

SAFETY FIBULA

(“Sicherheitsfibel”)

Experimental courses OCC / OCF

Contents

1.	Important telephone numbers	3
2.	Trained persons for first aid	3
3.	What is to do in the case of ...	
3.1.	...fire alarm and false alarm	3
3.2.	...accidents	4
3.3.	...poisoning	6
4.	Safety equipment of the Organic Chemistry Building	
4.1.	Safety equipment in the corridors	7
4.2.	First-aid-kits	8
4.3.	UPS	8
4.4.	Extractor hoods	9
4.4.1.	Extractor hoods in the laboratories	9
4.4.2.	Hoods in laboratory A 317	9
4.5.	Laboratories for long-term and overnight experiments	10
4.5.1.	Overnight experiments	10
4.6.	Computers	10
4.7.	Centrifuges	11
4.8.	Electric ovens	11
4.9.	Safety cabinets	11
4.10.	Refridgerators	11
4.11.	Rotatory evaporators	11
4.12.	Autoclaves	12
5.	Practical instructions for laboratories	
5.1.	Oil baths	12
5.2.	Liquid nitrogen	12
6.	Chemicals	
6.1.	Technical instructions („Betriebsanweisungen“).....	13
6.2.	Substitute Materials (“Ersatzstoffe”)	13
6.3.	Characteristics of carcinogenic, genetic materials influencing, or reproduction toxic substances	14
6.4.	Substances with carcinogenic potential	14
6.5.	Substances without R/S-Sentences	15
6.6.	List of dangerous substances according to §15a GefStoffV (old)	15
7.	Disposals of Chemicals	16
8.	Safety lectures	17
9.	References	17

1. Important Telephone Numbers

Fire, Emergency:	<u>4-112</u>
Police:	<u>4-110</u>
Rescue Service:	<u>4-112</u>
Hospital:	<u>0-714-0</u> (only exchange lines)



2. Trained persons for first aid

	Telephone
Marko Spillner	2192 (Lab B103) 2842 (Mass spectrometry, B308)
Monika Ries	2454 (Lab A 204)
Klaus Fischer	2537 (office)

A list of additional trained persons can be found in all first aid kits.

3. What is to do in the case of.....

3.1. ...fire alarm and false alarm

- Use the emergency exits ("**Fluchtwege**") immediately
- Advise all persons to **evacuate** from the building immediately; help persons, if necessary
- Close all doors
- Go to the meeting point („**Sammelplatz**“) (lawn in front of the graphiti wall)
- Inform the group leader or the head of the institute about:
 - persons in the building
 - dangerous experiments which are still in progress
- Leave the meeting point exclusively after allowance of the responsible person
 - responsible are: head of the institute
 - then, leader of the firefighters



The firefighters will be informed automatically after three minutes after the beginning of the fire alarm.

If you erroneously caused a fire alarm, please inform the following persons within three minutes:

Marko Spillner
Klaus Fischer
Wolfgang Schmelzer
Dr. Jan Namyslo
Prof. Dr. Dieter Kaufmann

3.2. ...accidents

1. Rescue the injured person under self-protection

2. Send for professional help by calling telephone no. 4-112



Give the following information:

1. **Wo** ist etwas passiert?
2. **Was** ist passiert?
3. **Wie viele** sind betroffenen/ verletzt?
4. **Wer** meldet?
5. **Warten** auf Rückfragen!

Where did the accident happen?
What happened?
How many persons are injured?
Who is calling?
Wait for questions.

Our address:

**Institut für Organische Chemie
Leibnizstraße 6
Clausthal-Zellerfeld**

Wait for the firefighter and/or police and/or ambulance in front of the building and lead the helping persons to the accident.

3. First aid (to be done while waiting for the doctor)

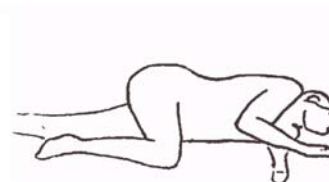
- Loss of consciousness means danger of life !

Reasons: too little O₂ or too much CO₂ in blood



Actions to be taken:

1. Emergency call: 4-112
2. In case of apnoea: 2 x rescue breathing
3. Prove the breathing
4. In the case of respiration: Recovery (lateral) position, fix the head, if necessary. Tilt the victim's head back by placing the heel of one hand on his forehead and the other hand under the bony part of his chin to lift it slightly.



- Rescue breathing / Respiratory restoration

(possible reasons: drowning, electric shock, heart failure, poisoning, or suffocation). The flow of oxygen throughout the body stops within a matter of minutes if a person's respiratory system fails. Heart failure, brain damage, and eventual death will result if the victim's breathing cannot be restarted.

1. Kneel beside the victim, place your ear near his nose and mouth, and watch his chest carefully. You should feel and hear the breaths and see his chest rise and fall if he is breathing.

IF HE IS NOT BREATHING...

1. Provide an open airway. Carefully place the victim on his back and open his mouth. If any material is blocking the airway, it must be cleared out.
2. Tilt the victim's head back by placing the heel of one hand on his forehead and the other hand under the bony part of his chin to lift it slightly.
3. Straddle his thighs, placing one palm slightly above the navel but well below the breastbone. Cover this hand with the other and interlace the fingers.
4. Without bending your elbows, press sharply on the victim's abdomen 6-10 times.
5. Turn the victim's head to one side and sweep out any contents in his mouth with your fingers.
6. If the victim's breathing is not restored after removing the object, reposition his head in the head-tilt/chin-lift position and continue breathing for him as long as is necessary or until help arrives.
7. If there are no signs of breathing, pinch the victim's nostrils closed. Seal your mouth over the victim's mouth and blow two full breaths. A rising chest indicates that air is reaching the lungs. If the stomach is expanding instead, the victim's neck and jaw are positioned improperly. Gently push on the victim's abdomen with the palm of your hand until the air is expelled, because the extra air in the stomach may cause vomiting.
8. Look, listen, and feel again for signs of breathing. If the victim is still not breathing on his own, continue blowing into his mouth one breath every five seconds until help arrives.

- External Bleeding

1. Apply direct pressure. Place a clean, folded cloth over the injured area and firmly apply pressure. If blood soaks through, do not remove it. Instead, cover that cloth with another one and continue to apply pressure to the wound for 7-10 minutes.
2. Elevate the injury. Position the wounded part of the body above the level of the heart if possible while you apply direct pressure.
3. Know the pressure points. If direct pressure and elevation do not sufficiently slow the bloodflow, find a pressure point. Large arteries found close to the skin's surface supply blood to the head and to each arm and leg. The most common pressure points used during first aid are located in the upper arms and in the creases above the upper legs. Apply pressure to the closest pressure point to the wound so that the artery is pressed between your fingers and the bone directly behind the artery. If using the pressure point on a leg, you may need to use the heel of your hand instead of your finger.
4. Resort to a tourniquet. On very rare occasions everything listed above may fail. To prevent the victim from dying, you should apply a tourniquet. Once a tourniquet is applied, it should not be loosened or removed until the victim has reached medical help. Use a tourniquet **ONLY** if everything listed above has failed. If you use a tourniquet, write down somewhere on the victim the time it was applied, so medical personnel will know how long it has been in place.

Additional information can be found in the booklet „Erste Hilfe“ in the first aid kits (s. 4.13., page 14)

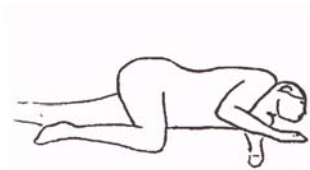
CAUTION: Never transport injured persons by yourself, but call for first-aid-transport by an ambulance van!

3.3. Poisoning

1. Rescue the poisoned person under self-protection!

2. Call for professional help: 4-112

- **call for trained persons in our institute („Ersthelfer“)** (s. list)
- **if the poisoned person is consciousness:** Tilt the victim's head back by placing the heel of **4.** In the case of respiration: Recovery (lateral) position, fix the head, if necessary. Tilt the victim's head back by placing the heel of one hand on his forehead and the other hand under the bony part of his chin to lift it slightly.



3. What is to do:

- **oral poisoning:**
Do not provoke vomiting!
No rescue breathing!
- **contamination of the skin:**
clean poisoned areas with clear water and soap
- **injured eyes:**
use the eye-shower for at least 10 minutes
- **poisoning by inhalation:**
fresh air
No rescue breathing!
In the case of irritating gases: apply „Auxiloson-spray“ (First aid kit in front of the seminar room)

4. Answer questions:

- What? Name of the poison / chemical?
- How ? oral poisoning, imhalation or skin contact?
- When? Get information about exact time of poisoning or first symptoms!
- Why? Suicide intended? Drug abuse? Erraneous?
- How much? Get infromation about amount of poison!
- Condition of the poisoned person?
- Who? Age / Sex / Weight

5. Inform the „Vergiftungszentrale“ (Poisoning Emergency Center), collect information for physician!

Giftinformationszentrum Nord
Pharmakol. u. toxikol. Zentrum der Universität Göttingen,
Robert-Koch-Str. 40
37075 Göttingen
Phone: 0551/19240 Fax: 0551/3831881
e-mail: Giznord@med.uni-goettingen.de
<http://www.giz-nord.de>

6. References:

1. R. Ludewig: *Akute Vergiftungen*, Wissenschaftl. Verlagsges. mbH Stuttgart [SICH 1, OC-library and in office of Dr. Schmidt]
2. W. Braun, A. Dönhardt: *Vergiftungsregister*, Thieme Verlag [S14 OC-library and in office of Dr. Schmidt]

COPY RELEVANT PAGES AND GIVE THESE TO THE PHYSICIAN

4. Safety equipment of the Organic Chemistry Building

4.1. Safety equipment in the corridors

- CO₂ fire extinguisher
- powder fire extinguisher
- sand
- fire blanket
- eye rinse bottle
- first aid kits (cf. chapter 4.13)



Fig. 1: Corridor in A



Fig. 2: Corridor in B



Fig. 3: Powder fire extinguisher in front of fuse boxes of electric power supply

Contingency plans can be found in all corridors. Note the fire alarm button.



Fig. 4: Contingency plans

4.2. First Aid Kits („Erste-Hilfe-Kästen“)

1. **“Erste-Hilfe-Kästen” (white)** for band-aids, gauze bandages and simple material for first aid are located in all corridors of the institute of organic chemistry (cf. Fig. 1 und 2). Responsible person: Marko Spillner. These kits contain a list with names of persons who are trained for first aid („Ersthelfer“).
2. **„Erste-Hilfe-Kästen“ (orange)** can be transported in the emergency case. They are located
 - in front of the students’s labs
 - in front of the seminar room (cf. Fig. 5)

These kits are sealed to guarantee completeness of their contents.

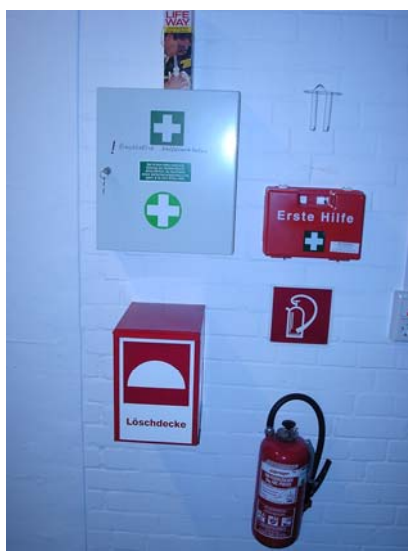


Fig. 5.: First aid kit in front of the seminar room

4.3. Red power outlets UPS (“USV”)

Red power outlets guarantee the uninterruptible power supply (UPS) (“unterbrechungsfreie Stromversorgung USV”) of the institute by means of special batteries and the emergency generator. They are intended **exclusively** for personal computers without screens, printers and so on. Never use these power outlets for heating plates, electric ovens etc.!



Fig. 6: Red power outlets of the UPS

4.4. Extractor Hoods

4.4.1. Extractor hoods in the laboratories

- In general:
- Close the front window!
 - Minimize inflammable materials inside the hood!
 - Experiments in the near of cans with solvent disposals are forbidden!
 - Absorb reactive gases, whenever possible

Four programmes of the hoods are defined:

1. The hoods start automatically at 7:00 a.m. and are automatically switched off at 7.00 p.m.
2. Pushing the green switch of the control unit once leads to additional 120 minutes of hood operation
3. Hoods start automatically at 5:00 a.m. to 5:30 h a.m.
4. Key position „1“: Uninterruptible operation of the hood (allowance of the head of the institute is mandatory!).

After pushing the switch, the systems needs up to 5 minutes to begin operation.

In the case of failure:

- alarm on the display can be switched off by pushing “O“.
- information is submitted electronically to the emergency center of the TU Clausthal
- information is submitted electronically to Klaus Fischer

4.4.2. Hoods in laboratory A 317

The hoods in room A 317, designed for experiments overnight and over prolonged reaction times, can be switched on and off by means of the I/O-switch in the display (cf. **Fig. 7.**). After three minutes, the air flow is regulated automatically. Opening of the window automatically enhances the air flow.



Fig. 7.: *Display of the hoods in room A 317*

The keys serve to activate and deactivate the permanent operation of the hoods.

4.5. Laboratories for long-term and overnight experiments

Two labs are equipped for these purposes, A 117 und A 317. The following rules must be obeyed:

4.5.1. Overnight experiments

.... must be exclusively performed in lab A 117 or A 317.

Take care that....

- ...heating plates are equipped with well-working regulating thermometers (“Kontaktthermometer”)!
- ...oil baths must be filled with PEG-safety oil or silicon oil (for exceptions, see 5.1.)
- ...tubes for cooling water are fixed by metal clamps!
- ...glass connections are fixed by metal clamps!
- ...cooling is surveyed by an automatic cooling water assistant („Wasserwächter“)!
- ...hoods work in the “permanent operation mode” (key)
- ... cans and bottles with chemicals are removed.
- ...two safety sheets are supplied (pdf-files on drive „H” of the intranet); one sheet has to be placed on the window of the hoods, the other at the front doors!
- ...all doors and the windows are closed.

Sicherheits-Formular			
für Reaktionsansätze ab 500 mL Kolbengröße oder bei besonderen Gefahren			
Reaktionsgleichung			
Lösungsmittel: _____			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rückfluß @ _____ °C	Kühlung @ _____ °C	Inertgasatmosphäre	
Versuchsbeginn: ____ : ____ Uhr			
Voraussichtl. Ende: ____ : ____ Uhr			
Mitarbeiter	UNI-Tel	Telefon privat 1	Telefon privat 2
Arbeitskreisleiter	UNI-Tel	Telefon privat 1	Telefon privat 2
Institutsleiter	UNI-Tel	Telefon privat 1	Telefon privat 2
Prof. Dr. D. Kaufmann	2027	0 53 21 / 4 58 39	0170 / 4 81 08 14
Bemerkungen			

Fig 8.: Obligatory safety sheets which must be used while performing over-night experiments (cf. 4.4.1.)

4.6. Computers

Computer and computer screens have to be switched off over night.

4.7. Centrifuges

► See safety instructions

4.8. Electric ovens

► See safety instructions

In general:

- no chemicals!
- no glassware contaminated with organic solvents, as explosions might occur!
- must be switched off overnight.
- no polymers

4.9. Safety Cabinets

... are intended for the storage of

- inflammable solvents
- bottles for more than 1L of chemicals / solvents.

4.10. Refridgerators

Only refridgerators without potential internal ignition sources such as lighting or thermostats may be used in laboratories.

In general:

- only gas-tight bottles may be used
- plugs must be secured by clamps.
- bottles must be fixed safely
- bottles must be labeled with the following information:
(name, lab no., date, contents etc.).
- no comestibles in lab refridgerators

4.11. Rotary evaporators

► See technical instructions

In general:

- Safety equipment for implosions must be present and intact
- never use damaged flasks
- peroxide-containing solvents may not be evaporated to dryness

4.12. Autoclaves

► See technical instructions

In general:

- Autoclaves may be used after instructions by professional persons only

5. Practical instructions for laboratories

5.1. Oil baths

The usage of vegetable oil, vegetable fat, or paraffin in oil baths is not allowed.

Reasons:

- fire hazard
- danger of scalds by spilled oil bath liquid after contact with water.
use silicon- and mineral oil only in exceptional case.

Polyethyleneglycole (PEG) has some advantages as oil bath liquids it is water-soluble and avoids splashing after contact with water even at temperatures <100°C. Please always check the temperature range which you need for your experiments to avoid overheating of the oil baths. Polyethyleneglycole with a flash point of approximately 250 °C may be used as oil bath liquid up to 230 °C. Please refer to the specification of the oil supplier!

Polyethyleneglycole is not suited for

- reactions with nitric acid (use water baths instead)
- reactions with alkali metals or hydrides
(use silicon oil or WOOD´s metal instead)

Never mix distinct types of oils! All oil baths must be labeled so that the oil bath liquid can be identified unambiguously.

5.2. Liquid nitrogen

► See technical instructions

Never pour used liquid nitrogen back into the vessel.

6. Chemicals

6.1. Technical instructions („Betriebsanweisungen“)

Please refer to the internet for technical instructions in English.

6.2. Substitute Materials („Ersatzstoffe“)

1. **Benzene** > Toluene

2. **Benzyl chloride** > Benzyl bromide

3. **Blaugel** > "Orange-Gel"

4. **Chromium / sulfuric acid** > Sulfuric acid / hydrogen peroxide or tensides

5. **Chromiumtrioxid**

6. **Diazomethane** > Trimethylsilyldiazomethane

7. **Dimethyl sulphate** > Iodomethane > Methylsulphonate > Dimethylcarbonate

8. **Kristallviolett** > Ethylviolett

9.

Hexamethylphosphoric acid triamide > 1,3-Dimethyl-2-imidazolidinone
(HMPT oder HMPTA) (Dimethylethylenurea DMEU)
> 1,3-Dimethyltetrahydro-2(1H)-pyrimidinone
(Dimethylpropyleneurea DMPU)
> Dimethylsulphoxide
> 1-Methyl-2-pyrrolidone
(NMP)
> Sulfolane

10.

Methoxymethylchloride > (2-Methoxyethoxy)-methylchloride
(MOM-Cl; Chloromethyl-methylether) (MEM-Cl)
> (2-Chlormethoxyethyl)-trimethylsilane
(SEM-Cl)

11.

N-Nitroso-N-methylurea > Diazald
(N-Methyl-N-nitroso-4-toluenesulphonic acid amide)
> Diazald II
N-[(Nitroso-methyl-amino)methyl]benzamide)
> MNNG
1-Methyl-3-nitro-1-nitrosoguanidine

6.3. Characteristics of carcinogenic, genetic material influencing or reproduction toxic Substances



a) **Symbol** with the following R-sentences (R = risk)

R45 : Can cause cancer

R46 : Can cause hereditary damages

R49 : Can cause cancer on inhalation

R60 : Can influence fertility

R61 : Can damage unborn children



b) **Symbol Xn** with the following R-sentences (R = risk):

R40 : Suspicious to cause cancer

R62 : May influence fertility

R63 : May damage unborn children

R68 : Irreversible damage possible

Caution: The symbol Xn is missing when "C" (irritating), "T" (toxic) or "T⁺" (very toxic) is to be used.

c) **Substance is listed in TRGS 905**

d) **Substance is listed in „MAK- und BAT-Werte-Liste“**

6.4. Substances with carcinogenic potential

1. Aromatic hydrocarbons
2. Aromatic amines
3. Aromatic nitro compounds
4. Hydrazines
5. Alkylating reagents
6. Epoxides
7. Unsaturated compounds
8. Nitrosamines
9. Halogenated aromatic Compounds
10. Some metals

6.5. Substances without R/S-Sentences

Possible causes: 1. substance is not dangerous
 2. substance is not examined

6.6. List of dangerous substances according § 15a GefStoffV (old)

- 6-Amino-2-ethoxynaphthalene
- 4-Aminobiphenyl or salts of this compound
- Asbestos
- Benzidine or salts of this compound
- Bis(chloromethyl)ether
- Cadmium chloride (inhalable)
- Chloromethyl-methylether (MOM-Cl)
- Dimethylcarbamoylechloride
- Hexamethylphosphoric acid triamide (HMPT, HMPTA)
- 2-Naphthylamine or salts of this compound
- 4-Nitrodiphenyl
- 1,3-Propansulton
- N-Nitrosamine compounds, except for:
 - *N*-Nitroso-methyl-*tert.*butylamine
 - *N*-Nitroso-dibenzylamine
 - *N*-Nitroso-dicyclohexylamine
 - *N*-Nitroso-ethyl-*tert.*butylamine
 - *N*-Nitroso-*n*-butyl-*tert.*butylamine
 - *N*-Nitroso-diallylamine
 - *N*-Nitroso-proline
 - *N*-Nitroso-*N*-methyl-3-aminopyridin
 - *N*-Nitroso-*N*-methyl-4-aminopyridine
 - Dinitrosopentamethylentetramine
- Tetranitromethane
- 1,2,3-Trichlorpropane

7. Disposal of Chemicals

Opening hours for the receipt of chemicals for disposal are as follows:

Mo – Thu: 9:00 a.m.– 10:30 a.m. and 2:00 p.m. – 3:00 p.m.
Fridays and before national holidays: 9:00 a.m. – 11:00 a.m.

- In general:
- All chemicals for disposal must be supplied in the purest form possible
 - All cans and bottles must be labeled according to “GefStoffV” unambiguously. Information concerning the contents must be as precise as possible.
 - Use exclusively leak-proof bottles and cans which cannot react with the contents. Seek advice from the staff of the “Chemicals Management Center” (“Chemikalienlager”)
 - Use only clean bottles which are not contaminated on the surface
 - Reactive substances must be chemically deactivated before disposal. Care must be taken that no reaction inside the disposal cans are possible.

Solvents and liquid organic substances (except for oils)

Use exclusively the cans supplied by the staff of the “Chemicals Management Center” (“Chemikalienlager”). Collect solvent mixtures in the purest form possible. Use separated cans for halogen-containing and halogen-free solvents.

Organic and inorganic solids

Do not dissolve organic solids for disposal! Organic solids do not belong into the solvent cans for disposal. Use small flasks (“Schnappdeckelgläser”) and bring the chemicals to the “Chemicals Management Center” („Chemikalienlager“). Deactivate all reactive substances before disposal.

Inorganic liquids

Reagents such as sulphonyl chloride, thionyl chloride etc. must be deactivated before disposal. Look for suited methods in the literature.

Silica gel and aluminum oxide

Disposal in special cans. Seek advice from the staff of the “Chemicals Management Center” („Chemikalienlager“).

Used Oils

Oils (from vacuum pumps, oil baths etc.) are collected in the “Chemicals Management Center” („Chemikalienlager“). Seek advice from the staff.

Mercury

1. Spilled mercury in small amounts must be absorbed with suitable materials (e.g. „Mercurisorb“); Sulphur or zinc as absorbants are not allowed.
2. Large amounts of mercury must be disposed separately from inorganic or organic solids.
3. Salts of mercury must be disposed as inorganic solids

Filter papers, tlc plates

...must be collected separately and disposed in special cans

Cannulae

.... must be collected in special yellow cans for disposal.

Broken glasware

....must be disposed in clean form and without any labels in the bottle bank at the rear of the institute. Laboratory glass is normal waste, as it cannot be recycled.

Styropor and packages

....are collected in front of the repair shop of Klaus Fischer.

8. Safety Lectures

Participation is necessary once per semester and before you start any experiments as a newcomer. Your signature is mandatory BEFORE you start your work. The safety lecture will be held at the beginning of each semester.

9. References

1. Information by Dr. Thomas Lehmann, FU Berlin.
2. <http://www.tu-clausthal.de/gsv>
3. Chemikaliengesetz: <http://bundesrecht.juris.de/bundesrecht/chemg/>
4. Arbeitsschutzgesetz: <http://bundesrecht.juris.de/bundesrecht/arbschg/index.html>
5. Arbeitsschutzgesetz: http://www.lfas.bayern.de/recht/arbschg/arbschg_ix.htm
6. Brandschutz: <http://www2.his.de/Abt3/Umweltschutz/pdf/Kib/kib199802.pdf>

Safety instructions:

1. <http://www.chemie.fu-berlin.de/chemistry/index.html#safety>
2. <http://www.chemie.uni-freiburg.de/orgbio/brueck/w3br/index.php?cid=0106&cid2=01>
3. http://www-organik.chemie.uni-wuerzburg.de/misc/betr_ein/betr_ein.html

Poisoning; Informationen for the Doctors

1. R. Ludewig, Akute Vergiftungen, 9. Aufl., Wissenschaftliche Verlagsgesellschaft mbH Stuttgart, 1999 (OC-Bibliothek).
2. W. Braun, A. Dönhardt, Vergiftungsregister, 3. Aufl., Thieme Verlag, 1982 (OC-Bibliothek).