



SAFETY INSTRUCTIONS

General Laboratory Regulations for Research Laboratory Work and Students' Practical Laboratory Courses

When handling dangerous gaseous, liquid or solid substances, please pay attention to the related code of practice and follow the appropriate preventive regulations.

When handling substances the harmlessness of which is not 100 % confirmed (this includes new substances or analytic samples), follow the instructions that are given for hazardous materials.

These materials may be absorbed by the human body by breathing, by resorption over the skin and the mucous membrane and also the digestive tract.

Dangerous substances are materials or preparations that are

explosive (E)	oxidising (O)
extremely flammable (F+)	highly flammable (F)
flammable	highly toxic (T+)
toxic (T)	harmful (Xn)
corrosive (C)	irritant (Xi)
sensitiser	harmful to the environment (N) (R 50 to R 59)
carcinogenic (T, Xn if suspected; R 45, R49)	
may include risk of impaired fertility (T, Xn if suspected; R 60 to R 64)	
may cause heritable genetic damage (T, Xn if suspected; R 46)	
may explode	
or may cause chronic damage in some other way or which produce or set free dangerous or explosive materials or preparations when used.	

It is essential that the rules listed below are strictly obeyed when carrying out any type of work!

1. Basic rules:

- 1.1 It is necessary to keep the work station clean and in good order. It is not allowed to do experimental work when you are alone in the laboratory.
- 1.2 Consult the list of hazardous substances and preparations (e.g., BIA report [list of hazardous substances]) or catalogues of manufacturers or traders or databases containing hazardous substances, to determine the risk group of the substance you are going to handle (pay attention to relevant notices posted on the notice board).
The particular risks (risk phrases shown as R 23, R 45 etc.) and safety phrases (shown as S 1, S 17 etc.) are part of these Safety Instructions.
- 1.3 Strictly avoid to inhale vapours and dust and avoid skin and eye contact. Working with very toxic, toxic and other hazardous substances, malodorous and caustic gases and vapours, materials that are highly flammable or decomposable and strongly fuming substances and those with a high vapour pressure is only allowed in the fume chamber.
When working in special rooms (night rooms, poison rooms etc.), the particular rules that are laid down are to be obeyed.
Avoid any contact with hazardous substances by using safety equipment and behaving properly and by wearing protective clothing.
Carcinogenic substances may only be used for teaching and research purposes if the teaching and research objective cannot be attained without them.
- 1.4 You must wear safety equipment, such as protective glasses, face protection and suitable gloves as indicated in the relevant safety recommendations and special laboratory instructions. If very toxic, toxic or caustic pressurised gases are handled, a gas mask with a suitable filter is to be provided at the work station.

- 1.5 Users of the laboratory must wear safety glasses with side shields at all times; those who normally wear optical glasses may wear additional **over-glasses** or goggles according to W DIN 2, or prescription lens safety glasses. The laboratories provide safety goggles for visitors. Always wear safety glasses when filling and carrying chemicals also outside the laboratory. Chemicals may only be transported in specially designed containers (buckets or carriers).
It is strictly forbidden to transport gas bottles, chemicals, liquefied gases and dry ice in elevators in the presence of people.
- 1.6 Appropriate clothing must be worn in the laboratory at all times (e.g., a cotton laboratory coat). The clothing's burning and melting behaviour should not include a high risk in case of fire. Clothing must cover the body and the arms properly. Laboratory users must wear suitable footwear which covers the feet (i.e., no sandals) and is skidproof.
- 1.7 Chemicals may not be removed from the laboratory without permission. It is prohibited to store chemicals under preparation tables or in cloak rooms etc.
The head of the laboratory has the inventory of chemicals checked once a year for their usability, correct labelling and good condition of containers. He / she is responsible for the correct handing over of chemicals and the proper disposal of residues by leaving staff, graduates etc.
- 1.8 Flammable liquids of the danger classes A1, A2 and B must be stored at work stations in containers with a maximum designated volume of 1 litre. Number and capacity of the containers for the storage of hazardous substances should be limited to the absolute minimum.
All storage bottles must bear labels indicating the chemical's name, the danger symbol and the relevant danger terms. Containers with a capacity larger than one litre must bear labels with full declarations, i.e., including risk and danger terms. It is prohibited to overwrite labels of any type on bottles or to stick new labels on old ones.
- 1.9 Hazardous substances must not be stored in containers that may be confused with containers for foodstuff because of their form or label.
- 1.10 Eating, drinking, smoking, snuffing and storing all kinds of food in the laboratory is prohibited. Smoking is prohibited also in all public areas of the new building of the Chemistry Department.
- 1.11 Drawing in liquids with the mouth (mouth pipetting) is forbidden.
- 1.12 Make sure that all pieces of your flash chromatographic equipment are tightly connected. Never apply more than 0.8 bar pressure to the column.
- 1.13 Combustible liquids that must be stored in a cool place and also decomposable, extremely flammable and highly flammable substances must be stored in refrigerators and deep freezers whose interior is **explosion-proof**. It is important that these devices are labelled accordingly.
Store only firmly sealed, stable and labelled (name of the substance and owner) containers in refrigerators and deep freezers. The latter must be defrosted if necessary. Read the relevant manual.
- 1.14 Make sure that only authorised persons have access to hazardous substances. Unattended rooms must be locked.
Unauthorised persons are not admitted to laboratories.
Very toxic and toxic substances must be **kept under lock and key** by a responsible expert.
- 1.15 Pressure cylinders may remain at the work station only for the time they are used or a test series is conducted (stable storage in a carrier or in chains). Afterwards, take the cylinders back to the storage room (ZGV [central gas control rooms] or the pallet in front of the Western entrance).
The use of toxic and corrosive gases in the laboratory is only allowed in small pressure cylinders that stand on a stable basis directly in the fume chamber.
Store little steel bottles that are not used in the safety cabinet in room 141.
Do not position pressure cylinders in the immediate vicinity of heating elements.
- 1.16 Equipment that contains combustible or thermally unstable substances, must never be heated directly over a free flame, neither above a wire gauze or sand bath.
Fix heating sources in a way that they can easily be removed without affecting the equipment.
All heated equipment with combustible contents must be fitted with coolers to retain volatile combustible substances.

Working with highly flammable liquids (e.g., diethyl ether) and carbon disulphide is only permitted in the designated areas or rooms (distillation...) when the amount used is more than 500 ml (staff) or 200 ml (students). Follow the rules that are laid down for these works and rooms.

Working with smaller quantities in the laboratories or in practical classes requires well functioning exhaust hoods.

It is necessary that the operation of apparatus that requires flowing water is secured in a way that the water flow and the heating are stopped immediately in an emergency (e.g. water leakage). It is prohibited to run solvent distillation units during the night or the weekend.

Equipment, which is operated during the night and heated or cooled, must be placed in night rooms exclusively. Night room rules must be obeyed.

- 1.17 Electrical appliances must be in good technical order and bear a valid safety label.
- 1.18 Make sure you have read the instructions listed below before you start working in the laboratory; obey the contents therein:
- Guidelines for Laboratories (GUV R 120), amended in October 1993; version amended in Jan. 1998: http://regelwerk.unfallkassen.de/daten/regeln/R_120.pdf
 - Emergency Instructions for the Institute of Organic Chemistry and other technical instructions for particularly dangerous substances, groups of substances and works, and also regulations for particular rooms.

Special regulations for practical classes

- 1.19 It is necessary that students are supervised when working in the laboratory. Outside classes, a special permit must be obtained for doing chemical work in the laboratory. Students are only permitted to work in the laboratory if they regularly received safety instructions and are well informed about the regulations that apply for the special work they are going to do.
- 1.20 Students may carry through only such experimental tasks in the laboratory that have been fixed and confirmed in writing by the responsible assistant after a preparatory colloquium. In practical classes for unassigned programmes, students may carry out only such tests that are assigned for them on the notice board.
- 1.21 Chemicals that are necessary for making preparations are distributed to students only after the pre-colloquium and after attestation by the assistant in charge. With their signature in the protocol for chemicals students confirm that they are well informed about the hazardous properties of the distributed substances. They undertake to obey the relevant safety rules for processing chemicals and to follow disposal instructions. Students need a certificate that authorises them to use refrigerators and work in special rooms.
- 1.22 Working with carcinogenic substances and those that may cause heritable genetic damage and include the risk of impaired fertility (cf. 1.3) requires instruction in accordance with the relevant safety rules and the student's signature. Working with these hazardous materials is only permitted in clearly marked fume chambers.
- 1.23 Please return chemicals to their exact position in the chemical cabinets (self service) after use; do not change the arrangement of containers in the cabinet. Pay attention to strict cleanliness and minimum usage of chemicals every time you take chemicals out of the cabinet. A maximum of one litre of combustible liquids of all danger classes may be processed at the same time at one work station. The quantity at 'one work station' includes all combustible liquids or mixtures thereof which are placed ready for chemical experimentation (preparation), processed (actual experimentation), left over after stages of the test (residues) or reworked. The assistant must give written permission if large amounts of solvents are needed at the work station. The volume of one single laboratory bottle must not exceed 250 ml.
- 1.24 In open practical classes, students entering or leaving the laboratory room must sign in or sign out at the signing boards. This rule must be obeyed at all times, even if the laboratory is entered or left only for a short time.

2. General Protective and Safety Equipment

- 2.1 Principally, the front gate of the fume chamber should be closed; make sure the fume hoods function fully.

- 2.2 Make sure you know where the nearest emergency stop switch is located and how it functions. After operating the switch, immediately inform the person that is responsible for the laboratory (for practical student classes: inform the assistant). Operating the stop switch must be limited to emergencies. Inform and warn other persons in the laboratory who use electricity.
- 2.3 It is necessary that the laboratory staff have the full functionality of emergency showers and eye wash units checked monthly. A protocol must be written about the regular checks. In the student laboratory, some students are assigned this task at the first day of the practical classes of each week; in practical classes for students of unassigned programmes, members of the staff take over this task.
- 2.4 Fire extinguishers and sand buckets which have been used, even partially, must be immediately refilled. Any fire extinguisher used (also those with broken seal) must be taken to the Labour Safety Office of the TUD together with the fire report signed by the director of the Institute and exchanged for a fully charged one as soon as possible (students get instructions from their assistant).
All staff and students must be familiar with the type, location and use of fire extinguishers, fire blankets and other fire-fighting equipment.
- 2.5 Make sure that sink traps are filled with water at all times.
Switch off cooling water, also in the membrane pumps, after having finished work in the laboratory.
- 2.6 All first-aid kits that are within the reach of the Institute shall regularly be checked and refilled if necessary by the responsible staff members.

3. Waste Reduction and Disposal

THE SPECIFICATIONS OF THE WASTE DISPOSAL DIRECTIVE OF TU DRESDEN AND THE OPERATIONAL INSTRUCTIONS OF THE INSTITUTE SHALL BE OBEYED.

- 3.1 The amount of hazardous waste shall be reduced by using only small quantities of substances in reactions. Reuse residues in other reactions or rework them (e.g., solvents) instead of disposing.
It is prohibited to dispose of special waste by pouring it down the drains or giving it to the domestic waste. Particular note: it is not allowed to dilute substances to reduce the concentration of waste solutions and mixtures by adding harmless solvents or water to circumvent the set limits and thus be able to dispose of the waste into the public sewer system.
- 3.2 Solvent waste that is produced regularly and in large quantities is collected in labelled extra containers and reworked later. Strictly avoid mixing with other solvents.
- 3.3 Special waste is collected at certain times at the collection point between FFB/Ost and the new building in Mommsenstraße in accordance with the valid operational instructions. As for laboratory classes, collection and disposal of waste is controlled by an assistant or a responsible student. Further regulations may be made by the responsible laboratory lecturer.
- 3.4 **Solvent waste and solutions of organic fine chemicals** are collected separately: halogen-free waste (Merck label container A) and halogenated mixtures (Merck label container B).
(Attention: acetone and halogenated solvents may form explosive mixtures, in particular in the presence of other substances!)
- 3.5 It is necessary that the collection containers can be sealed tightly, their capacity may be 10 l of which only a maximum of 8 l shall be filled. Locate the containers in a safe place (plastic containers of > 5 l must not be used for the collection of solvent waste).
- 3.6 Collection containers are labelled as follows:
solvents (halogen-free), waste code no. 070704,
symbols for hazardous substances F and T, indicating the hazard,

solvent mixtures containing halogenated organic solvents, waste code no. 070703, symbols for hazardous substances F and T, indicating the hazard,

R phrases; S phrases if relevant for the disposal
VbF risk class
name/address of the waste producer

- 3.7 To keep the quantity of waste small in the laboratories, the containers shall be emptied weekly if possible.
- 3.8 The waste that is delivered at the collection point is accompanied by a certificate stating the substances contained. The deliverer confirms with his / her signature that the waste is homogeneous, neutral and free of reactive substances and heavy metals and solid residues.
- 3.9 Waste producers themselves empty the packing drums thereby obeying all labour and safety instructions (goggles, gloves, clothing). Follow the instructions of the responsible collecting staff.
- 3.10 **Solid organic waste** is preferably dissolved in suitable solvent residues and collected as halogen-free (container A) or halogenated solutions (container B). Therefore it is essential that reactive substances are deactivated and detoxicated in advance.
- 3.11 If organic solid waste is produced in great quantities or is dissolved with difficulty so that dissolution would render economically inefficient, deliver it as solid waste at the collection point. Choose a suitable method to pack them safely (wrap the waste, for example, in tightly sealed, chemical-resistant polyethylene bags - use several bags at a time if necessary). Labelling of these bags shall be durable and easy to read: quantity, constituents, date of storage and name of the deliverer (make sure that the waste has been deactivated and detoxicated in advance).
Certificate: contents, quantity, substance, symbol of the hazardous substance, signature
- 3.12 **Inorganic solids** shall be delivered to the collection point in the same way as organic solids. This applies to contaminated absorption materials as well.
Attention: Reactive and corrosive desiccants, such as alkaline metals, NaOH, KOH, CaCl₂, P₂O₅ must in no case be delivered to the collection point without preliminary deactivation!
- 3.13 **Contaminated filter paper** shall be packed in PE bags and brought to the collection point. Indicate the name of the waste producer on the bag.
Attention: Deactivate reactive substances before delivering them (see also 3.10-3.12).
- 3.14 **Contaminated glass**
Use as little as possible of a suitable solvent to pre-clean contaminated glass apparatus so that they can subsequently be washed with water and conventional cleaning agents.
Collect and dispose of the produced solvent residues.
Glass apparatus that cannot be cleaned shall be disposed of as special waste (at the collection point).
- 3.15 **Aqueous waste solutions** are collected according to the following categories:
- saline solutions with halogen-free solvent residues
 - nitric acid solutions
 - solutions containing heavy metals, also with solvent residues

4. Safety Behaviour in Emergencies

If dangerous situations arise, e.g., fire, releases of hazardous gases and liquids, the Emergency Control Plan and the instructions listed below must be obeyed:

- 4.1 Keep calm and collected and avoid overhasty and rash action!
- 4.2 Warn others working in the area, tell them to leave the building if necessary.
- 4.3 Stop experiments that are at a risk, switch off gas, electricity and – if possible – water (cooling water may be left running – if possible).

- 4.4 Report the accident to the director of the Institute or the supervisor and / or head of the laboratory.
- 4.5 If the laboratory room or other areas of the Institute are evacuated, all students and / or members of the staff go to the fire assembly point: square in front of the lecture hall building (take valuables and – in cold weather - overclothing with you). Wait for further instructions.
- 4.6 In case of accidents with dangerous substances that can cause long-term damages or that have resulted in feeling bad or in skin irritations, consult a physician. Inform the superior, the head of the practical class or the assistant about the accident. Ask the Institute's supervisor for an accident report form, fill it in as soon as possible and pass it on to the Labour Safety Office.
- 4.7 Follow the instructions of the Institute's Emergency Control Plan.

5. First Aid Principles

- 5.1 Every time you render first aid, care for your own safety! Make an **EMERGENCY CALL** as soon as possible.
- 5.2 Save injured persons from the area at risk and take them in the open air.
- 5.3 Extinguish fire on clothing.
- 5.4 Use emergency showers after having removed clothing that is contaminated with chemicals; if necessary completely undress persons concerned; clean with water and soap; remove poorly water-soluble substances with polyethylene glycols (BASF) or with *Roticlean* (manuf. by Roth) from the skin and rinse with water.
- 5.5 In case of chemical eyeburns, wash both eyes from outside toward the root of the nose with the eyelids wide open for 10 minutes or longer using a soft tilted water jet or an eye wash station.
- 5.6 Check and monitor breathing and circulation.
- 5.7 If the injured person is conscious, turn onto side in shock position; support legs only slightly above the level of the casualty's heart (max. 10 cm).
- 5.8 If casualty is unconscious but breathes, put into recovery position; if there is no breathing try extending the neck first by means of head tilt and, if breathing again, gently move into recovery position; if casualty is still not breathing, immediately start resuscitation. Use a tube and pay attention to possible intoxication. (check for pulse, if no pulse: cardiopulmonary resuscitation by a paramedic).
- 5.9 Stop the bleeding of wounds, apply dressings thereby using disposable gloves.
- 5.10 Do not leave the casualty alone until paramedics arrive in the place.
- 5.11 Call a physician and provide the following information: name of the chemical and additional information from technical books, poison catalogues or the HOMMEL, save vomit and chemicals.
- 5.12 First care for people than for things!

6. Emergency calls

- 6.1 **FIRE / FIRE BRIGADE:** Dial 112 from any telephone!

Fire alarms are

- at the foot and top of each stair
- on each floor: on both sides of the corridors

6.2 ACCIDENT / EMERGENCY MEDICAL SERVICE (EMS): Dial 112 from any telephone!
EMERGENCY DISPATCHER 0 8042251

6.3 Make your emergency call by providing the following information:

WHERE did the accident happen?	place
WHAT happened?	fire, cauterisations, injuries due to a fall etc.
TYPE of injury?	type of injury and which parts of the body
HOW MANY?	number of persons injured
WAIT!	Hold the line until the emergency dispatcher has definitely finished the call to answer essential questions if necessary.

6.4 health advisers:

Herr Püschel	chemicals distribution	34842
Frau Czerwonka	room E 03	32651
Frau Schulze	room 101	35152

first aid kits: rooms S 07, S 39, E 03, E 07, E 42, 101, 105, 150, 247

7. Other important telephone numbers

UNIVERSITY DOCTOR: Dr. Römer 36199 and 36255

SURGEON: Dr. Spremberg 0 4763184 / 0 4763200 Liebigstraße 24
Dr. Köhler 0 4675220 Liebigstraße 23
(nearest practices of emergency physicians appointed by the GUV Sachsen [Accident Assurance Company for Saxony] – for lists of further appointed emergency doctors see notice boards opposite rooms E 30 and 131)

EYE DOCTOR: Dr. Zenker 0 4726480 Bayreuther Str. 30

HOSPITAL FRIEDRICHSTADT: first aid post 0 4801938
eye clinic 0 480 1840 / 0 480 1823
(house Z; ward 76)

POISON INFORMATION CENTRE: 0 0361 730730

TECHNICAL ACCIDENTS: Central Office for Technical Damages and Accidents at the Technische Universität Dresden 34614, in case of emergencies 34515

8. **Alarm signal:** continuous wailing of the siren

- identify place of fire
- in the case of a minor fire 'first use equipment' (i.e., fire extinguisher, fire blanket or similar) may be used where there is no risk to the individual user; take care of your own safety; do not panic.
- if necessary: secure your working place, switch off electricity and gas if possible
- leave the building by the nearest exit using the stairs. DO NOT USE ELEVATORS.

fire assembly point: square in front of the lecture hall building