, always produce considerable amounts of flammable gases and must always be supervised so it can be sealed immediately in case evacuation.

Example 2: Bottles with solvent must never be left open to atmosphere and must be closed in case of evacuation.

Example 3: Use of a continuous stream of flammable gas must be supervised and closed in case of evacuation or be equipped with an automatic valve that closes if ventilation ceases.
5.2.1 EX-classified areas

Click to enlarge

Common storage för flammable gas and flammable solvent waste
Chemical storage room

Cabinet for flammable gas
Ventilated cupboard for flammable solvents

Fridge/Freezer for flammable solvents
Fume hood

Handling of flammable solvents on workbench WITH local exhaust ventilation
Handling of flammable solvents on workbench WITHOUT local exhaust ventilation

Handling of flammable solvents on fume bench
Bottle of flammable gas

Outlet for flammable gas at the lab
5.3 Flammable gases

Gas cylinders containing flammable gases MUST NOT be stored in the laboratory.

Exception for gas cylinders of maximum 10 L for temporary use. Pay attention to the EX-zone. No electrical devices in the EX-zone, exception is EX-classified equipment.

Temporary use means only during a specific day and never over-night or weekends.

Cylinders must be kept in the gas cabinet when not in use. The cabinets must be clearly marked with symbols denoting EX-zone, flammability and gas cylinders.

Acetylene gas cylinders should be equipped with regulators to prevent back flow in the pipes or in the gas cylinder. Pressure in the regulator should not exceed 1.5 bar. Self-testing of the setup, including leak-testing, should be done twice per year and documented. Safeguard should be checked by a qualified person every other year and documented. Fire-proof gloves should be located in the vicinity of the acetylene gas cylinder in case of fire. Acetylene gas has a garlic-like odor.

Hydrogen gas is highly flammable. Hydrogen gas is 15 times lighter than air, odorless and burns with a clear flame. The main risks when working with it are leakage, fire and explosion.
<table>
<thead>
<tr>
<th>Flammable gases must be marked with these labels.</th>
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<tbody>
<tr>
<td>Cabinets containing flammable gases must be marked with these labels.</td>
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</tbody>
</table>
5.4. Toxics

Numerous chemicals have a toxic effect on the human body. Therefore, every substance should be treated as though it were toxic. The greatest possible care and cleanliness should be observed during laboratory work.

Carcinogenic substances

Regulations concerning the handling of carcinogenic substances have been issued by the Work Environment Office (arbetsmiljöenheter) a part of the Buildings Office (LU Byggnad). Carcinogenic substances are divided into groups.

Substances for which permission is required

- Group A chemicals are listed here
- Group B chemicals are listed here

Substances for which no permission is required, but follows exposure limit values according to AFS 2011:18, where the full list is available.

- Carcinogenic substances are denoted C.
- Substances easily absorbed through skin are denoted H.
- Substances that might require a medical examination prior use are denoted M.
- Sensitizing substances are denoted S.
- Substances posing a danger to reproduction are denoted R.

Allergenic substances

Chromium, nickel, cobalt, mercury and their salts, formalin, certain types of plastic, paint, and film, especially epoxy, can cause an allergic reaction, usually in the form of eczema. Be careful and observe good hand hygiene. Allergenic substances are denoted with an S in the ‘Occupational exposure limit values list’ (AFS 2011:18).

Narcotic substances

There are special requirements concerning application for or permission to use certain substances, which may be used to manufacture narcotics. The list is available at Läkemedelsverkets webpage.

Depending on toxicity, should toxic material be marked with one or both of these labels.

Cupboards containing toxic material should be marked with this label.
5.5. Toxic gases

Corrosive substances or substances which may impede respiration should be obtained in cylinders small enough to be used within a fume hood. Such gas cylinders should be clearly marked with skull and crossbones.

Poison gas may not be stored together with flammable gas.

<table>
<thead>
<tr>
<th><img src="image1.png" alt="Label" /></th>
<th><img src="image2.png" alt="Label" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxic gases should be marked with these two labels</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><img src="image3.png" alt="Label" /></th>
<th><img src="image4.png" alt="Label" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupboards and storage rooms containing toxic gases should be marked with these labels</td>
<td></td>
</tr>
</tbody>
</table>
5.6. Corrosives

Chlorosulfonic acid, fuming sulfuric acid, concentrated sulphuric acid, concentrated nitric acid, concentrated hydrochloric acid, hydrofluoric acid, strong alkalis, and bromine, etc. should be handled with the greatest care. Remember that perchloric acid is explosive when it comes in contact with organic materials. Such chemicals should not be stored on high shelves, nor transported or stored permanently in beakers or flasks.

Bottles containing such chemicals are best transported in plastic buckets or similar containers. Glass vessels that contain bromine can become brittle and should therefore be handled especially carefully. When working with corrosive chemicals, protective goggles should be worn. When handling large amounts of corrosive substances or when tapping from large bottles or diluting acids or alkalis, protection for the entire face should be used.

The alkali metals (primarily lithium, sodium, and potassium) should be stored in paraffin or kerosene. Protective gloves should always be worn when working with alkali metals.

Note that acids that produce corrosive gases/fumes e.g. perchloric acid, aqua regis and concentrated hydrochloric acid must only be handled in special, flushable fume hoods. These fume hoods are available in building 5, floor -1, room 074A. Contact the Information desk at 046-222 83 49 for access and information.

Corrosive material should be marked with this label

Cupboards containing corrosives should be marked with this label
### 5.7. Oxidizing agents

Oxidizers, although not necessarily combustible in themselves, can yield oxygen and in so doing cause or contribute to the combustion of other materials. Organic peroxides are thermally unstable and may exude heat whilst undergoing exothermic autocatalytic decomposition. Additionally, organic peroxides may be liable to explosive decomposition, burn rapidly, be sensitive to impact or friction, react dangerously with other substances or cause damage to eyes.

Oxidizing chemicals should be stored separate from flammable liquids or other flammable chemicals.

---

- **Oxidizing material should be marked with this label**

- **Cupboards containing oxidizing material should be marked with this label**
5.8. Gases

Doors to room where gas cylinders are stored must be marked with a this sign. This sign is intended as guidance and a warning to fire fighters in the event of a fire.

Regulations also require that this sign be removed from the door when gas cylinders are no longer present in the room. Incorrect placement of such a sign may result in fire fighters avoiding extinguishing a fire in a room, due to the risk of explosion, when in fact no gas cylinders are being stored in that room.

Check that the correct gas cylinder with the correct valve or reduction valve is being used. Gas cylinders must only be coupled to a reduction valve labelled with the same gas as that stated on the gas cylinder itself. Note that only approved gas hoses may be used with gas cylinders.

Gas cylinders should be moved using gas cylinder carts. The pressure regulator should be removed before transport of the cylinder. The cylinders should be handled with care and not exposed to shock or impact. They should not be placed in a location where they will be exposed to high temperatures, nor where they may be easily knocked over. Gas cylinders should always be chained when stored (not around the valve) in such a way that they can be released easily and rapidly when necessary. Alternatively they should be kept in one of the wheeled racks designated for gas cylinders.

Building I: Only 20-liter gas tubes may be stored in the gas cabinets in Building I, as mandated by the Swedish Work Environment Authority. Because of the high elevation of the floors of the gas cabinets, there is too high risk of 50-liter gas tubes falling over when one is attempting to store them.

Collect as much information as possible about the gas you are going to use. Study the product safety information sheets carefully. If you have any further questions, please contact the gas supplier.

The Swedish Board for Occupational Health and Safety Statute Book (AFS, Arbetarstyrelsens författningssamling) can also be of use:

- AFS 1997:07 'Gases' (Gaser)
- AFS 2001:04 'Gas cylinders' (Gasflaskor)

Swedish Civil Contingencies Agency (MSB, Myndigheten för samhällsskydd och beredskap):

- SÄIFS 1998:7/2000:3 'Flammable gas in loose containers' (Brandfarlig gas i lös behållare)
- SÄIFS 1997:3 'Permission to handle flammable goods' (Tillstånd till hantering av brandfarlig vara)
- SRVFS 2004:7 'Handling of flammable gases and liquids in high-explosion-risk environments'.
<table>
<thead>
<tr>
<th>Icon</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Compressed gases label" /></td>
<td>Compressed gases should be marked with this label.</td>
</tr>
<tr>
<td><img src="image" alt="Cupboards label" /></td>
<td>Cupboards and rooms containing compressed gases should be marked with this label.</td>
</tr>
</tbody>
</table>
5.9. Liquid Nitrogen and Pressurised Oxygen

Liquid nitrogen

Never use an elevator with a container with liquid nitrogen. If the elevator becomes stuck there is a risk of asphyxiation. Use the sign “Transport of liquid nitrogen! Do not enter the elevator!” during transport in elevators.

1 l of liquid nitrogen is equivalent to 800 l of nitrogen gas.

Example: In an elevator sized 2x2x2 m (8m³) it is enough to spill 0.35 l liquid nitrogen for the oxygen level to decrease to a dangerously low level (<18 %).

In the room for dispensing liquid nitrogen there is an oxygen sensor which gives an alarm in the form of a flashing red light when the oxygen level is too low. In the event of an alarm, leave this area immediately! It is not allowed to fill liquid nitrogen if the fan system is out of order.

Two persons should be present when dispensing liquid nitrogen.

<table>
<thead>
<tr>
<th><img src="image" alt="Liquid nitrogen should be marked with this label." /></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cupboards and rooms containing liquid nitrogen should be marked with this label." /></td>
</tr>
</tbody>
</table>
Pressurized oxygen

Pressurized oxygen can cause an explosion in the presence of oil or other lubricants. When exposed to a spark or an open flame, pure oxygen can significantly speed up the combustion of porous materials such as clothing.

<table>
<thead>
<tr>
<th><img src="image1.png" alt="Label" /></th>
<th><img src="image2.png" alt="Label" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressed oxygen should be marked with these labels.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><img src="image3.png" alt="Label" /></th>
<th><img src="image4.png" alt="Label" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupboards and storage rooms containing compressed oxygen should be marked with these labels.</td>
<td></td>
</tr>
</tbody>
</table>
5.10. Radioactive substances

Work with radioactive substances and X-ray equipment can only be carried out after obtaining special permission from the Swedish Radiation Safety Authority (Strålsäkerhetsmyndigheten, SSM). The University's radiation safety physicist is available for information, tel.: 046 - 222 01 93.

Radioactive material should be marked with this label and it should state what radioisotope and activity at the date marked.

Cupboards and rooms containing radioactive material should be marked with this label.
5.11. Biological substances

There are special rules regarding work with biological substances (BS), genetically modified organisms (GMO) and genetically modified microorganisms (GMM) with application or permission required for certain work. For more information, refer to the Legislation page or contact the Buildings Unit, LU Byggnad, on tel: 046 - 222 70 26.

Biohazard material should be marked with this label and a describing text.

Cupboards and rooms containing biohazards should be marked with this label.
5.12. Laboratory animals

People working with laboratory animals run the risk of becoming allergic to animals used in experiments, particularly those with fur. Contact with skin particles from shaving the animals and with urine and feces while cleaning cages primarily lead to increased sensitivity.

Use protective gloves and dust-screening breathing protection while carrying out such tasks.

In addition, the AFS 1990:11 ‘Work with laboratory animals’ (Arbete med försöksdjur) are to be followed.
6. First aid and accidents

What everyone should know

Where the first aid kit is located, what it contains and how to administer first aid in case of an accident.

How to call the ambulance and fire services.

First aid for severely injured or unconscious casualties

Check the casualty using the D-ABC method.

D: Danger
Assess your own safety and that of the casualty.

A: Airway
Open the airway. Is the casualty breathing? If not, begin artificial respiration immediately using the mouth-to-mouth method.

B: Bleeding
Stop any bleeding by applying pressure and raising the injured part of the body.

C: Circulatory Shock
Prevent shock by carrying out the above steps. Shock is a life-threatening condition.

When you have checked for the above, place the person in the recovery position (semi-prone position). Monitor the person as changes in condition may occur quickly.

Call the ambulance service if this has not already been done. Dial 112 (if you are calling from an internal phone, dial 0 in order to secure an external line) and ask for an ambulance.

The casualty should be accompanied to the hospital by someone who can explain the circumstances of the accident.
Defibrillators

HeartSine Samaritan 500P defibrillators have been bought and installed at Kemicentrum.

Locate your nearest defibrillator on the map.

Everyone should be able to use the defibrillator, no special training is required. The defibrillator has clear pictures showing you how to put the pads and it gives you instructions (in English) regarding if a shock is recommended and/or if you should do cardiopulmonary resuscitation (CPR).

The SAM 500P also gives you additional instructions regarding the CPR, for example “press harder”, “press slower”, “press faster” and the desirable “good compressions”.

Below you find a video showing you how the defibrillator should be used. This is an American video, in Sweden the emergency number is 112.
6.1. Hospital visits

If hospital care is needed, but transport by ambulance is not essential, then take a taxi or another vehicle immediately to the hospital, emergency department, Klinikgatan 15.

Someone should always accompany the injured person even if he or she is of the opinion that it is not necessary.
6.2. Burns

Heat burn

Burns are categorized in three classes.

<table>
<thead>
<tr>
<th>Degree</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree</td>
<td>Redness (erythema) of skin.</td>
</tr>
<tr>
<td>Second degree</td>
<td>Red with clear blisters. Blanches with pressure or Red-and-white with bloody blisters.</td>
</tr>
<tr>
<td>Third degree</td>
<td>Stiff and white/brown or black and charred.</td>
</tr>
</tbody>
</table>

In the case of a first or second degree burn rinse with plenty water for at least 30 minutes and seek medical advice if necessary. Prevent circulatory shock. Cover with sterile bandage. Do not remove clothing covering the burn.

In the case of a third degree burn, do not rinse with water. Call 112 and if possible cover the burned area with a clean and dry piece of fabric. Prevent circulatory shock. Do not remove clothing covering the burn.
Cold burn

- Dry ice (-78 °C)
- Liquid nitrogen (-196 °C)

Treat as heat burn

Chemical burn

- Acids - rinse with water for up to 6 hours
- Bases - rinse with water for up to 24 hours

Otherwise treat as heat burn.
Always seek medical advise in the case of:

First degree burns larger than 10% of the body.

Second and third degree burns.

Example of a first degree burn
6.3. Eye injuries

If you get chemicals in your eye:

Rinse with water for at least 15 minutes at an eye wash station. You might need help to keep your eyes open.

Seek medical advice.

For the transport bring an eyewash bottle and keep rinsing.

If you got a compound that contains silver ions in your eye, do not use saline solutions to rinse with.

Eyewash station

Start by pushing the yellow lever all the way back.

Use the eyewash bottles during transport to hospital.
6.4. Poisoning/Corrosive injuries

Safety/product information sheets for individual chemicals should be available in the laboratories.
6.5. After an accident

Work incident

Incident at work or on the way to and from work that could have led to an accident or injury.

An incident report should be filled out and signed by the Department head (Prefekt) and the Safety representative (skyddsombud) and sent to Registrar (Registrar, hämtställe 31).

Incident report to be filled in (eng)

Incident report to be filled in (swe)

Responsible managers should follow this routine (sve)

All accidents and occupational injuries/incidents of a serious nature should be reported to the Labour Inspectorate immediately. A written report of what happened and the measures to be taken must be sent within three weeks. In cases where reporting is obviously neglected, the Labour Inspectorate may initiate legal proceedings.

Reporting injuries – EMPLOYEES

The following types of occupational injuries must be reported:

- work accidents
- accidents on the way to or from work
- occupational illnesses
- violence or abuse
- infectious diseases

Responsible managers should follow this routine (sve)


The employee’s injuries shall be reported and investigated by the employer, i.e. the head of department or equivalent. A report shall be made in consultation with the health and safety representative (skyddsombud) and usually with the injured person.

The head of department is obliged to report work injuries that an employee claims to have suffered, irrespective of whether the head of department considers that an occupational injury has occurred. The Swedish Social Insurance Agency (Försäkringskassan) decides whether an occupational injury has occurred.

The signed report shall be sent to Registrar (the Registrar), Hs 62. Human Resources in the central administration forwards the occupational injury report to Försäkringskassan.

Copies of the report shall be distributed immediately:

- to the safety representative.
- to Johan Ohlin (health and safety coordinator at Kemicentrum).
- to the prefekt of the department.
- to your department’s own documentation.
Reporting injuries – STUDENTS/DOCTORAL STUDENTS

Personal injury reports shall be completed for students and doctoral students in the following cases:

- accidents
- accidents on the way to or from the University
- certain cases of infectious disease

Responsible managers should follow this routine (svenska)

Claim form, Personal injury students - Legal, Financial and Administrative Services Agency

Occupational injury report form in Swedish- The Swedish Social Insurance Agency

Both reports are to be signed by both the student and the University.

In signing the report, the University confirms both that the report applies to an individual covered by its insurance policy and, where possible, that the injury occurred during university hours or during direct travel between the place of residence and the site of study.

The signed report shall be sent to Registrator (the Registrar), Hs 62. Student Affairs then forwards the report to the Legal, Financial and Administrative Services Agency (Kammarkollegiet).

Copies of the report shall be distributed immediately:

to the safety representative.

to Johan Ohlin (health and safety coordinator at Kemicentrum).

to the prefekt of the department.

Save a copy of the report for your own documentation.

Accidents/incidents involving flammable material

If the handling of flammable material that needs a license results in an accident or incident it should be reported to the Swedish Civil Contingencies Agency (MBS). Any form below can be used, in the case of a major accident or incident the more comprehensive form should be used.

- MSB Accident report form (comprehensive)
- Räddningstjänsten Syd report form
7.1. Labeling of chemicals

Effective from January 20th 2009, a new system is implemented: CLP Classification, Labeling and Packaging. The CLP uses the Globally Harmonized System, GHS for labeling of chemicals. The previous Swedish regulation, KIFS 2005:7, will be completely replaced by 2015. In the meantime both systems will be in use. For more information about the system, please consult the website of UNECE. The regulation concerning labeling of chemicals for transport is also regulated by CLP, please consult the UNECE webpage for more information.

All chemicals that are stored should be marked accordingly, including round bottom flasks, vials etc. of chemicals synthesized in the laboratory. Chemicals currently in use do not need to be labeled.

<table>
<thead>
<tr>
<th>CLP</th>
<th>Hazard class</th>
<th>KIFS 2005:7</th>
<th>Hazard class</th>
</tr>
</thead>
</table>
| ![Corrosive](image1) | - Corrosive to metals, category 1  
- Skin corrosion, categories 1A,1B,1C  
- Serious eye damage, category 1 | ![Corrosive](image2) | -Corrosive |
| ![Environmental](image3) | Hazardous to the aquatic environment | ![Environmental](image4) | -Dangerous for the environment |
| ![Gases](image5) | Gases under pressure:  
- Compressed gases  
- Liquefied gases  
- Refrigerated liquefied gases  
- Dissolved gases | | No Classification |
| ![Toxic](image6) | - Acute toxicity (oral, dermal, inhalation), category 4  
- Skin irritation, category 2  
- Eye irritation, category 2  
- Skin sensitisation, category 1  
- Specific Target Organ Toxicity – Single exposure, category 3 | ![Toxic](image7) | -Harmful  
-Irritant |
| ![Explosive](image8) | - Unstable explosives  
- Explosives of Divisions 1.1, 1.2, 1.3, 1.4  
- Self reactive substances and mixtures, Types A,B  
- Organic peroxides, Types A,B | | -Explosive |
<table>
<thead>
<tr>
<th>Category</th>
<th>Hazard Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable gases, category 1</td>
<td>- Extremely flammable</td>
</tr>
<tr>
<td>Flammable aerosols, categories 1,2</td>
<td>- Highly flammable</td>
</tr>
<tr>
<td>Flammable liquids, categories 1,2,3</td>
<td></td>
</tr>
<tr>
<td>Flammable solids, categories 1,2</td>
<td></td>
</tr>
<tr>
<td>Self-reactive substances and mixtures, Types B,C,D,E,F</td>
<td></td>
</tr>
<tr>
<td>Pyrophoric liquids, category 1</td>
<td></td>
</tr>
<tr>
<td>Pyrophoric solids, category 1</td>
<td></td>
</tr>
<tr>
<td>Self-heating substances and mixtures, categories 1,2</td>
<td></td>
</tr>
<tr>
<td>Substances and mixtures, which in contact with water, emit flammable</td>
<td></td>
</tr>
<tr>
<td>gases, categories 1,2,3</td>
<td></td>
</tr>
<tr>
<td>Organic peroxides, Types B,C,D,E,F</td>
<td></td>
</tr>
<tr>
<td>Oxidizing gases, category 1</td>
<td>- Oxidizing</td>
</tr>
<tr>
<td>Oxidizing liquids, categories 1,2,3</td>
<td></td>
</tr>
<tr>
<td>Respiratory sensitization, category 1</td>
<td></td>
</tr>
<tr>
<td>Germ cell mutagenicity, categories 1A,1B,2</td>
<td>or</td>
</tr>
<tr>
<td>Carcinogenicity, categories 1A,1B,2</td>
<td></td>
</tr>
<tr>
<td>Reproductive toxicity, categories 1A,1B,2</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Single exposure, categories 1,2</td>
<td></td>
</tr>
<tr>
<td>Specific Target Organ Toxicity – Repeated exposure, categories 1,2</td>
<td></td>
</tr>
<tr>
<td>Aspiration Hazard, category 1</td>
<td></td>
</tr>
<tr>
<td>Acute toxicity (oral, dermal, inhalation), categories 1,2,3</td>
<td>- Very toxic</td>
</tr>
<tr>
<td></td>
<td>- Toxic</td>
</tr>
</tbody>
</table>
7.2. Prohibitory signs

These signs are regulated by [AFS 2008:13](#).

Prohibitory signs are round. Black symbol on a white background, red border and strike through. Examples are listed below.

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Forbidden to introduce an open flame" /></td>
<td>Forbidden to introduce an open flame</td>
</tr>
<tr>
<td><img src="#" alt="Smoking forbidden." /></td>
<td>Smoking forbidden.</td>
</tr>
<tr>
<td><img src="#" alt="Escape route - Keep clear." /></td>
<td>Escape route - Keep clear.</td>
</tr>
<tr>
<td><img src="#" alt="No labcoats in this area." /></td>
<td>No labcoats in this area.</td>
</tr>
</tbody>
</table>
7.3. Warning signs
These signs are regulated by AFS 2008:13 and AFS 2014:40.
Examples are listed below.

<table>
<thead>
<tr>
<th>Flammable material</th>
</tr>
</thead>
<tbody>
<tr>
<td>All laboratories and cupboards that contain flammable material should be marked with this sign.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gas Cylinders</th>
</tr>
</thead>
<tbody>
<tr>
<td>All laboratories that contain a gas cylinder should be marked with this sign</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potentially explosive atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work according to fire protection routines. Contact your fire protection responsible person for information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid Nitrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>All laboratories that contain liquid nitrogen should be marked with this sign</td>
</tr>
</tbody>
</table>

All cupboards containing chemicals should be marked with a warning sign representing the chemicals stored.

<table>
<thead>
<tr>
<th>Flammable</th>
<th>Toxic</th>
<th>Corrosive</th>
<th>Oxidizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive</td>
<td>Radioactive substances</td>
<td>Biohazard</td>
<td></td>
</tr>
</tbody>
</table>

Other warning signs regarding chemical risks.

<table>
<thead>
<tr>
<th>Environmentally damaging</th>
<th>Health hazard</th>
<th>Irritant</th>
</tr>
</thead>
</table>
Other warning signs present at Kemicentrum.

<table>
<thead>
<tr>
<th>EX</th>
<th>High voltage</th>
<th>Laser radiation</th>
<th>Biohazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;EX - Zone&quot; Explosive atmosphere can occur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong magnetic field</td>
<td>Danger Additional text</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 7.4. Mandatory signs

These signs are regulated by [AFS 2008:13](https://www.lunds universitet.se). Mandatory signs are round. White symbol on a blue background. Usually accompanied by an explanatory text. Examples are listed below.

<table>
<thead>
<tr>
<th>Sign</th>
<th>Protection Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Eye Protection" /></td>
<td>Eye protection must be worn</td>
<td>Ögonskydd måste användas</td>
</tr>
<tr>
<td><img src="image" alt="Hearing Protection" /></td>
<td>Hearing protection must be worn</td>
<td>Hörselskydd måste användas</td>
</tr>
<tr>
<td><img src="image" alt="Respiratory Protection" /></td>
<td>Respiratory protection must be worn</td>
<td>Andningsskydd måste användas vid denna arbetsplass</td>
</tr>
<tr>
<td><img src="image" alt="Face Protection" /></td>
<td>Face protection must be worn</td>
<td>Ansiktsskydd måste användas</td>
</tr>
</tbody>
</table>
Protective clothing must be worn

Fire door - Keep closed
### 7.5. Emergency signs

These signs are regulated by [AFS 2008:13](#).

Emergency signs are rectangular or square. White symbol on a green background.

Examples are listed below.

<table>
<thead>
<tr>
<th>Sign Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of an eye shower</td>
<td><img src="image1.png" alt="Eye Shower Sign" /></td>
</tr>
<tr>
<td>Location of first aid kit</td>
<td><img src="image2.png" alt="First Aid Kit Sign" /></td>
</tr>
<tr>
<td>Location of emergency shower</td>
<td><img src="image3.png" alt="Emergency Shower Sign" /></td>
</tr>
<tr>
<td>Show direction of escape route</td>
<td><img src="image4.png" alt="Escape Route Sign" /></td>
</tr>
</tbody>
</table>
Location of a defibrillator
7.6. Fire safety signs

Fire safety signs are rectangular or square. White symbol on a red background.

Examples are listed below:

<table>
<thead>
<tr>
<th>Location of fire extinguisher</th>
<th>Location of fire hose / hydrant</th>
<th>Location of button for evacuation alarm</th>
<th>Fire Equipment, other. Sometimes specified with text</th>
</tr>
</thead>
</table>
8. Waste Handling

Lund University and Kemicentrum strives to make as low impact on the environment as possible and at the same time keep our co-workers safe. By sorting waste in the right way we can do this. To encourage your work, all waste handling is free of charge.

Waste is handled by av Sysav Industri AB.

Waste management advisor

Per Malmquist at Sysav Kemi is the waste management advisor for Lund University. Contact him for advice regarding transportation of hazardous waste. See right column.

CONTACT

Per Malmquist
Waste management advisor, Kemiavdelningen SYSAV.

E-post: per.malmquist@sysav.se

Telefon: 040-635 19 02

Johan Ohlin
Arbetsmiljösamordnare

E-post: johan.ohlin@kc.lu.se

Telefon: 046-222 31 11
8.1. Organic solvent waste

All organic solvent waste should be separated into:

Halogenated waste.

Non-Halogenated waste.

The organic solvent waste category does not cover ethers, see Chemical waste for ethers.

Oil is categorized as Chemical waste, see Chemical waste.

Use special plastic cans

Halogenated and non-halogenated waste should be separated and collected in special 5 l plastic cans marked UN 3H1/X1.9/250/10/D/BAM 11872. These plastic cans are available free of charge at the janitors office, no other plastic cans may to be used.

The solvent waste may not contain more than 10% water.

Maximum filling of the plastic can is 90% of total capacity.

The solvent waste may not contain toxic metals.

The solvent waste may not contain strong acids or bases.

The solvent waste cans must be kept in a ventilated area at the division with a tray underneath that can collect the whole volume of the container. A maximum of two cans can be kept in a fume hood before it influence the ventilation negatively.

Markings of plastic cans

Note that the labels for Non-halogenated and Halogenated waste are different.

Non-halogenated solvent waste cans should be marked with this label

![Non-halogenated solvent waste can label]

Halogenated/Chlorinated solvent waste cans should be marked with this label

![Halogenated/Chlorinated solvent waste can label]
These labels should also be attached to all waste cans

![Label 1](image1.png)  ![Label 2](image2.png)

Attach the labels properly, i.e. **correct orientation according to above picture** and fully visible.

Mark the plastic can with name, division and the date when it started to be filled!

**Disposal of plastic cans**

When the plastic can is full or has been kept for a maximum of 3 months, it has to be disposed of.

**Make sure the cap is firmly tightened until no “clicking” can be heard.**

Check if the plastic can is deformed. If this occurs report it as an incident and transfer the content to a new can.

Transport the plastic can to the janitors office. Follow the instructions for transporting chemicals strictly. The room for solvent waste is locked and can only be opened by authorized personnel during office hours. Sign up your disposed waste in the binder “Lösningsmedelsavfall”.

Each division is responsible for the risk assessment of the waste collected.
8.2. Chemical waste

Aqueous and Ether waste

Aqueous and ether waste should be stored at your division until collected by SYSAV. See “To schedule a collection” below.

Environmentally friendly and non-health hazardous substances

Environmentally friendly and non-health hazardous substances, including water-based solvents including inorganic acids and bases.

Provided that you have the proper knowledge of how to do, they should be neutralized and poured into the wastewater and sewage system. If you do not have the proper knowledge, schedule a pick-up by SYSAV.

Other chemical waste

All other chemical waste is stored at the division/centre until collected by SYSAV.

Packing of waste chemicals

The waste will be packed for transportation by waste handling company SYSAV.

The waste should be stored at your division until collected by SYSAV. See “To schedule a collection” below

To schedule a collection of waste

Fill in the form for pick up of chemical waste. Available in Swedish and English.

Blankett för hämtning av kemiskt avfall och lågradioaktivt avfall

Removal of chemical waste and low-level radioactive waste

and e-mail it to SYSAV. Cans and bottles without label should be marked with this type of label, SYSAV will contact you and schedule a pickup. On the day of the pick-up, two copies of the form should be signed by you and the person collecting the chemicals. Your copy should be stored at the division/centre for future reference.
8.3. Radioactive waste

Low-level radioactive waste

This category includes:

- Low-level radioactive waste, < 5 uSv/h, < 1 ALimin, < 50 kBq.
- Low-level radioactive scintillation vials. (Non radioactive scintillation vials are chemical waste)

If the waste is sharp it should be put in a sharps container.

Should be put in the white cardboard boxed marked “Smittförande/skärande/stickande” (infectious/sharp). and should be packed according to content (e.g. sharp in plastic container)

The boxes can be picked up at the janitors office.

When the box is full, the plastic bag shall be sealed with a cable-ties or tape and the box should be closed up and seal with tape.

Your name and contact info should be filled in on the top of the box.

To schedule a collection of waste

Fill in the form for "Blankett för hämtning av kemiskt avfall och lågradioaktivt avfall", and e-mail it to SYSAV.

SYSAV will contact you and schedule a pickup. On the day of the pick-up, two copies of the form should be signed by you and the person collecting the chemicals. Your copy should be stored at the division/centre for future reference.
Medium and highly radioactive waste

This waste material should remain at the division until agreement have been made with radiation safety physicist Hanna Holstein.

Any questions regarding radiation waste and safety should be directed to safety physicist Hanna Holstein.

More information available here.
8.4. Infectious waste

This category includes:

- Blood/Urine test tubes
- Cell culture waste, untreated
- GMM waste, untreated
- GMO plant waste, untreated

If the waste is sharp it should be put in a sharps container. When container is full dispose in cardboard box as described below.

The waste should be put in the white cardboard boxed marked “Smittförande/skärande/stickande” (infectious/sharp).

The boxes can be picked up at the janitors office.

When the box is full, the plastic bag shall be sealed with a cable-ties or tape and the box should be closed up and seal with tape.

Your name and contact info should be filled in on the top of the box. Underline the correct category for the waste.

Print out and fill in the Declaration of goods.

Bring the box to the janitors office and weigh it before putting it in the pick-up room.
8.5. Broken glass waste

Broken and disposable glass should be put in the brown cardboard box marked "Glasavfall" (Glass waste).

When the box is full, close it up and make sure no glass has punctured the box.

The glass waste box will be picked up at your local recycling station.
8.6. Sharp / Pointed waste

This category includes sharp / pointed waste e.g. disposable needles, scalpels etc.

The waste should be put in a sharps container.

If the waste is infectious and sharp/pointed then follow Chapter 8.4.

Pack the sharps container in brown cardboard box marked "Glasavfall".

The boxes can be picked up at the janitors office.

The glass waste box will be picked up at your local recycling station.
8.7. Other waste

All other waste is collected as Non hazardous waste are collected at the recycling stations at several places in the house or collected at the janitors office. See here for further details on the sorting.

Paper wastebaskets in offices and labs are not emptied by the janitors. This shall be done by the persons working in the area.

Collected at recycling stations at the local division

Combustable Garbage
Paper
Cardboard
Colored Glass Containers
Clear Glass Containers
Metal Containers
Batteries
Toner Cartridges

Collected at the janitors office

Electronics
Scrap metal
Light bulbs and Fluorescent tubes
Fridges and Freezers
Styrofoam
Wood
9. Plans of Action

Plan of Action for Power and/or Ventilation Failure

Plan of Action for Water Outage

Plan of Action for Emergency Evacuations

Crisis and catastrophe plan for Kemicentrum (in Swedish)
9.1. Plan of Action for Power and/or Ventilation Failure

Lund University Security Centre
phone number 046-22 20 700.

Power Failure

Loss of power will cause loss of ventilation. Loss of ventilation will cause evacuation alarm.

It is vital to consider the possible consequences of a power outage when doing risk assessment for laboratory work. This includes consideration of measures that would have to be taken in the event of a power and ventilation failure.

During a power failure it is likely that the internet connection is interrupted.

Akademiska Hus is responsible for emergency backup lighting at Kemicentrum.

All magnetically secured fire doors will close upon loss of electricity. When the fire doors close it can be difficult to orient oneself in the facilities.

Ventilation Failure

During an electrical failure, ventilation in fume hoods, fume benches, chemical cabinets and chemical storage areas will cease to function. There is a risk for spreading of health-hazardous and/or flammable fumes during ventilation failure.

Close all containers with flammable material, shut down heating in the laboratory set-up and then close the hatch.

If an experiment could become dangerous during a power/ventilation failure then remedies for such a possibility should be considered already in the planning stage.

Close all doors to labs.

Elevator stoppage

During a power failure, elevators are halted with the consequence that people and goods can be trapped therein. In the event of a power failure, Akademiska Hus is responsible for investigating and, when necessary, evacuating the elevators. Alarm buttons are found in all elevators.

If a power failure occurs outside of normal working hours

Lund University Security Centre will contact key personnel at Kemicentrum.
9.2. Plan of Action for Water Outage

It is important in risk assessment to consider the consequences of sudden unplanned water outages and what measures would have to be taken in such an event.

Specially important operations are:

Distillation

Reflux boiling

Other experiments where there is a risk for fire or explosion in case of an outage of chilling water.
9.3. Plan of Action for Emergency Evacuations

When the evacuation alarm bells ring the following steps should be taken

If there is an alarm you must always evacuate the building unless you are informed otherwise.

You shall promptly interrupt your work in a safe and secure manner.

Work being carried out in a ventilation hood shall be interrupted in such a way that safety will be maintained even if the work materials will remain standing for a more extended time period. Then the hood shall be closed.

In each room, check that no persons are left behind. Then close the door.

Bring your coat, keys and mobile phone if it possible without delaying the evacuation.

All personnel shall go to the reassembly point.

Nobody may re-enter an evacuated building before Lund University security staff gives the “all clear” signal.

A list of personnel and telephone numbers should be available as an aid in confirming that nobody is left in the building. Divisions should compile such lists on an ongoing basis.

In the event of an acute accident involving fire and smoke

The first priority before doing anything else is to save any persons who are injured or otherwise directly threatened by the accident.

If the evacuation alarm has not been activated, warn personnel in the vicinity by manually activating the alarm with one of the alarm buttons positioned nearby. Then telephone SOS alarm, Tel. (0)-112, to verify that the alarm has been transmitted properly to them.

In the event of a limited fire, measures to extinguish should be initiated if this can be done without risk of personal injury.

Close all interior doors to hinder the spread of fire and smoke! Make sure no persons are left behind.

After taking the above measures, quickly evacuate the rest of the floor.

If the usual evacuation route is blocked by smoke or fire, take an alternative route.

Meet the Fire Department when they arrive. Leave clear indications as to which building and which floor(s) were evacuated and in which department the alarm was activated, as well as the reason for activating the alarm.
10. Legislation

The general rules for work at Kemicentrum is regulated by several different laws and legislations. For a selection of different legislations see below.

Swedish Environmental Code, SFS 1998:808 (Miljöbalken)

Ordinance on chemical products and biotechnical organisms, SFS 2008:245 (Förordningen om kemiska produkter och biotekniska organismer)

Flammable and explosive substances act, SFS 2010:1011 (Lagen om brandfarliga och explosiva varor)

Work environment act, SFS 1977:1160 (Arbetsmiljöförordningen)

Radiation protection act, SFS 1988:220 (Strålskyddslagen)

Flammable gas in loose container, SÄIFS 1998:7 (Brandfarlig gas i lös behållare)

Permission to handle flammable goods, SÄIFS 1995:3 (Tillstånd till hantering av brandfarlig vara)

Handling of hydrogen peroxide, SÄIFS 1999:2 (Hantering av väteperoxid)

Handling of flammable gases and liquids in high-explosion-risk environment, SRVFS 2004:7 (Hantering av brandfarliga gaser och vätskor)

Occupational exposure limits, AFS 2011:18 (Hygieniska gränsvärden)

Work environment risks associated with chemical work, AFS 2011:19 (Kemiska arbetsmiljörisker)

Gases, AFS 1997:7 (Gaser)

Work environmental risks associated with microbiology, AFS 2012:07 (Mikrobiologiska arbetsmiljörisker - smitta, toxinpåverkan, överkänslighet)

Closed use of genetically modified microorganisms, AFS 2011:02 (Innesluten användning av genetiskt modifierade mikroorganismer)
11. Organization

Lund University has a central Safety Committee and 14 main work environment areas, of which Kemicentrum is one.

Kemicentrum comprises the following departments:

Department of Chemistry

Department of Chemical Engineering

Department of Food Technology in which also Food Engineering is included

From the point of view of safety in the working environment, the Department of Chemical Engineering and the divisions within the Departments of Food Technology and Food Engineering and Chemistry are separate work environment areas. In the case of LTH (the Lund Institute of Technology) teaching premises and a number of laboratories are included in these work environment areas. In the case of the Faculty of Science, teaching premises in building I constitute a separate work environment area (Division for Undergraduate Teaching in Chemistry).

A division is thus normally a work environment area in which the head of division is responsible for the working environment. Each division also has a safety representative, and deputy, who represent the employees and students, and whose task is to exert an influence on working conditions so as to improve the working environment. The employer or head of division is, however, always responsible for the working environment. Each division also has a person responsible for inflammable materials and a fire safety representative.

General aspects concerned with the working environment and the external environment are dealt with by the Committee for Health, Environment and Safety (HMS Committee) for Kemicentrum.

Kemicentrum also has a principal safety officer (and deputy) whose task is to coordinate the work of the safety representatives and to represent them in matters of common interest.

For further information, please refer to:

Lund University Safety Committee

HMS Committee

Safety representatives

Persons responsible for inflammable materials
# 12. Reassembly points

![Evacuation plan](image)

<table>
<thead>
<tr>
<th>Building I west:</th>
<th>Building I east:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS</td>
<td>Administration</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Chemical Physics</td>
</tr>
<tr>
<td>Students and teaching staff in the lecture halls and course laboratory</td>
<td>Students and teaching staff in the Lecture halls and course laboratories</td>
</tr>
<tr>
<td>Undergraduate students in Chemistry</td>
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<tr>
<td>NMR- center</td>
<td></td>
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<tr>
<td>Library</td>
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<tr>
<td>Building III:</td>
<td>Building II:</td>
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<td>-------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Applied Microbiology</td>
<td>Applied Nutrition and Food Chemistry</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>Biochemistry and Structural Biology</td>
</tr>
<tr>
<td>Caretakers</td>
<td>Biophysical Chemistry</td>
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<tr>
<td>Chemical Engineering</td>
<td>FFSC</td>
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<tr>
<td>Media-Tryck</td>
<td>Pure and Applied Biochemistry</td>
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<tr>
<td>Physical Chemistry</td>
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<tr>
<td>Service group</td>
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<tr>
<td>Theoretical Chemistry</td>
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<table>
<thead>
<tr>
<th>Building V:</th>
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</thead>
<tbody>
<tr>
<td>The hall</td>
</tr>
<tr>
<td>Biotechnology (Course lab)</td>
</tr>
<tr>
<td>Electron Microscopy</td>
</tr>
<tr>
<td>Food Technology, Engineering and Nutrition</td>
</tr>
</tbody>
</table>
13. Bibliography


