

## **IMPORTANT TELEPHONE NUMBERS:**

### **EMERGENCY**

### **SPEED DIAL**

**SOS**

**0 - 112**

**Inform the telephone operator about the nature of the emergency.**

**Give address and nearest building entrance for acute emergency situations!**

**Always meet the fire and rescue service to give helpful information and to lead the way to the emergency site!**

In case of electrical or  
telephone outage inform  
Securitas

046 - 222 07 00

## **OTHER PHONE NUMBERS**

Securitas (Security)

046 - 222 07 00

Akademiska Hus (Maintenance)

**Fault reporting, daytime:**

Uno Nilsson 046 - 31 14 61

Thomas Hallqvist 046 - 31 14 59

Anders Ringström 046 - 31 14 52

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 tel: **046 - 31 13 10.**

In case of no answer,  
call SOS alarm on **0 - 112.**

All none-emergency faults should be reported via  
KC: s Homepage <http://www.kc.lu.se>

Fire and Rescue Service South 046 - 540 46 00; for acute cases, see above

Poisons information 08 - 33 12 31; for acute cases, see above

Hospital 046 - 17 10 00

Industrial Health Service 046 - 222 32 80

Safety Representative Ulla Jeppsson Wistrand 046 - 222 97 39

Switchboard 046 - 222 00 00

## **Crisis and Catastrophe Plan for the Chemical Center (Kemicentrum)**

This plan has been devised to enhance our ability to react should a serious crisis or catastrophic situation arise in the Chemical Center (Kemicentrum). Such a situation results when personnel have suffered serious injury or when significant material damage has occurred. The plan also covers situations in which a crisis or catastrophe is judged to have a significant chance of occurring imminently.

The plan consists of the following parts:

1. Posters displaying critical telephone numbers and instructions concerning emergency situations, for personnel. These posters should be placed with good visibility in all departments, possibly adjacent to the posted evacuation plans.
2. Instructions to the Chemical Center's crisis group in the event of crisis but also in the event of smaller accidents.
3. Instructions on handling cases of accident and death at the Chemical Center

Note that the fire and rescue service and Securitas have access to all of the Chemical Center's pass keys.

In case of accident, it is vital to be able to rapidly seek assistance and come in contact with the right people. **Everybody can take the following steps already now:**

- √ Enter the number to Securitas, 046 - 222 07 00, along with other critical numbers, in your mobile telephone.
- √ Create a post in your mobile telephone called ICE and note there the telephone numbers of your next-of-kin. ICE stands for "in case of emergency". This will allow you to rapidly contact your next-of-kin if you become sick or suffer an accident.

This plan has been established by the Chemical Center's Executive Board (Husstyrelse).

## Emergency telephone numbers

<b>Securitas Jour (Help desk)</b>	<b>046-222 07 00</b>
<b>Ambulance/Police/Fire Department</b>	<b>112</b>
<b>Akademiska Hus Jour (Maintenance)</b>	<b>046-31 13 10</b>
<b>Olov Sterner (Head of Department)</b>	<b>046- 222 82 13</b>

### 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. Finally, contact Olov Sterner 046-222 82 13. If you are unable to reach Olov, contact Eva Qvarnström (046-222 81 86 or 070 -952 59 91 or Securitas instead.**

**If you summon an ambulance, the fire department or the police, inform Information (046-222 83 49) of the entrance to which the emergency personnel should be directed.**

Address:

Entrance:

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The Chemical Center's Strategic Workplace Environment Plan (systematiska arbetsmiljöarbete, SAM) can be found on the Chemical Center's (Kemikentrum) homepage: <http://www.kc.lu.se/>

## I INTRODUCTION

The safety regulations in this booklet (general regulations) apply to the Center for Chemistry and Chemical Engineering (Kemicentrum) as a whole. Safety regulations, which are common to all institutions/departments, are dealt with. For more detailed regulations, the reader is referred to the individual institutions/departments, as each of these has been instructed – when deemed necessary – to compile **special safety regulations** for its own particular field.

Literature concerning safety issues of relevance to chemical laboratory work is located on an allocated shelf in the Center for Chemistry and Chemical Engineering's central library, and should, if necessary, also be available in the institutional/departmental libraries.

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

Each person who is working at the Center for Chemistry and Chemical Engineering (KC, Kemicentrum) shall:

- carefully study and follow both the **general regulations** found in this booklet, and the relevant **special regulations** for each individual department
- be aware of the safety committee (skyddsorganisationen) at KC and know which person or persons in the department are responsible for the working environment and who is the local safety representative (skyddsombud), responsible for inflammable materials (föreståndare för brandfarlig vara) and fire safety representative (brandskyddsombud).

**Information concerning this must be available in all departments.**

## II GENERAL WORK REGULATIONS

### General rules

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.

Personal protection

Wear a protective coat (cotton) in the laboratory at all times. Also, use protective eyewear in the laboratory unless this is obviously unnecessary. 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 balsam). Do not taste the chemicals. Do not use your mouth for pipetting. Avoid skin contact with chemicals.

Never carry out hazardous work alone. This is particularly important outside of normal working hours. The person in charge in the lab, in consultation with the safety representative, decides what constitutes a risk.

Workstation

Keep your workstation free from chemicals and equipment that are not currently being used.

The person responsible should deal with spills immediately. Cleaning staff only undertakes standard cleaning duties.

Specific regulations for disposal of hazardous waste have been established for Lund University (see section IV). 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 labelled in such a manner that the person responsible for the experiment can be reached by telephone.

Workstation, continued

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

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 metres.

Other

Before starting an experiment, always check in the correct reference literature for any risks which could arise.

**See chapter XVI:  
Plan of action for  
power outage, water outage  
and emergency evacuations**

**A risk analysis** must always be carried out before starting a new experiment. Risk analysis 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 analysis one should even consider what would happen if a power outage, water outage or evacuation were to occur during the experiment and what measures would have to be taken as a result. Risk analysis forms are available on the Lund University website: Arbetsmiljö, Miljö och Säkerhet (Work Environment and Safety).

## 1. Ventilation and ventilated work stations

### **Regulations for improving the safety of work involving fume hoods and fume benches.**

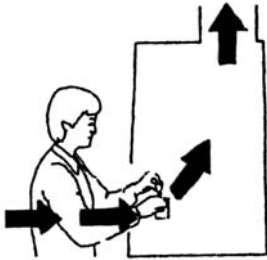
Work using fume hoods and fume benches is affected by the surroundings and by the individual work method as well as by the design of the supply and extraction air systems. **It is easy to disrupt the function of the fume hood/fume bench by using incorrect work methods, resulting in reduced safety.**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

#### **General rules**

- \* Doors in the vicinity of a fume hood should be kept shut when reactions are being carried out there.
- \* Avoid walking past a fume hood in which a reaction is being carried out.
- \* Lab coats and coat sleeves should be kept fastened.
- \* Carry out work using slow arm movements.
- \* Acutely poisonous substances may not be handled in a fume hood which lacks an audible/visible alarm for low airflow. The alarm must be in function!  
Working alone is not permitted when acutely poisonous substances are handled. A personal alarm which warns when limit values are exceeded should be used.
- \* Perchloric acid may not be handled in normal fume hoods or on any fume benches.
- \* Specially designed fume hoods with provisions for rinsing/flushing are found in a lab in the nutrition hall, Building 5, Floor -1, Room 074a.
- \* During electrical or ventilation outages, fume hoods should be closed.

## 1. Ventilation and ventilated work stations, continued

### Specific rules

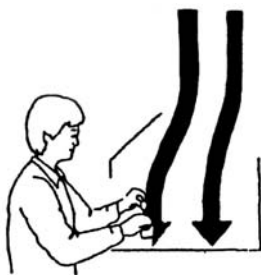


Air flow in a fume hood

### Fume hood

- \* **Work with the screen in the safety position, i.e. with the max. normal 30 cm screen opening.**
- \* 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.
- \* The fume hood's screen should be closed when work is not being carried out there.
- \* Airflow rate in the screen opening should be a *minimum* of 0.5 m/s.

### Fume benches



Air flow in a fume benches

- \* **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.

1. Ventilation and ventilated work stations, continued

Note that the fume hood's front screen is not suitable as protection when there may be a risk of explosion. In this event use special screens made of a material such as shatterproof plastic.

**Chemicals should not be stored in a fume hood when it is being used for work. Shelves in the fume hood reduce the safety function.**

Fume hoods and fume benches should have controls/alarm functions which warn when the extraction airflow rate is too low. Find out how the alarm works if this is not stated in the user instructions.

**Save energy:**

Always close the fume hood's screen when no work is being carried out there.

If the fume hood is equipped with automated screen closing, check that it functions properly.

Turn off pressure flows in the fume hood/fume bench when it is not being used.

Local extraction

Place the extraction point as close to the source of contamination as possible.

Max. distance = diameter of the extraction tubing.

LAF fume benches

Open LAF fume benches are used for product protection (sterile work) and closed LAF fume benches are used for product and operator protection. If harmful substances are to be used on the LAF fume bench, it should be connected to the extraction system.

NB: If you only require personal protection, a fume hood/bench always provides the best protection.

2. Storage in refrigerator

No flammable substances may be stored in a standard refrigerator or freezer. Should fumes or explosive mixtures develop, these may be ignited by sparks from the light fixture, thermostat, or compressor. Use approved refrigerators/freezers for storing flammable substances. Information on appropriate refrigerators/freezers can be obtained from the Buildings Office (Byggnadsenheten).

3. Usage of drying chambers

Drying chambers must not be used for flammable substances as hazardous gases may be emitted by hazardous substances

#### 4. Transportation and storage of bottled chemicals

Transportation of bottled chemicals should be performed in a secure manner. Use a trolley with wheels (soft rubber) and fence to protect the goods during transport. For example, larger bottles can be moved upright in a plastic bucket or a similar container. Avoid using lifts with liquid chemicals.



Yellow sign with black triangle and text



#### **Observe the special rules pertaining when chemicals are stored in the same cabinet.**

Chemicals should be stored in ventilated chemical cabinets or in a chemical storeroom. See illustration. **Observe that there are separate signs for flammable versus poisonous materials.**

Flammable liquids should be kept in ventilated steel cabinets.

Toxic substances should be kept in a locked ventilated cupboard. Chemicals that are both flammable and poisonous should be stored together with other flammable chemicals.

Chemical storerooms and ventilated cupboards with flammable and poisonous chemicals should be clearly marked with the respective danger symbol:

A yellow sign with a flame within a triangle for flammable wares, and a yellow sign with skull and crossbones within a triangle for poisonous materials. Acids should be stored in ventilated acid-proof cabinets. Acids and bases should not be stored in the same cupboard, but placing acids and bases on separate shelves is acceptable if only a few bottles are involved. The storage of chemicals in cupboards in an evacuation area is forbidden.

#### 5. Electric hotplates and water and oil baths

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 net via a 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.

#### 6. Vacuum equipment

All glass equipment that is to be used in a vacuum should be designed for use in a vacuum, made from special durable glass and assembled with the greatest care. When working with vacuum equipment, protective goggles should be worn.

6. Vacuum equipment, continued

Special screens made from Plexiglas, for example, should be assembled around larger vacuum units. Dewar and thermos bottles are vacuum vessels.

7. Cold water hoses

Always fasten cold-water hoses with a hose clamp. Use a PVC hose for low water pressure and a reinforced hose for high pressure. During experiments in which there is risk of fire, explosion or other problems in the event of a cold water outage, the apparatus should be equipped with a flow sensor which immediately halts the water flow and electrical current supply when the water flow drops below a certain level. More information can be found on the Chemical Center's homepage and "Handlingsplan vid vattenavbrott" (also available in English).

8. Inspection, transportation, storage, etc. of gas cylinders

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 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 Bldg. 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.

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.

## Liquid nitrogen



Never use an elevator with a container filled with liquid nitrogen! If the elevator becomes stuck there is a risk of asphyxiation.

In the room for dispensing liquid nitrogen there is an oxygen sensor which gives an alarm in the form of a blinking red light when the oxygen level is too low.

**In the event of an alarm, leave this area immediately! It's not allowed to fill liquid nitrogen if the fun system is out of function!**

**1 l of liquid Nitrogen creates about 800 l gases.**

**Use the sign: "Transport of liquid Nitrogen! Do not enter the elevator!" during the transport.**

## Oxygen

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

## Flammable gases



Gas cylinders containing flammable gases should not be kept in the laboratory. They should be stored in specially approved (EI30) cabinets or rooms. Such cabinets or rooms should be clearly marked with symbols denoting flammability and gas cylinders. Cylinders of maximum 5 l may, however, be handled in the laboratory, though they should still be kept in a gas cabinet when not in use.

## - Acetylene gas



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.

Leaking acetylene gas smells of garlic.

## - Liquefied petroleum gas



LPG cylinders are filled with condensed gas and should not be laid down. The condensed gas may block safety valves and a risk of explosion may arise.

- Hydrogen gas



Highly flammable. Hydrogen gas is 15 times lighter than air, odourless and burns with a clear flame. The main risks when working with it are leakage, fire and explosion. Hydrogen gas is not toxic.



Doors to rooms where gas cylinders are stored must be marked with a sign with the text: '**Gasflaskor, förs i säkerhet vid brandfara.**' (Gas cylinders. Remove to safety in case of fire.) 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.

Information about gases

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 2002:03 'Gas cylinders' (Gasflaskor)  
AFS: 1997:10 'Laboratory work using chemicals', (Laboratoriarbete med kemikalier) § 11 and § 15

National Inspectorate of Explosives and Flammables (Sprängämnesinspektionen)/Fire and Rescue Service Statute Book (SÄIFS)

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'.

**Most signs can be ordered via the following address: <http://e-handel.pre.se/>**

### III PERSONAL PROTECTIVE EQUIPMENT

#### General rules

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 departmental 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.

#### Protective gloves

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.

## IV REGULATIONS CONCERNING WORK WITH HAZARDOUS SUBSTANCES

### General rules

- Always have appropriate chemicals at hand to render spills of toxic or corrosive substances harmless.
- Always store toxic substances in a secure manner. Unless otherwise proven, each and every chemical should be considered as toxic.
- Never use the mouth directly for pipetting, use a peléus bulbs or other suitable equipment.



Oxidizing



Poisonous



Corrosive



Health Hazard

### Examples of danger symbols



Very/Extremely Flammable  
Danger symbols for chemicals  
with flamepoint < 21°C

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 labelled in this way. Templates for labels for chemical waste are available at KC: s homepage ([www.kc.lu.se/kcintern/avfall.html](http://www.kc.lu.se/kcintern/avfall.html)). The label must be marked with a "Dangerous" symbol.

**Danger symbols on bottles or jars should have an orange colour.** Even test tubes, beakers, etc. which will be stored should be appropriately marked.

**NB!** See chapter XV concerning new regulation on classification, marking and packing of chemical substances and mixtures in the European Union applies as from the 20<sup>th</sup> of January 2009. During a transitional stage until 2015 both the old and the new regulation will be valid.

Only chemicals denoted R 11 (very flammable) and R 12 (extremely flammable) use this danger symbol.

Fluids with flamepoint > 21°C and < 100°C are also classified as flammable, but lack danger signs. The notation R 10 is appropriate for these substances. Notation and flamepoint are found sometimes on the label and always in the information sheet accompanying the product.

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

- A maximum of 10 l of flammable substances may be kept out for everyday use. KC recommends a maximum of 2.5 l.
- A maximum of 50 l of flammable substances may be stored in a lab, independent of lab size. The substances must be stored in a ventilated cabinet. If this amount is exceeded, the room must be fire safety approved.

General rules, continued

- Toxic substances must never be stored with flammable chemicals.
- Chemicals which are also flammable should be stored with other flammable materials.

**See chapter XVI:  
Plan of action for  
power outage, water outage  
and emergency evacuations**

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. Information regarding the above should be obtained **before** an experiment is carried out. **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 1997:10 Laboratory work using chemicals [Laboratorierbete med kemikalier]  
AFS 2000:04 Chemical working environment hazards. (Kemiska arbetsmiljörisker)  
AFS 2005:17 Occupational exposure limit (Hygieniska gränsvärden och åtgärder mot luftföroreningar).

Information on valid guidelines can be found in the Labour Inspectorate's "TRYCKSAKSKATALOG" (Catalogue of printed materials). This can be obtained free from the publication service, tel.: 08-730 97 00.

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 KC's library (also refer to section XII: Bibliography).

The following are some general rules and recommendations concerning work with hazardous substances. More detailed regulations will be issued if necessary by the departments concerned within the framework of the department's **Specific safety regulations.**

1. Carcinogenic substances

Regulations concerning the handling of carcinogenic substances have been issued by the Work Environment Office (arbetsmiljöenheten) which now forms part of the Buildings Office (byggnadsenhet).

1. Carcinogenic substances, continued

A list of the following:

- Substances for which permission is required, Groups A and B
- Carcinogenic substances, Group C
- Sensitising substances, Group D
- Substances posing a danger to reproduction, Group E is available under section X following exposure limitation values (Occupational exposure limit values, AFS 2005:17)

2. Highly corrosive substances



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.

**Note that perchloric acid must only be handled in special, flushable fume hoods.**

3. The alkali metals

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.

4. Poisons and toxic substances



Numerous chemicals have a toxic effect on the human body. Therefore, every substance should be treated as though it were toxic. Because of the risk of poisoning, eating in the laboratory is forbidden. For the same reason, the greatest possible care and cleanliness should be observed during all lab work.

5. Explosive mixtures and flammable substances



As a general rule, the smallest possible quantities of these substances should be stored in the laboratory. A maximum of 2.5 l of flammable substances should be available for daily use. Toxic substances must not be stored with flammable substances.

5. Explosive mixtures and flammable substances, continued



Solvents in quantities of over 2.5 l should not be stored in glass bottles, but in appropriate safety containers. Glass bottles containing solvents should not be placed directly on the floor. Solvents which dry over sodium, and therefore must be placed in glass vessels, should be handled with great care.

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

- Perchloric acid must only be handled in special, flushable fume cabinets.
- Picric acid, max. 5 kg per storeroom
- Hydrogen peroxide with a concentration of  $\geq 20\%$



Permitted storage volumes:

Max. 1 l if the concentration is  $\geq 80\%$

Max. 5 l if the concentration is  $\geq 60\%$  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%.

**Because of the risk of combustion or explosion, all work with flammable substances must be carried out with great care and always in a well-ventilated workplace.**

6. 'Narcotics' chemicals

There are special requirements concerning application for or permission to use certain substances, which may be used to manufacture narcotics. See list under section XI.

7. Radioactive substances



Work with radioactive substances and X-ray equipment can only be carried out after obtaining special permission from the State Radiation Safety Institute (Statens strålskyddsinstitut, SSI). The University's radiation safety physicist is available for information, tel.: 046 - 17 31 21.

8. 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 marked with an S in the 'Occupational exposure limit values list', see section X.

9. Biological substances (BS), genetically modified organisms (GMO) and genetically modified microorganisms (GMM)

There are special rules regarding work with BS, GMO and GMM with application or permission required for certain work. For more information, refer to section XIII, Legislation or contact the Buildings Unit on tel: 046 - 222 70 26.

10. 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 faeces while cleaning cages primarily lead to increased sensitivity.

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

In addition, the 'Generella föreskrifter för arbete med försöksdjur' (General regulations for work with laboratory animals) established by the rectorate and AFS 1990:11 'Work with laboratory animals' (Arbete med försöksdjur) are to be followed.

11. Hazardous waste



Hazardous waste must be handled in accordance with special regulations. Please refer to the following pages.

## HANDLING AND DISPOSAL OF HAZARDOUS WASTE (Non-conventional waste)

### Directions for the disposal of hazardous waste at Lund University from 2002-05-01

Hazardous waste (sharp waste, biological waste, infectious waste and radioactive waste), chemical waste and environmentally hazardous waste is defined as hazardous waste and is governed by special legislation and regulations. Hazardous waste is to be stored, packaged and labelled according to the instructions below, and a declaration of contents attached when necessary.

**NB: Hazardous waste will not be removed if it is not packaged and labelled correctly.**

#### PACKAGING:

- \* Only boxes marked **RISKAVFALL**, with volumes of 25 or 55 litres (**NB:** max weight 12.5 kg), or approved **UNMARKED** boxes may be used. Seal each box with adhesive tape.

#### LABELLING:

- \* Mark with a permanent felt marker, name and telephone number of the person responsible for packaging, department/division and cost centre.
- \* **RISK WASTE box type 1** is prelabelled **INFECTIOUS WASTE/SHARP WASTE** + symbols.
- \* **RISK WASTE box type 2** is prelabelled **RISK WASTE** and is intended for **BIOLOGICAL, SHARP** and **LOW-RADIOACTIVE** waste.
- \* **CHEMICAL WASTE** is to be packaged in **UNMARKED** boxes **WITHOUT** hazardous waste labelling.
- \* Attach a **DECLARATION OF CONTENTS** to **INFECTIOUS** and **LOW-RADIOACTIVE** waste.

R I S K   W A S T E		
SHARP WASTE	BIOLOGICAL WASTE	INFECTIOUS WASTE or INFECTIOUS/SHARP WASTE
<b>Cannulae, lancets, etc.</b> (non-infectious) <b>Pipette tips; Contaminated laboratory glassware</b> <b>Empty chemical bottles</b> <b>Low-radioactive sharp waste</b>	<b>Experimental animals</b> <b>Tissue from humans or animals</b> <b>Low-radioactive animal waste</b> <b>GMO animal waste</b> <b>NB: No <u>glass</u> or other waste.</b>	<b>Blood and urine test-tubes</b> <b>Cannulae, lancets, etc.</b> <b>Cell culture waste, untreated</b> <b>GMM waste, untreated</b> <b>GMO plant waste, untreated</b> <b>Low-radioactive, infectious waste</b>
<ul style="list-style-type: none"> <li>* Place the waste in a suitable sharps container.</li> <li>* When the sharps container is full, tape the lid in place.</li> <li>* Pack in RISK WASTE box type 2, in a plastic bag. Seal.</li> <li>* For sharp waste, mark the box with tape, SKÄRANDE-STICKANDE (Sharps)</li> <li>* For low-radioactive waste, affix such a label to the box and fill in and attach a declaration of contents.</li> </ul>	<ul style="list-style-type: none"> <li>* Place the waste in a plastic bag and tie up well.</li> <li>* Pack in RISK WASTE box type 2, with a plastic bag. Seal.</li> <li>* Mark the box with tape, BIOLOGISKT (Biological), and if necessary with a label declaring low-radioactive waste. Fill in and attach a declaration of contents.</li> </ul> <p><b>NB:</b> Biological waste must not be kept at room temperature for longer than 4 hours. Material for later disposal must be stored in a freezer.</p>	<ul style="list-style-type: none"> <li>* Place test-tubes, cannulas, etc. in a sharps container, tape on the lid.</li> <li>* Other waste is to be placed in a plastic bag and tied up well.</li> <li>* Pack in "RISK WASTE" box type 1, with a plastic bag. Seal.</li> <li>* <u>Underline the appropriate category</u>, and if necessary affix a label declaring low-radioactive waste.</li> <li>* <b>Infectious waste is to be stored in a refrigerator or freezer.</b></li> <li>* Fill in and attach a declaration of contents.</li> </ul>

Directions for the disposal of hazardous waste at Lund University from 2002-05-01

HAZARDOUS WASTE and RADIOACTIVE WASTE		
CHEMICAL WASTE	RADIOACTIVE WASTE	OTHER HAZARDOUS WASTE
<p><b>Health- and environmentally hazardous chemicals</b>  <b>Pharmaceutical waste</b> (which has been used in chemical research)  <b>Scintillation containers –note:</b>                      1. must not contain <math>\alpha</math>-emitting substances                      2. activity conc. &lt; 10 Bq/ml or &lt; 100 Bq/ml for <math>^3\text{H}</math> or <math>^{14}\text{C}</math></p>	<p><b>Low-radioactive waste</b>                      sharp, biological and infectious waste is to be treated as hazardous waste, according to each category.  <b>Low-radioactive scintillation containers and other low-radioactive waste</b> is treated as Risk waste  <b>Other scintillation containers</b> see chemical waste</p>	<p><b>Photographic chemicals</b>                      Spent film, developer and fixer solutions must be disposed of as chemical waste or be returned to an approved waste management company.</p>
<p>* Pack in an unmarked box with an absorbent, e.g. vermiculite, in a plastic bag, and seal well.</p> <p>* Scintillation containers: Affix a label declaring: <b>Kemiskt avfall, Vätskescintillationslösning</b> (Chem. Waste, Scint. Solution)</p> <p>* <b>For disposal</b> - Contact the University's waste deposit, tel: 046-22 271 25                      or submit the form "<b>Hämtning av kemiskt/farligt avfall</b>" (Collection of chemical/-hazardous waste) to the Div. of Buildings, mail stop 31</p>	<p>"<b>Low-radioactive waste</b>" means that the activity of each package may not exceed 1 ALImin.</p> <p>* Low-radioactive waste is to be labelled with special labels containing information on the radionuclide, activity and confirming that the surface dose rate is less than 5 <math>\mu\text{Sv/h}</math>. When necessary it is to be packaged and marked as SHARP, BIOLOGICAL, INFECTIOUS or INFECTIOUS/SHARP</p> <p>* Fill in and attach a declaration of contents.</p>	<p><b>Batteries; Fluorescent tubes and Mercury lamps</b>                      These are collected by LRF on the first Monday of every month.</p> <p><b>Equipment containing environmentally hazardous substances</b> (PCB, lead, mercury, sources of radiation, etc.)                      Contact the Div. of Buildings.</p> <p><b>Electronic waste (excluding IT equipment)</b>                      Collection to be requested via Uno Lindman, LRF, tel: 046-35 53 97</p>
<p><b>Thermometers containing mercury</b>  <b>Mercury electrodes</b>  <b>Mercury switches</b>  <b>Lead containers (empty, clean)</b>                      These are to be collected and disposed of as chemical waste. Contact the University's waste deposit, tel: 046-22 271 25</p>	<p><b>Moderate- and highly radioactive waste</b>                      This is to remain at the department or division until agreement has been reached with LU's radiation safety physicist regarding disposal, tel: 046-17 31 21.                      Affix a label containing information on the name of the radionuclide, the person responsible for the waste and the activity at the time of packaging.</p>	<p><b>IT- equipment</b>                      (Normally not regarded as hazardous waste)                      This kind of waste is collected by LRF on the first Monday of every month.</p>

**Boxes, plastic bags and tape** marked "Biologiskt" and "Skärande/stickande"; order from the Service Division.

**Labels** for low-radioactive waste and liquid scintillation waste can be ordered from the Service Division or downloaded from the Internet at the address given below. Labels are also available for radioactive waste which has been set aside to decay, "**Avklingning**".

Forms for the declaration of contents ("**Godsdeklaration**") and collection of chemical/hazardous waste ("**Hämtning av kemiskt/farligt avfall**") can be downloaded from: [www.lu.se/miljo](http://www.lu.se/miljo), under "**Avfall**".

**For further information, please contact:**

*Åsa Gustafson*, Occupational hygienist, Div. of Buildings

*Sven Ericson*, Research engineer, Div. of Building

*Christer Samuelsson*, Radiation protection physicist

*Elisabeth Gierow*, Environmental manager, Div. of Buildings

*Lars Paulsson*, Service Division

ext. 270 26 (Hazardous waste)

ext. 271 25 (Chemical waste)

ext. 731 21 (Radioactive waste)

ext. 270 88 (Other hazardous waste)

ext. 270 84 (Boxes, tape and labels)

## V WASTE HANDLING AT THE CENTER FOR CHEMISTRY AND CHEMICAL ENGINEERING

### Waste receptacles

Available at the caretaker's office.

### Hazardous waste (sharp, biological, infectious waste or infectious/ sharp):

Place in the storage close to the caretaker's office (by loading bay E).

Biological and infectious waste has to be kept in the freezer/refrigerator in the department and should be left to storage (by loading bay E) Tuesday afternoon. On Wednesday morning the hazardous waste is fetched by Region Skåne.

Please note!

- Plastic sacks shall be sealed with twist-strips or tape.
  - Cartons (boxes) shall be taped after the top flaps are closed.
  - A delivery note for the left cartons shall be filled in correctly and informatively.
- Forms are available at [www.Bygg.lu.se](http://www.Bygg.lu.se): "Blanketter och checklister – "Farligt avfall".

### Sorting of Refuse

Annexed to the caretaker's office is a large station for sorting of the following refuse:

- burnable refuse (container). Containers can also be found by entries B, D, F, G and between house II and V.
- clean wood (container)
- metal containers, metal foil
- copy machine toner cassettes
- batteries
- clear (non-coloured) glass
- coloured glass
- hard plastic (ketchup bottles, washing soap bottles, plastic pails, etc.)
- soft plastic (packaging material)
- cartons, cardboard boxes (carton press)
- paper recycling
- fluorescent lamp tubes
- filament lamps (light bulbs)
- electrical waste should be placed in the special container for used laboratory equipment.

### Such waste may not contain radioactive sources.

- computers, printers, etc. which are office rather than laboratory equipment should be placed in the separate container provided.
- Scrap metal should be placed in the container by entry D.

Further information on refuse sorting and handling may be found on the net [www.kc.lu.se/kcintern/index.asp](http://www.kc.lu.se/kcintern/index.asp).

Refuse sorting stations are also placed nearby all departments. Paper wastebaskets in offices and labs are not emptied by the janitors. This shall be done by the departments themselves. However the paper wastebaskets in the bathrooms and kitchens are emptied regularly by the janitors. The stations are emptied once per day by the Chemical Center.

### It is vital that glass, plastic and foil packaging be cleaned before recycling.

### OBS! Syringe needles may not be discarded with other burnable waste.

Special bottles for used needles shall be placed in proximity to work areas. Special refuse boxes for used needle bottles, broken glass, and non-contaminated, non-infectious pipette tips can be purchased at the caretaker's office.

## CHEMICAL WASTE

1. Oil waste (petroleum)  
Action: Collect and hold in containers placed in the storage area for solvent waste in the caretaker's office.  
  
Vegetable oil  
Action: Hold in the zink barrel for non-chlorinated solvent.
2. Water-based solvent waste (HPLC-eluat)  
Action: Should be disposed of by the University's waste department
3. Ethers  
Action: Collect and place on the shelf in the storage area for solvent waste in the caretakers office.
4. Other solvent waste  
Action: Chlorinated and non-chlorinated solvents should be collected separately and poured into respective containers in the storage area for solvent waste in the caretaker's office. The waste should be registered as to amount and type.  
**Non-chlorinated solvent waste should be poured in the zink barrel and chlorinated solvent waste should be poured into the other available barrels. Solvent should not contain water.**
5. Inorganic acids and bases  
Provided that you have the proper knowledge of how to do so, they should be neutralised and poured into the wastewater and sewage system. If you do not, this will be dealt with by the University's waste disposal station.
6. Environmentally friendly and non-health hazardous substances, and water-based solvents such as KCl and MgSO<sub>4</sub>  
Action: May be poured into the wastewater and sewage system. If you have any doubts please contact the University's waste disposal station.
7. Other environmentally hazardous substances and solvents  
Action: to be disposed of by the University's waste disposal station. Forms for chemical waste should be filled out and turned in to Sven Ericson, at the University's waste disposal station, before fetching. All chemical waste left at the disposal station should be documented and archived at the department of origin for possible spot-checking by the authorities.
8. Scintillation vials  
To be disposed of by the University's waste disposal station.  
  
If you have any doubts please contact the University's waste disposal station on tel: 046-222 71 25.

## VI ELECTRICITY

Two systems of current

The electrical net connections in the laboratories are system IT 230 volts.

The other system is 400/230 volts.

**This system is placed in the corridors and is labelled “städuttag”, and may not be used for powering instruments or apparatus. This system cannot sustain any large electrical load.**

NB: Do not connect too many multiway sockets to one electricity socket. Do not wind too many cables on the same coil.

If an extension cable reel is used in conjunction with high voltage electricity, the entire cable should be pulled out to reduce heat production.

If the cable is overloaded, it may overheat, resulting in a fire risk.

**Secure all multiway sockets!** No contacts or multiway sockets should remain on the floor. In case of a water leakage, this could have catastrophic consequences.

Ex classified equipment

Only use explosion-classified equipment for storing large quantities of solvents.

## VII FIRST AID IN THE EVENT OF AN ACCIDENT

### GENERAL RULES:

#### What everyone should know:

- Where the first aid kit is located, what it contains and how to administer first aid in case of accident
- How to call the ambulance and fire services

#### 1. First aid for severely injured or unconscious casualties

1. Check the casualty using the D-ABC method.

##### **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=Shock**

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

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

2. Call the ambulance service if this has not already been done. **Dial 0 - 112** and ask for an ambulance.

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

#### 2. 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, accident and emergency department, AB block. Someone should accompany the casualty even if he/she is of the opinion that he/she does not need assistance.

### 3. Burns

Burns are distinguished as first, second or third degree burns.

- First degree burns = redness of the skin.
- Second degree burns = blisters on the skin.
- Third degree burns = charring of the skin.

#### **Action to take at the site of the incident:**

1. Rinse thoroughly and for a long time with plenty of water
2. Prevent shock
3. Cover with sterile bandage
4. **Do not** remove clothing covering the burn.

### 4. Eye injuries

If chemicals get into eyes:

- Always rinse eyes with warm water in an eye bath for at least 15 minutes
- Always see a doctor
- Take a disposable eye bath for rinsing on the way to see the doctor. **It is important to rinse continuously!**

**NB:** Always seek medical help in the case of:

- Major burns, for a doctor's opinion
- Burns to the face, feet or joints and genitals
- All deep burns
- Eye injuries.

### 5. Corrosive injuries/poisoning

Safety/product information sheets for individual chemicals should be available in the laboratories.

### 6. After an accident

Work injuries/accidents should be reported to the Registrar (registrator) on a special form available at: [www.bygg.lu.se](http://www.bygg.lu.se) "Blanketter och checklistor" – "Arbetskada och tillbud".

Near-accidents should be reported on a special form available at: [www.bygg.lu.se](http://www.bygg.lu.se) "Blanketter och checklistor" – "Arbetskada och tillbud".

All accidents and occupational injuries/near-accidents 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 to the Labour Inspectorate within three weeks. In cases where reporting is obviously being neglected, the Labour Inspectorate may initiate legal proceedings.

Tel: 040 - 38 62 00 Jour tel. 040-38 62 90  
Fax: 040 -12 64 07  
E-mail: malmo@av.se

If the handling of flammable goods results in an accident/near-accident, this should also be reported to the National Inspectorate for Explosives and Flammables, the Lund Fire Department, and the Environment Administration .

## VIII FIRE PREVENTION REGULATIONS

### RESCUE – SOUND ALARM – EXTINGUISH

#### Fire/evacuation alarm

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. In Building I the alarm can even be activated by a pressure drop in the sprinkler system, as well as if the pressure in the ventilation system's main line is too low. 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).

Doors held open magnetically serve to limit the spread of fire and close automatically in case of fire (and fire alarm). In Building I all fire doors are closed each night and must be opened manually each morning.

The system is built around three main fire alarm subsystems. The subsystem in Building (close to caretakers office) is an older installation covering Buildings III and IV along with connecting corridors linking to Building II, and also classrooms D, E, F, G and O. The subsystem situated by Entrance E is new and cover Building I and II (including classroom B and C) and has a backup subsystem located by entrance A. The subsystem in Building V covers Building V and its hallways.

Once a month there is a test of the fire-alarm system, called "tyst brandlarmstest". During these tests the alarm bells are silent but the fireproof doors will close.  
Once every fourth month there is fire-alarm test, called "stort brandlarmstest". During these tests the alarm bells will sound and the fireproof doors will close.

**NB! The alarm system is disconnected from the fire department during the test.**

**In case of accident dial 0-112.**

**NB! No evacuation during the test.**

Fire/evacuation alarm, continued

In Building I and II:

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 Buildings III, IV and V:

In case of fire, the alarm sounds only on the floor where the fire started, but in these buildings the fireproof doors close on all floors. Note that Building III and IV are considered as separate.

**Evacuate the premises when the alarm sounds.**

If you need to alert the entire building call:

Akademiska Hus jour 046-31 13 10.

Diagrams showing available evacuation routes are posted in proximity to all stairwells in Kemicentrum.

**NB: 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.

**NB: Do not use elevators when evacuating the premises.**

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, carbonic acid, powder, foam, and water extinguishers, fire blankets and emergency showers, are located in corridors, laboratories, equipment halls, etc.

There are halotron extinguishers in some of the chemical storerooms.

Use **carbonic acid** for **electrical fires**.

Use **carbonic acid** or **foam** for **solvent** fires.

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

**NB: Access to this 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 (casualties)!
- 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.

### **During a major fire, evacuate the entire department!**

## 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.

## Power outage

**During a power outage, fume hoods should be closed to hinder leakage of solvent vapours because ventilation stops during an power outage. Close all the doors!**

Power and telephone outages out of normal working hours

Out of working hours **Securitas** should be immediately contacted if possible, **tfn 046 - 222 07 00 (jour)**.

**OBS! Prepare yourself by studying “Contingency Planning for Power Outage in Chemical Center”, chapter XVI**

The department should be equipped with a number of flashlights and a battery-operated radio.

## IX THE ORGANISATION OF THE SAFETY BOARD

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

Kemicentrum comprises the *Department of Chemical Engineering*, the *Department of Food Engineering* and the *Department of Chemistry*. The two latter departments are divided into divisions with their own economies. From the point of view of safety in the working environment, the Department of Chemical Engineering and the divisions within the Departments of 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 KC. KC 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.

### **On behalf of the HMS Committee at KC**

Chairperson	Olov Sterner
Secretary	Eva Qvarnström

For further information, please refer to:  
"Lokalt arbetsmiljöavtal för Lunds universitet".

**X AFS 2005:17 Substances A, B, C, D and E.**

**A (may not be handled)**

**B (may only be handled by permission),**

**C (carcinogens included in the limit value list)**

**D (sensitising substances included in the limit value list)**

**E (sensitising-disturbing substances included in the limit value list)**

**AFS 2005:17 Hygienic limits values and actions against air pollutions.  
The limit value list is available at KC's homepage [www.kc.lu.se](http://www.kc.lu.se)  
under rubric "internt" or at [www.av.se](http://www.av.se) (Arbetsmiljöverket)**

*Appendix 3*

**Group A <sup>1)</sup>**

**Substances which under 21 § may not be handled**

<i>Carcinogens</i>	<i>CAS-nr</i>
2-Acetamidofluorene .....	53-96-3
4-Aminodiphenyl.....	92-67-1
Benzidine.....	92-87-5
1,1'-Dichlorodimethylether .....	542-88-1
1,2-Dibromo-3-chloropropane (DBCP) .....	96-12-8
N,N-Dimethyl-4-aminoazobenzene.....	60-11-7
Erionite .....	66733-21-9
Hexamethylphosphotriamide (HMPA) .....	680-31-9
Methyl chloromethyl ether.....	107-30-2
20-Methylcholanthrene (3-methylcholanthrene) .....	56-49-5
N-Methyl-N-nitroso urea (MNU).....	684-93-5
β-Naphthylamine .....	91-59-8
4-Nitrodiphenyl .....	92-93-3

<sup>1)</sup> In the case of group A substances, the stipulations of 21 § also apply to salts of the substance concerned.

**AFS 2005:17***Appendix 3***Group B <sup>1)</sup>****Substances, which under 23 § may only be handled by permission of the Labour Inspectorate**

<i>Carcinogens</i>	<i>CAS-nr</i>
p-Aminoazobenzene.....	60-09-3
Auramine .....	492-80-8
(4,4'-imidocarbonyl-bis(N,N-dimethylaniline))	
Benzalchloride .....	98-87-3
Benzotrichloride.....	98-07-7
β-Butyrolactone .....	3068-88-0
4,4'-Diamino-3,3'-dichloro-diphenyl methane.....	101-14-4
(MOCA methylenebis(o-chloroaniline))	
2,4-Diamino-1-methoxybenzene (2,4-diaminoanisol) .....	615-05-4
2,4-Diaminotoluene (2,4-Toluenediamine) .....	95-80-7
Dianisidine (3,3'-dimethoxybenzidine) .....	119-90-4
Diazomethane .....	334-88-3
1,2-Dibromoethane (ethylene dibromide) .....	106-93-4
1,2,3,4-Diepoxy butane .....	1464-53-5
Diethyl sulfate .....	64-67-5
3,3'-Dichlorobenzidine .....	91-94-1
2,2'-Dichlorodiethylether .....	111-44-4
2,2'-Dichlorodiethylsulphide (mustard gas).....	505-60-2
1,1-Dimethylhydrazine.....	57-14-7
1,2-Dimetylhydrazine.....	540-73-8
Dimethyl sulfate .....	77-78-1
Ethylenimine (aziridine) .....	151-56-4
Ethylene thiouriea.....	96-45-7
Ethyl methane sulfonate(EMS).....	62-50-0
Hydrazine .....	302-01-2
4,4'-Methylene dianiline .....	101-77-9
(MDA, 4,4'-diaminodiphenylmethane)	
Methyl methane sulfonate (MMS).....	66-27-3
Monomethylhydrazine .....	60-34-4
α-Naphthylamine .....	134-32-7
N-Nitrosodimethylamine (N,N-dimethylnitrosamine).....	62-75-9

<sup>1)</sup> In case of group A substances, the stipulation of 12 § also apply to salts.

**AFS 2005:17***Appendix 3*

<i>Carcinogens</i>	<i>CAS-nr</i>
Phenyl- $\beta$ -naphtylamine .....	135-88-6
1,3-Propane sultone .....	1120-71-4
$\beta$ -Propiolactone .....	57-57-8
1,2-Propylenimine.....	75-55-8
Thioacetamide .....	62-55-5
o-Tolidine (3,3'-dimethylbenzidine).....	119-93-7
Tris(2,3-dibromopropyl)phosphate.....	126-72-7
Urethane (ethyl carbamate).....	51-79-6
 <i>Sensitising substances</i>	
2,4-Diaminotoluene (2,4-Toluenediamine) .....	95-80-7
3,3'-Dichlorobenzidine .....	91-94-1
S-[2-(Dimethylamino)ethyl]-pseudothiourea- dihydrochloride (PBA 1).....	16111-27-6
Hexahydrophthalic anhydride .....	85-42-7
	13149-00-3
	14166-21-3
Methyl hexahydrophthalic anhydride .....	25550-51-0
	19438-60-9
	48122-14-1
	57110-29-9
Methyl tetrahydrophthalic anhydride.....	26590-20-5
	34090-76-1
	1694-82-2
	3425-89-6
	5333-84-6
	42498-58-8
Tetrahydrophthalic anhydride .....	85-43-8
	935-79-5
 <i>Reproduction-disturbing substances</i>	
Ethyleneglycolmonomehtylether <sup>2)</sup> .....	109-86-4
(2-Metoksiethanol)	
Ethyleneglycolmonomethyletheracetate <sup>2)</sup> .....	110-49-6
(2-Metoksiethylacetate)	
Ethylene thiourea.....	96-45-7

<sup>2)</sup> The standard value for risk determination, 0.1 ppm, can be used as a guide.

**AFS 2000:3***Appendix 3***Group C****Carcinogens included in the limit value list, where they are marked K or other marks.**

	<i>CAS-nr</i>
Acetaldehyde.....	75-07-0
Acetamide.....	60-35-5
Acrylamide.....	79-06-1
Acrylonitrile.....	107-13-1
Aniline.....	62-53-3
Arsenic.....	7440-38-2
and inorganic compounds (other than arsenic hydride)	
Asbestos	
Actinolite.....	77536-66-4
Amosite.....	12172-73-5
Anthophyllite.....	77536-67-5
Crocidolite.....	12001-28-4
Crysotile.....	12001-29-5
Tremolite.....	1332-21-4
Benzene.....	71-43-2
Benzo(a)pyrene.....	50-32-8
Benzyl chloride.....	100-44-7
Beryllium and compounds.....	7440-41-7
1,3-Butadiene.....	106-99-0
1,2-Dichloroethane.....	107-06-2
Cadmium and inorganic compounds.....	7440-43-9
Carbon tetrachloride.....	56-23-5
Chloroform.....	67-66-3
Cobalt dichloride.....	764679-9
Cobalt sulfate.....	10124-43-3
Chromic(VI)-compounds, see appendix 1	
Dinitrotoluene.....	25321-14-6
Dioxane.....	123-91-1
Epichlorohydrin.....	106-89-8
Ethylene oxide.....	75-21-8
Formaldehyde.....	50-00-0
Methylene chloride.....	75-09-2
Methyl iodide.....	74-88-4
Nickelcompounds see appendix 1	
Nickel carbonyle.....	13463-39-3
2-Nitropropane.....	79-46-9
PCB (polychlorinated biphenyls)	
Propylene oxide.....	75-56-9
Radon.....	10043-92-2
Tetrachloroethylene (perchloroethylene).....	127-18-4
Toluene diisocyanate,.....	26471-62-5
isomeric mixture (TDI)	

CAS-nr

2,4-Toluediisocyanate (2,4-TDI) .....	584-84-9
2,6-Toluediisocyanate (2,6 TDI) .....	91-08-7
Trichloroethylene .....	79-01-6
Trinickeldisulfide .....	12035-72-2
Trichlorophenol and salts.....	25167-82-2
Vinyl chloride .....	75-01-4
Wooden dust	

**AFS 2000:3***Appendix 3***Group D****Sensitising substances included in the limit value list, where they are marked S**

	<i>CAS-nr</i>
Beryllium and compounds .....	7440-41-7
Butyl acrylate .....	141-32-2
n-Butylglycidyl ether .....	2426-08-6
n-Butyl methacrylate .....	97-88-1
3-Carene.....	13466-78-9
Chlorcresole .....	59-50-7
Chromates(VI)compounds, see appendix 1	
Cobalt and inorganic compound .....	7440-48-4
p-Cresyl glycidyl ether .....	2186-24-5
Cyanamide .....	420-14-2
Diethylentriamine .....	111-40-0
Diglycidyl ether .....	2238-07-5
2,6-Diisopropyl phenylisocyanate .....	28178-42-9
Disulfiram.....	97-77-8
Enzymes, subtilisines .....	1395-21-7, 9014-01-1
Epichlorohydrin.....	106-89-8
Ethyl acrylate .....	140-88-5
Ethylene diamine .....	107-15-3
Ethyl methacrylate .....	97-63-2
Formaldehyde.....	50-00-0
Glutaraldehyde .....	111-30-8
Hexamethylene diisocyanate, HDI.....	822-06-0
Hexamethylene tetramine.....	100-97-0
Hydroquinone .....	123-31-9
2-Hydroxyethyl acrylate .....	818-61-1
Isobutyl methacrylate.....	97-86-9
Isocyanates see appendix 1	
Isophorone diisocyanate.....	4098-71-9
Limonene.....	138-86-3
Maleic anhydride .....	108-31-6
Methyl acrylate .....	96-33-3
Methylene bisphenyl isocyanate, MDI .....	101-68-8
Methyl methacrylate .....	80-62-6
Meal dust	
Naphtalene diisocyanate, NDI .....	3173-72-6
Nickel compounds, (except nickel carbonyl) see appendix 1	
Phenyl glycidyl ether.....	122-60-1
Phenyl isocyanate .....	103-71-9
Phthalatic anhydride .....	85-44-9
Piperazine.....	110-85-0
Platinum solid compounds	
Thiram .....	8006-64-2
Toluene diisocyanate, TDI .....	26471-62-5

CAS-nr

2,4-Toluenediisococyanate (2,4-TDI) .....	584-84-9
2,6- Toluenediisococyanate (2,6 TDI).....	91-08-7
Triethylenetetramine .....	112-24-3
Trimellitic anhydride.....	552-30-7
Trinickelsulfide.....	12035-72-2
Trimethylhexamethylenediisocyanate.....	34992-02-4
Turpentine .....	8006-64-2
Ziram .....	137-30-4

## AFS 2000:3

### Bilaga 3

#### Grupp E

**Sensitising-disturbing substances included in the limit value list where they are marked R or other marks, or in appendix 3**

	CAS nr
Benzo(a)pyrene .....	50-32-8
Cadmium difluoride.....	7790-79-6
Cadmium dichloride.....	10108-64-2
Carbon disulfide.....	75-15-0
Carbon monoxide .....	630-08-0
Dibutylphthalate .....	84-74-2
1,2-Dibromo-3-chloropropane (see group A).....	96-12-8
Di-(2-ethylhexyl)phthalate.....	117-84-0
Di-(2-methoxyethyl)phthalate.....	117-82-8
Dimethylformamide.....	68-12-2
N,N-Dimethylacetamid.....	127-19-5
Ethyleneglycolmonoethylether .....	110-80-5
Ethyleneglycolmonoethyletheracetate .....	111-15-9
Ethyleneglycolmonomethylether (see group B) .....	109-86-4
Ethyleneglycolmonomethyletheracetate (see group B) .....	110-49-6
Ethylene thiourea (see group B).....	96-45-7
Formamide .....	75-12-7
Lead compounds	
Nickel carbonyl .....	13463-39-3
Tetraethyllead.....	78-00-2
Tetramethyllead.....	75-74-1

## XI 'NARCOTICS' – chemicals

### Class 1

Ephedrine  
Ergometrine  
Ergotamine  
Lysergic acid  
1-Phenyl-2-propanone (phenyl acetone)  
Pseudoephedrine  
Corephedrine  
N-acetylanthranilic acid (2-acetamide benzoic acid)  
3,4-Methylenedioxydiphenylpropane-2-one  
Isosafrole (cis and trans)  
Piperonal  
Safrole

### Class II

Acetic-acid-anhydride	for amounts exceeding > 100 litre
Potassium permanganate	for amounts exceeding > 100 kg
Anthranilic acid (+ salts)	for amounts exceeding > 1 kg
Phenylacetic acid (+ salts)	for amounts exceeding > 1 kg
Piperidine (+ salts)	for amounts exceeding > 0.5 kg

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### XIII LEGISLATION

Swedish Environmental Code, SFS 1998:808  
(Miljöbalken).

Ordinance on chemical products and biotechnical organisms, SFS 1998:941  
(Förordningen om kemiska produkter och biotekniska organismer).

Flammable and explosive substances act,  
SFS 1988:868  
(Lagen om brandfarliga och explosiva varor).

Work environment act, SFS 1977:1160  
(Arbetsmiljölagen).

Work environment ordinance, SFS 1977:1166  
(Arbetsmiljöförordningen).

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Occupational exposure limit values, AFS 2005:17  
(Hygieniska gränsvärden och åtgärder motluftföroreningar).

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Permission to handle flammable goods (Tillstånd till hantering av brandfarlig vara) SÄIFS 1997:3.

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

Handling of flammable gases and liquids in high-explosion-risk environments SRVFS 2004:7

- LABORATORY WORK USING CHEMICALS, AFS 1997:10 [LABORATORIEARBETE MED KEMIKALIER]

These regulations apply to laboratory work using chemicals and associated activities, e.g. washing up, cleaning and maintenance of equipment.

- Kemiska arbetsmiljörisker AFS 2000:04
- Gases, AFS 1997:07 (Gaser)
- Work with laboratory animals, AFS 1990:11 (Arbete med försöksdjur)
- Work Environment Risks Associated with Microbiology AFS 2005:01
- Closed use of genetically modified microorganisms, AFS 2000:05 (Innesluten användning av genetiskt modifierade mikroorganismer)

Information on valid guidelines can be found in the Labour Inspectorate's "TRYCKSAKSKATALOG" (Catalogue of printed materials). This can be obtained free from the publication service, tel.: 08-730 97 00.

## XIV ADDRESSES

University waste disposal station  
Sven Ericsson, 046 - 222 71 25  
Sven.ericsson@bygg.lu.se

Byggnadsenheten - physical work environment  
questions  
Åsa Gustafsson, 046 - 222 70 26  
Asa.gustafsson@bygg.lu.se  
Klas Nordström, 046 - 222 41 33  
Klas.Nordstrom@bygg.lu.se

Företagshälsovården, 046 - 222 32 80  
Occupational Health Services

Strålskyddsfysiker Christer Samuelsson  
Radiation Physics, Lund, 046 - 17 31 21  
Christer.Samuelsson@med.lu.se

Arbetsmiljöverket, 08 - 730 90 00  
Swedish Work Environment Authority  
www.av.se

Giftinformationscentralen, 08 - 33 12 31  
Swedish Poisons Information Centre  
in an emergency dial 0-112  
www.giftinformation.se

Kemikalieinspektionen, 08 - 519 411 00  
Swedish Chemicals Agency  
kemi@kemi.se  
www.kemi.se

Räddningstjänsten Syd, 046 - 540 46 00  
Region South Fire and Rescue Service  
info@rsyd.se  
www.rsyd.se  
in an emergency dial 0 -112

Läkemedelsverket, 018 - 17 46 00  
Medical Products Agency  
www.lakemedlsverket.se

Miljöförvaltningen, 046 - 35 52 61  
Environmental Management  
www.lund.se  
miljoforvaltningen@lund.se

Naturvårdsverket, 08 - 698 10 00  
Sweden Environmental Protection Agency  
[www.naturvardsverket.se](http://www.naturvardsverket.se)

Strålsäkerhetsmyndigheten, 08 - 799 40  
Swedish Radiation Safety Authority  
[www.ssi.se](http://www.ssi.se)

Räddningsverket, 054 -13 50 00  
Swedish Rescue Services Agency  
[www.srv.se](http://www.srv.se)

## XV EXAMPLES OF SIGNS AND LABELS FOR DANGER SYMBOLS

### Signs (Yellow sign with black text)

Most signs can be ordered at this address: <http://e-handel.pre.se/>



Extremely/Very flammable materials



Explosive materials



Very poisonous/  
Poisonous substance



Corrosive substance



Gas bottles to be taken to safety in case of fire



Radioactive substance



Oxidizing substance



Natural gas cylinders to be taken to safety in case of fire



Health hazard/  
Irritating substance



Danger



Danger, Chemicals

### Orange-coloured danger symbols (labels) for chemical flasks, Waste flasks, bottles, storage bottles, etc.



Extremely/Very flammable substance



Health hazard/  
Irritating substance



Explosive substance



Very poisonous/  
poisonous substances



Corrosive substances



Oxidising substances



Environmental hazard

# Labeling of chemicals

There are at least four different systems for labeling of chemicals presently in use in Sweden.

The “old” system with the orange labels is a part of KIFS 2005:7. This system uses both **Hazard warning symbols** (the orange labels) and **Risk- and Safety-phrases** (R- and S-phrases) that gives more information on the hazards and safety information.



Effective from January 20<sup>th</sup> 2009, a new system is implemented: CLP = classification, labeling and packaging. The CLP uses the Globally Harmonized System (GHS) for labeling of chemicals. KIFS 2005:7 will be fully replaced by 2015. In the meantime both systems will be used. The GHS uses red and white pictograms with black symbols. Most symbols are similar to the old system. However, a new symbol is introduced for health hazards and for pressurized gases and the St Andrew cross is replaced by an exclamation mark. GHS also uses two **Signal words**; **Danger** (more severe) and **Warning** (less severe).



The GHS also uses specific labels for transportation of chemicals. These labels are usually found on the outside of boxes.



In addition there are yellow signs used on cupboards and on doors to rooms with chemicals. These signs usually have information in Swedish.




















For more information on the GHS, please check the homepage of the United Nations Economic Commission for Europe (UNECE) at:



[http://www.unece.org/trans/danger/publi/ghs/ghs\\_welcome\\_e.html](http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html)

A brief explanation of the pictograms is given on the next page. A poster with a full comparison of the symbols is available.

CLP	Hazard class	KIFS 2005:7	Hazard class
	<ul style="list-style-type: none"> <li>•Explosives</li> <li>•Self-reactive substances</li> <li>•Organic peroxides</li> </ul>		Explosive, E
	<ul style="list-style-type: none"> <li>•Flammable gases, aerosols, liquids and solids</li> </ul>		Extremely flammable (F+) Highly flammable (F)
	<ul style="list-style-type: none"> <li>•Oxidizing gases, liquids or solids</li> </ul>		Oxidizing (O)
	<ul style="list-style-type: none"> <li>•Gases under pressure</li> </ul>	No classification	
	<ul style="list-style-type: none"> <li>•Corrosive to metals</li> <li>•Skin corrosion / irritation</li> <li>•Serious eye damage / eye irritation</li> </ul>		Corrosive (C)
	<ul style="list-style-type: none"> <li>• Acute toxicity</li> </ul>		Very toxic (T+) or Toxic (T)
	<ul style="list-style-type: none"> <li>•Acute toxicity</li> <li>•Skin corrosion/irritation</li> <li>•Skin sensitization</li> <li>•Serious eye damage</li> <li>•Respiratory irritation</li> </ul>		Harmful (Xn) or Irritant (Xi)
	<ul style="list-style-type: none"> <li>•Respiratory sensitization</li> <li>•Carcinogenicity</li> <li>• Specific target organ toxicity</li> <li>•Aspiration hazard</li> <li>•Reproductive toxicity</li> </ul>	 or 	Toxic (T) or Harmful/Irritant (X)
	<ul style="list-style-type: none"> <li>•Aquatic toxicity</li> </ul>		Dangerous for the environment (N)

## XVI PLAN OF ACTION

### Plan of Action for Water Outages at the Chemical Center

Important factors to consider and suggested measures to take in the event of a water outage.

- In the event of any *planned* interruption in the water supply, affected institutions and departments must be given appropriate information in advance by means of red notices posted by entrances, elevators, or in the vicinity of the laboratories/work areas that will be affected by the outage.

In these notices shall be clearly stated:

- the date of the outage
- the time the outage will begin
- how long the outage will last
- that all emergency showers and eyewash fountains will be out of order during the outage
- whether there is a risk of air remaining in the water pipes after restoration of water. If there is such a risk, respective institutions/departments will be requested to flush all the water pipes to the emergency showers and eyewash fountains immediately after restoration of services.

Keep in mind that leftover air in the water pipes can lead to powerful air and water surges when water flow is first initiated in the emergency showers or eyewash fountains. These surges can cause severe damage to the eyes and face. Sensitive laboratory equipment can also be damaged by such surges and appropriate measures should be taken to prevent this.

- In the event of any interruption in the water supply, no laboratory work requiring continuous access to tap water for chilling or other purposes may be carried out.
- The workplace environment officer in the respective institution/department shall always conduct a risk assessment (or request that such a risk assessment be carried out) in order to decide whether laboratory work can be permitted without undue risk in the event of a planned water outage. If laboratory work is permitted, portable eyewash bottles should be made available in the immediate vicinity of all laborative work.
- It is always important in risk assessment to even consider the consequences of sudden *unplanned* water outages and what measures would have to be taken in such an event. One area where this is especially important is distillation. Also, during experiments where there is a risk for fire, explosion or other accident in case of an outage of chilling water, use of a flowmeter safety device is required which immediately cuts the electrical power when the water flow rate sinks below a certain level. It is additionally essential that all water tubes be firmly attached with suitable clamps and that the right kind of tubing be used. PVC tubing should be used for low flowrates and reinforced tubing should be used at high flowrates.

- In case of an unplanned water outage, the workplace environment officer shall judge whether continued laboratory work will be allowed to occur in the institution/department under the duration of the outage.

Eva Qvarnström

## Contingency Planning for Power Outages at the Chemical Center

Vital considerations and suggested measures to take in the event of a longer power outage.

- **Blackout**

Akademiska Hus is responsible for emergency backup lighting at the Chemical Center. Emergency lighting shall be active for at least one hour after house electricity is lost. 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 locale if the power outage is longer and the emergency lighting weakens or is extinguished.

Remedial measures:

- One should consider evacuating the department. However, someone should remain in the department to make sure that nothing unforeseen occurs with equipment that was switched on at the time of the power outage – hot plates, heating mantles, distillation equipment, and so forth.
- It is important that all departments be equipped with a reasonable number of flashlights for orientation in the dark. Batteries therein should be checked regularly.
- It is vital to consider the possible consequences of a power outage when doing risk assessment for proposed experiments. This includes consideration of measures that would have to be taken in the event of a power failure.

- **Combined power and telephone outage**

During a combined power and telephone outage, it can be difficult to obtain information on the cause of the outage.

Remedial measures:

- Every department should be equipped with a battery-powered radio for receiving information on an ongoing basis. Periodically make sure that the batteries therein are fresh.
- A car radio can also be of use in this circumstance.

- **Elevator stoppage**

During a power outage, elevators are incapacitated with the consequence that people and goods can be trapped therein.

Remedial measures:

- In the event of a power outage, Akademiska Hus is responsible for investigating and, when necessary, evacuating the elevators.
- Alarm buttons are found in all elevators and the alarm is transmitted via a telephone line.

OBS! Unfortunately, during a telephone outage the alarm signal will not reach the Alarm Center. In this event contact the Alarm Center by mobile telephone 046-2220700.

- **Ventilation System**

During an electrical outage, ventilation to fume hoods, fume benches, chemical cabinets and chemical storage areas will cease to function.

This implies a risk for the spread of health-hazardous, flammable, or explosive materials as well as risk for contamination of materials on safety benches.

Remedial measures:

- Close all fume hoods.
- Switch off all sensitive equipment which can give risk or which can cause injury (or itself be damaged) when power comes back on line.
- Close all doors to labs.
- If an experiment would become dangerous during a power outage then remedies for such a possibility – however remote – should be considered already in the planning stage.
- The department head ought to consider whether the department should be evacuated.

- **Fire/Evacuation Alarm**

Fire/Evacuation Alarms in Buildings 1, 2, 3 and 5 are coupled to a battery backup which functions for ten minutes in the event of the alarm being activated. After that the alarm bells will be silent.

Remedial measures:

- Doors to the departments/institutions should be kept shut and the number of people in the department reduced to a minimum.
- It is planned in the near future that inner doors normally held shut by card readers should open automatically when an evacuation alarm is activated.
- A backup battery system for the card readers has been upgraded and, in absence of an evacuation signal, this system should function during the first two hours of a power failure.

- **Emergency (Call for Help, SOS) Alarms**

SOS alarms in the handicap toilets, freezers, *etc.* have battery backup which functions for about one hour in the event of a power failure.

Remedial measures:

- These areas should be checked in the event of a power outage to make sure nobody is trapped therein.

- **Free-standing refrigerators, freezers, low-temperature freezers, etc.**

Material from ongoing investigations can be lost if the power outage lasts for more than a few minutes.

Remedial measures:

- If there is a risk that sensitive substances, cell lines, *etc.* will be destroyed, remember that there is the possibility to purchase dry ice which is kept in a box just outside the custodians' office.

- **Inventorying of sensitive equipment**

It is a good idea to do an inventory of equipment which is sensitive to power outage (instruments, computer systems, freezers, etc.). Electrical- and water-cooling of instruments should also be considered, because even the supply of cooling water can be interrupted during a power outage.

Remedial measures:

- It may be realistic to equip such instruments with battery backup.

- **If a power outage occurs outside of normal working hours**

Securitas is charged with taking contact with key personnel at the Chemical Center in the event of a power outage or other unexpected event. In Eva Qvarnström's office there is a list of contact people specified by the departments.

Remedial measures:

- Securitas will contact key personnel belonging to departments that are affected by a power outage. This is even more important if there are ongoing experiments which require special supervision.

- **No-Voltage protection**

Machines, particularly those with moving parts which could cause damage and/or personal injury if operation abruptly resumes when electricity is restored, should be equipped with no-voltage trip protection, to prevent unsupervised reactivation. See <<Arbetsmiljöverkets föreskrift "Maskiner vid tekniska anordningar", AFS 1994:48>>.

- **Other sensitive aspects**

There can be other aspects of Chemical Center activities, not mentioned above, that can be adversely impacted by a power outage. The departments should watch for such additional issues. It can be of value to document happenings during a power outage or other unexpected event. The knowledge gained can be shared with others at the Chemical Center in order to better prepare in the future for such events.

Eva Qvarnström

## **Plan of Action for Emergency Evacuations.**

Each institution/department shall develop routines for safe and effective evacuation of the premises in the event of an emergency. These routines constitute an important part of systematic fire protection planning.

**When the fire alarm sounds it is important that the instructions below be followed.**

- Evacuation shall only be carried out on the floors where the alarm is sounded.
- When the fire department arrives they are responsible for judging whether other floors in the same building should also be evacuated. Additional alarms will be sounded as needed.
- Always evacuate injured persons first!
- Always evacuate along a path away from any smoke!

**In the event of an acute accident involving fire, smoke, etc.:**

- 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 Lund Fire Department, 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.
- Gas tubes and containers with flammable solvents should be evacuated from the building if possible.
- 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.
- 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.

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

- All personnel shall promptly interrupt their 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.
- The fire safety representative shall appoint responsible persons to check that all rooms in the vicinity are empty and that all personnel have begun evacuation, and that all interior doors are shut.
- If the usual evacuation route is blocked by smoke or fire, take an alternative route!
- On evacuation, a list of personnel and telephone numbers should be available as an aid in confirming that nobody is left in the building. Departments should compile such lists on an ongoing basis.
- All personnel shall go to the department's pre-arranged rendezvous point.
- Appoint a person to take attendance as evacuating personnel arrive at the rendezvous point.

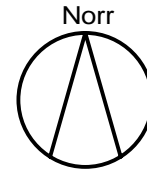
**If there is an alarm you must always evacuate the building unless you are informed otherwise.**

**Nobody may return to an evacuated building before Lund's Fire Department gives the "all clear" signal!**

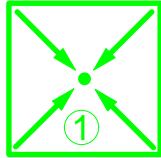
Eva Qvarnström

Getingevägen

XVII Evacuationplan



P



P

Entré E (plan -1)

Entré D (plan -1)

Hus IV

Hus III

Hus I

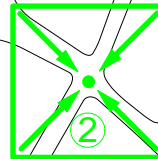
Entré B

Entré C

Hus V

Hus II

Entré A



P

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Sölvegatan



## Assembly stations



### House I etapp 1:

Dept of Chemical Engineering  
Organic Chemistry  
Polymer- and Materials Chemistry  
Students and teaching staff in the  
lecture halls and course laboratories

### House III:

Biotechnology  
Caretakers  
Dept of Chemical Engineering  
Service group  
UB-Media - Reproservice

### House IV:

Applied Microbiology  
Biotechnology  
Physical Chemistry 1  
Theoretical Chemistry

### House V:

The hall  
Biotechnology (Fermentation)  
Electron Microscopy  
Food Technology

### House I etapp 2 and 3:

Administration  
Chemical Physics  
Library  
NMR- center  
Undergraduate studies in Chemistry  
Students and teaching staff in the  
lecture halls and course laboratories

### House II:

Applied Nutrition and Food Chemistry  
Biophysical Chemistry  
Biochemistry  
Molecular Biophysics  
Pure and Applied Biochemistry  
LCL