

LABORATORY REGULATIONS

OF THE CHEMISTRY DEPARTMENT

OF THE UNIVERSITY OF OLDENBURG

1. Basic general rules

The entry to the laboratory is forbidden to unauthorized persons. In this respect all people active in the laboratory have to pay proper attention.

Eating, drinking and smoking is in all laboratories forbidden.

The laboratory and in particular the work tables should be cleaned and tidied up after the end of the workday. The workplace should be thoroughly cleaned at least once a week.

Each person active in the laboratory is obliged from the beginning of his employment or study to become acquainted with the instructions described in the booklet "Laboratory Regulations.." and has to confirm that by depositing his signature to the responsible laboratory director.

1.1 Opening times

- 1.1.1 The laboratories of the Chemistry Department of the University of Oldenburg are open to the participating and authorized students in the officially assigned times indicated either in the course catalogue or on the appropriate board. Beyond these times students are allowed to enter only with permission of the responsible scientific coworker.
- 1.1.2 For the people officially employed in the laboratory the opening time period is in work-days from 6.30 to 18.00 (employment convention of 30.04.1991).
- 1.1.4 Entering beyond the service hours is possible only with special authorization order.
- 1.1.3 Laboratory activities by technical coworkers, diploma students and doctoral fellows beyond the official opening hours are possible only after discussion and upon agreement with the responsible Professor.
- 1.1.5 In case of prolonged absence and after the end of the working day the laboratories should be locked up.

1.2 Instructions for the use of laboratory facilities

- 1.2.1 For each laboratory in the Department of Chemistry a responsible Professor is nominated, His name is noted on the doorplate.
- 1.2.2 Each person working in the laboratory is obliged to deal with the laboratory operations and instrumentation systematically and carefully. Unknown and unfamiliar apparatus and instrumentation should not be touched. Members of the University which are not authorized to perform independent research should absolutely follow the guidance of the person responsible for that laboratory.
- 1.2.3 Persons which do not work in the laboratories are allowed to enter only with the agreement of the person responsible for that laboratory (exceptions: security personnel). Children are absolutely not allowed to enter into the laboratories. Entry of domestic animals (dogs, cats etc) is absolutely prohibited. This is valid for all rooms, even those not used as laboratories.
- 1.2.4 In order to avoid accidents and damage of the supply and disposal pipelines, any mounting operations on the walls, ceilings, floors and facades should be performed only upon agreement of the physical plant department (**haustechnische Abteilung, Dezernat 4**). The respective phone numbers are to be found in the emergency plans (**Alarmplänen**).
- 1.2.5 Experimental work in the university laboratories and grounds should never be performed by persons working alone. In exceptional cases, if activities related to teaching and research require solitary work, the required phone and visual controls must be guaranteed.
- 1.2.6 Short routine activities like the filling of recipients with coolants or the control of long-term experiments can be performed without the presence of another individual even beyond the normal opening hours in times agreed with the responsible laboratory director and the gate-keeper in charge.
- 1.2.7 For the appropriate and secure building and operation of instruments and equipment the users are responsible as long as they are authorized to perform independent research. Equipment no more in use should be dismantled; intermittently used equipment should be kept in a condition not posing any dangers (for example evacuated vacuum vessels should be filled with air or another gas). All connections should be secured with clamps. Cooling water pipelines for solidly installed apparatus should be constructed solidly from

pressure-tissue tubing and should be tested at least once a month for operational reliability. In this respect a record should be kept.

1.2.8 For instruments and equipment which should stay in operation outside the laboratory opening times (long-term experiments) should be used the night laboratories prescribed for that purpose. A clear description should be forwarded containing the following data:

- 1 The person conducting the experiment and his residence (e.g. private address),
- 2 the duration (date, time),
- 3 where appropriate, special dangers (posed by dangerous materials, explosion danger)
- 4 exact description of the experiment including all introduced dangerous materials involved

Moreover in such equipment water-lack detectors, temperature detectors and water-leak detectors should be installed. Water-cooling tubing should be fastened in a way to avoid slipping due to water pressure.

1.2.9 The laboratory floor should be kept free from unused objects.

1.3 Protection and safety instructions

The emergency call equipment, fire detectors, emergency push-buttons, and safety doors are destined to the security of all those who work in the laboratories and in the university. Whoever incorrectly uses or damages them endangers the life and the health of others. He will be legally prosecuted and he is obliged to repair the inflicted damage.

1.3.1 Exit corridors, exit windows and exit doors are in all the domain of the chemistry department clearly indicated. Those should be accessible without any obstacles in the way.

Flammable material should be never deposited in the exit corridors and in the stairways.

Cables and tubing which cross the exit ways should not lie on the floor, but they should be deposited on bridges in the work-place.

1.3.2 Fire protection doors and fire sector doors should be kept always closed as far as no automatic devices closing them in case of fire are installed. Those doors should not be forced open by wedges and should not be covered.

1.3.3 Fire-alarms are located on the hydrant boxes in the stairways. Their presence should alert the fire department as well as the janitor in charge.

1.3.5 Next to the entry doors and in the power boards of the laboratories are emergency switches (red touch-activated switches with yellow base plates). When touched these switches are activated: they cut all the electrical current circuits of the concerned laboratory.

The deactivation of the switches is possible without a key only in the case of some energy devices (turn on in the right direction). Keys for putting again all the switches to the initial condition are available by the concierges, doorkeepers, security personnel and security officers.

1.3.6 The frontal slide door of the fume hoods should be strictly kept shut off at all times.

1.3.7 Water drains located at the floor and sink siphons should be kept filled with water in order to keep the waste water drain tubes locked against the under pressure prevailing in the laboratories and to prevent the propagation of obnoxious smells. This should be tested at least once a month and a protocol should be kept.

1.4 Protection of persons in the laboratory

Eye protection

- 1.4.1 In the laboratory people should always wear protection glasses. People carrying vision-correction glasses should carry either optically-adjusted protection glasses or so-called overglasses over the actual glasses.
- 1.4.1.1 In the case of operations posing particular dangers to the eyes, e.g. in the case of filling recipients with corrosive liquids, fully protecting glasses or a face protection shield should be worn. The kind of eye protection depends on the degree of the hazard (see **GUV 20.13 + UVV**).
- 1.4.1.2 In the case of work with high intensity light, UV light, lasers etc special protection glasses should be worn. Furthermore the light source should be adequately shielded.
- 1.4.4 In case of eye injuries by chemicals, washing with copious water is immediately required. For this purpose the installed eye showers (in the emergency body showers in the laboratory entry) should be used.

Body protection

- 1.4.5 During the laboratory work a coat should be worn, it should cover body and hands, and be fabricated from a tissue which will not melt upon heat evolution (linen, cotton) and in case of fire would not pose an increased danger.
- 1.4.6 Slip-proof, closed shoes should be worn.
- 1.4.7 During work with high quantities of etching, poisonous or skin damaging chemicals the protection means foreseen for that purpose (gloves, aprons, boots, protective suits) should be carried on.
- 1.4.8 When working in technical installations persons exposed to the danger of falling objects should wear a protection helmet.
- 1.4.9 In the case of burns or high-area skin exposures to corrosive chemicals the emergency body showers (in the laboratory entry door) should be used. Fire-extinction blankets equally serve to the avoidance of serious body burns.
- 1.4.10 The emergency body showers should not be blocked and their function capability should be tested at least once a month.

Breathing protection

- 1.4.11 Work in which dangerous gases, vapours or dust is involved should be conducted in fume hoods. Proper attention should be paid to the fact that not protected persons should not remain in the dangerous area.
- 1.4.12 The so called escape filters have only limited protection activity and should be not used for breath protection in physical or chemical operations (GUV 20.149).
- 1.4.13 Work requiring breathing protection is strongly forbidden in the chemistry department.
Persons which should be allowed to wear breathing protection apparatus are subject to a strict medical check-up and in cases of emergency the use of the apparatus is reserved to those persons.

2 Special chemical activities

2.1 Handling of chemicals

- 2.1.1 Everybody who works with chemical substances should know their properties and the risks associated with them. This normally presupposes a relevant training (literature: Kühn-Birett, **Organikum**, security data sheets und **TGRS** etc...)
- 2.1.2 In the laboratory should be kept only chemicals which are necessary for the ongoing activities. Chemicals no longer needed should be either given back to the reserve chemicals stockroom in the laboratory storehouse or be kept in the appropriate security cabinet.
- 2.1.3 Toxic substances should be always kept under key. This is also valid for materials flammable in contact to air and reacting with water resulting to the formation of flammable or health-endangering gases. Those should be kept in fireproof cabinets only. Oxidizing substances should not be kept in the same cabinet with flammable materials.
Recipients with substances emitting corrosive vapors like bromine, liquid acids, fuming mineral acids, should be kept in corrosion-resistant vessels in exhaust fume cabinets.
- 2.1.4 Containers of chemicals should be described according to Directive for Handling Dangerous Substances **GefStoffV** as following:

Chemical description of the material
Description of the associated dangers
Danger symbol
R-and S- designations

In the case of standard flasks < 1L the chemical description could be replaced by the chemical formula and the R-and S- designations could be omitted.

- 2.1.5 Corrosive or toxic liquids should be transferred without squirting (e.g. by means of a squeeze bottle) or pouring. Suitable transfer devices like transfer pumps, siphons and funnels should be used; the free fall height should be as low as possible. When necessary, face protection (see above) should be carried on.
- 2.1.6 Breakable containers (e.g. glass flasks) with corrosive or toxic content should be transported outside the laboratory only with buckets or transport boxes constructed from acid and solvent-resistant materials.
- 2.1.7 All operations involving corrosive, poisonous, health-endangering or foul-smelling gases, vapours or dusts should be conducted either in exhaust fume hoods with good aspiration or in closed installations with efficient absorption capability. Similar operations of greater extent should be conducted in special rooms (e.g. hydrogen sulphide rooms).
- 2.1.7 Sucking of liquids by means of pipettes or other devices with the mouth is forbidden.

2.2 Flammable substances and liquids

- 2.2.1 The storage of flammable liquids in the workplace is not permitted. Flammable liquids in the workplace should be kept only in quantities needed for the respective day's activity; such quantities should not exceed 5 litres. For keeping and storage the security cabinets available in each group should be used.
- 2.2.2 Larger quantities of flammable liquids should be brought from the storeroom in the laboratory immediately before using. Proper care should be taken for appropriate transport in protection vessels.
- 2.2.3 Easily flammable materials should not be kept in recipients with thin walls. Therefore special security vessels (metal jugs etc.) should be used.

- 2.2.4 If low-boiling flammable liquids like ether, acetone or carbon disulfide are stored in a refrigerators, their interior space should be explosion-proof, this means that the interior space should be free of ignition sources. Such refrigerators should carry the designation "interior space explosion-proof".
- 2.2.5 Flammable materials should not be heated without adequate supervision.
- 2.2.6 The distillation, evaporation and refluxing of flammable liquids should not be performed with an open flame.
- 2.2.7 The heating of volatile flammable substances in open vessels, e.g. on a magnetic stirrer with heating plate is forbidden.
- 2.2.8 Before any activities with flammable materials it should be assured that the necessary fire-extinguishing devices and materials (hand-held fire extinguishers, fire-extinguishing blankets, sand) are available at close proximity.
- 2.2.9 The activities with flammable materials should be performed on a fire-proof support (laboratory table from ceramic, underlying metal plate etc). Below equipment operating during the night, on Sundays and on holidays and containing more that 1L of flammable liquids an appropriately large and not flammable capture vat should be placed. In the case of an eventual explosion it could accept the entire content of the installation.
- 2.2.10 In the case of liquids which could generate peroxides (alkenes, aldehydes, ketones, ethers) the appropriate measures should be taken, i.e. the liquids should be freed from peroxides by appropriate means and should not be evaporated up to dryness. **Explosion danger!**

2.3 **Activities with explosive materials**

- 2.3.1 Working with explosive substances is permitted only in compliance with the respective protection and safety measures. These include:
- the use of the minimum of required quantities
 - eventually full body protection (helmet, face protection, thick leather or plastic aprons, gloves, boots).
 - the covering of the apparatus (protection layers, wire net cages, metal boxes etc.)

These experiments should be conducted uniquely in high-pressure chambers (W3 0-169-172).

2.3.2 Experiments with thermite and similar mixtures should be conducted outdoors without any exception. In this respect particular permission from the locally responsible authorities for each individual case should be obtained.

2.3.3 Residues of explosive substances should be immediately eliminated in the appropriate way.

2.4 Activities with carcinogen materials and materials affecting the reproductive system

2.4.1 In the case of activities with carcinogenic materials extreme care is required. The operations should be performed with quantities as low as possible and under the fume hood.

2.4.2 In the case of activities with carcinogen materials, materials affecting the reproductive system and materials provoking genetic modifications the special interdiction of involvement of adolescents and women of reproductive age as well as the involvement of pregnant women should be obeyed.

2.4.3 Anyone responsible has the obligation to investigate about the harmful effects of any of the above described substances prior to their use according to **§ 16 Abs. 1-3a GefStoffV**.

In particular the following regulations should be followed:

- Law about chemicals, regulation about dangerous materials
- Law of maternity and youth protection in the workplace
- TRGS 451 ad 910

2.5 Handling of liquefied gases (low temperatures)

2.5.1 Liquefied gases should be transported only in the containers (steel-insulated tanks, transport vats) prescribed for that purpose (utilization instructions to be respected).

2.5.2 Liquefied, aggressive, poisonous and health-threatening gases should not be transported outside the laboratory. This is not valid for pressure-gas flasks and other prescribed containers.

2.5.3 In operations with liquid oxygen it should be ascertained that no mixing of it with combustible materials should take place: Explosion danger!

2.6 Handling of vacuum apparatus

2.6.1 In the case of vacuum apparatus only glass-made pieces of equipment suitable for that purpose should be used. Above all they should be tension-free and crack-free.

2.6.2 In the case of vacuum generation (membrane pumps) the operating instructions of the apparatus should be followed. In order to avoid the discharge of harmful material, cooling traps should be introduced.

2.6.3 Glass vessels with flat surfaces like suction flasks and desiccators should be evacuated only if they have strong walls and are expressly suitable for the application of a vacuum.

Such pieces should never be heated! (Never in the drying oven!!!).

2.6.4 Larger glass-made vacuum apparatus, in particular desiccators, should be equipped with broken-glass protection (e.g. narrow-mesh wire net shells, protection slabs in front of the equipment).

2.6.5 In all operations with vacuum safety eyeglasses with side protection should be worn.

2.6.6 Glass-made Dewar flasks should be filled with liquids only if they are dry. If they have been in the past loaded with dry ice, then they tend to implode due to scratches particularly easily. Such Dewar flasks should not be deep-cooled.

2.6.7 In the case of pumping of gases, removal of solvents and other similar operations the pump exhaust should be vented to the fume hood or outdoors through secure hose lines.

2.6.8 In all chemical operations under vacuum a trap should be introduced in front of the pump inlet in order to keep vapors away from the pump. Refrigerated traps should be cooled before the application of vacuum. There is the possibility that solid particles (dust) might be emitted from the installation; in this respect a suitable filter should be introduced in front of the pump.

2.7 Pressure cylinders and apparatus

In the case of operations with high-pressure gas cylinders the user's guide Nr. 4 "Handling of pressure gas cylinders" should be obeyed.

- 2.7.1 Gas cylinders should not be deposited in laboratories.
- 2.7.2 Gas cylinders should be secured against accidents and should not stay free of any support. They should be tied either to holding hooks or to a pillar by means of appropriate chains.
- 2.7.3 The transport of gas cylinders, empty ones included, should take place with the chariot suitable to that purpose under the necessary safety conditions (screwed on protection cap, fastening with security chains).
- 2.7.4 For gas delivery from gas cylinders only the gate valves and the tubes suitable to the particular gas should be used. In particular proper care should be taken that oxygen does not come into contact with fats and oils and acetylene with heavy metals like copper or lead.
- 2.7.5 Gas cylinders should be protected from heat; they should not be placed close to heat sources. Exposure to direct sunlight should be avoided.
- 2.7.6 In cases of use of very toxic, toxic and corrosive pressurized gases small quantities (lecture bottles) should be used whenever possible. In this respect a breathing protection mask with a suitable filter should be kept nearby, in this respect the mask carrier should be qualified and instructed.
- 2.7.7 Operations under high pressure in chemical installations should take place uniquely in properly designed rooms.
- 2.7.8 Operations with autoclaves are allowed to be conducted by people having received the required training and provided that with the user manual instructions are exactly executed.
The user of the autoclaves is responsible for complying with the technical inspection deadlines (**TUV-Überprüfungstermine**).

2.8 Electrical installations

- 2.8.1 The maintenance and eventual modification of fixed electrical installations should be performed solely by the technical service department (Dezernat 4):
- 2.8.2 In rooms with explosion-protected electric installations (solvent storeroom, extraction rooms) only protected (**ex-geschützte**) apparatus should be used.
- 2.8.3 When electric appliances are used in long-term experiments overheating protection should be available.
- 2.8.4 Before being put to use, self-made electrical installations with operational potentials exceeding 40V should be checked and authorized by an electrician or a coworker of the GBI-service section (**GBI-Wartungsabteilung**) The same is valid for alterations in such installations.

3.0 Waste reduction and waste disposal

- 3.1 Chemical special waste should be handled according to the "standard procedures for the disposal of special waste of the Univ. Oldenburg (**Richtlinie für die Entsorgung von Sonderabfällen an der Uni Oldenburg**), in the currently valid version.
- 3.2 Waste and solvents should not be thrown in the sinks. They should be collected in the collection bottles envisaged for that purpose (Labels and containers are available in the Laboratory stockroom).
- 3.3 The waste containers should be kept (when available) in the ventilated waste security cabinets.
- 3.4 In order to keep the quantities of dangerous wastes low only small amounts should be introduced in the reactions.
The re-utilization and recycling e.g. of solvents should be given priority over disposal.

4.0 Behaviour in the case of work-place disruptions

Warn all threatened persons and, if needed, request them to evacuate the room.

Interrupt endangered experiments (switch off gas, electricity and, if needed, water).

- 4.1 All cases of injury, skin attack, poisoning and electric shock should be immediately reported to the responsible working group leader. He decides in this respect whether the person concerned can continue working in the laboratory.
- 4.2 Each one who is starting working in the laboratory should be informed about the availability, the standing place and the handling of the fire extinguishers, the fire extinguishing blankets, the emergency showers, the fire detectors and the medical bandage box.
The participation to the yearly fire extinguishing exercises is the duty of all members of the university and students.
- 4.3 In all stairways and corridors instructions for the steps to follow in the case of fire are posted. Their knowledge is a prerequisite for working in the laboratories.
- 4.4 Fire extinguishers, fire-extinguishing blankets and sand buckets are destined solely for the fight against small generated fires. In the case of bigger fires the fire brigade and the security group of the chemistry department should be warned as soon as possible.
- 4.5 Whoever is not involved in disaster fighting (fire fighting, saving of people) should in the case of fire or other disaster leave immediately the laboratory and move to an appropriate place where taking care that the fire extinguishing and people saving operations are not prevented. When professional fire fighter units enter, their instructions should be followed immediately.
- 4.6 Damage to the technical installations (aeration, heating, sanitary facilities, water supply and waste water drainage) should be reported directly to the **Dezernat 4 (Störfallannahmestelle, service in charge of breakdowns)**.
- 4.7 In days of technical control any operations in which health-endangering, toxic or foul-smelling compounds are involved should be avoided.

- 4.8 In case of breakdown of the ventilation installation any experiments with health-endangering, toxic or foul-smelling substances should immediately stop. The apparatus should be appropriately secured and the fume exhaust hood should be appropriately labelled. Persons in danger should be warned and if necessary requested to quit the room.
- 4.9 In case of electricity interruption all running experiments should be interrupted and appropriately secured.

5.0 Behaviour in danger situations and first help

In the case of dangerous situations calm should prevail and imprudent, rushed behaviour should be avoided

In all helping efforts the individual safety should be safeguarded

Personal safety takes priority over object safety!

5.1 Emergency phone calls:

From all service-destined phones **0-112**

From all other phones **12-112**

the fire brigade (**Feuerwehr**) and the emergency service (**Notdienst**) can be reached.

In emergency calls please give the following information:

Where did the accident happen (building, floor, room)

What happened, Fire, downfall, incidents involving corrosive liquids etc

Which injuries Which kind and body part affected

How many injured Number

Wait for enquiring questions Only put the receiver down, when the rescue service people have terminated the discussion.

After notifying the emergency doctors, colleagues should be posted to the University access roads (main entry and side drive-delivery roads) in order to indicate to the rescue personnel the shortest way to the accident place.

5.2 The responsible director should be immediately informed.

- 5.3 Injured persons should be taken care of and if necessary the first aid care should be undertaken, respiration and cardiac rhythm should be checked.
- 5.4 Injured persons should not be left alone until the doctor arrives.
- 5.5 Persons in danger should be warned and helped to leave the room.
- 5.6 In case of cloth burns the emergency showers should be activated or alternatively the injured should be covered by the fire-extinction blanket.
- 5.7 In case of eye injuries immediately wash for a long time (5-10 min) with water, for that purpose eye showers should be used and then the doctor should be called.
- 5.8 Starting fires should be put down with a fire extinguisher or sand, in this respect one's own safety should be cared.
- 5.9 In the case of bigger fires first secure the work place (shut off town gas and electricity) and then leave by the shortest exit way, in this respect do not use any lift. The respective refuge place should be immediately sought after.