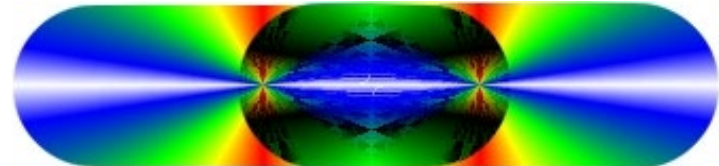


WESTFÄLISCHE  
WILHELMS-UNIVERSITÄT  
MÜNSTER

# Safety work in (chemical) labs

- What's to do and what's not to do



Thats me:

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## Laws and regulations

- Arbeitsschutzgesetz (ArbSchG) [Labour protection laws]
- Gefahrstoffverordnung (GefStoffV) [Direction on hazardous materials]
- Betriebssicherheitsverordnung (BetrSichV) [Ordinance on reliability]
- Technische Regeln für Gefahrstoffe (TRGS) [Accident prevention regulations]
- Unfallverhütungsvorschrift (UVV) [Technical regulations on hazardous materials]



## General Operating Instructions and Lab Rules

for working in labs of the Physics as well as CeNTech.

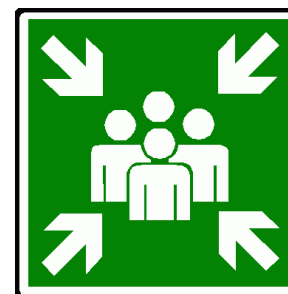
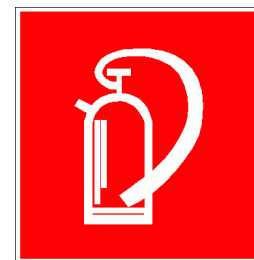
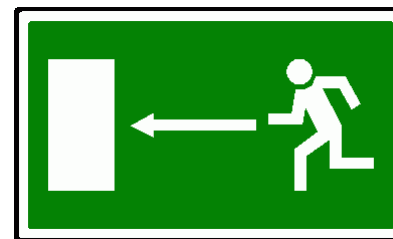
At all work the regulations specified here has to be kept.

The following papers are to be read and their contents are to be considered:

- Guidelines for laboratories
- General accident prevention regulations
- Safety booklet of WWU (Sicherheitsfibel)
- Fire prevention regulations of WWU
- Facility rules of Physics

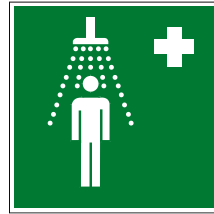
## General behavior in case of emergency

- Switch off power, gas and water supply (**Not-Aus**)
- Rescue people (mind yourself)
- In case of accident, fire etc. call for help  
**Fire brigade 112**, service department **33333**
  - **W**hat is happend ?
  - **W**here is it happend ?
  - (How many persons are injured ?)
  - (Who is calling ?)
  - **W**ait (for questions) !
- Warn other people
- Observe the emergency plan
- Introduce the emergency brigade
- In case of fire don't use the elevator





# Symboles ...



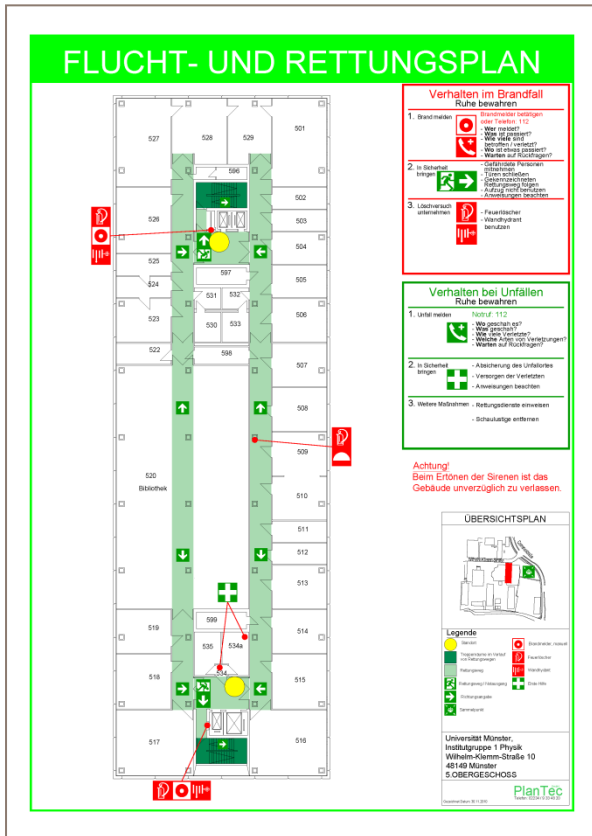
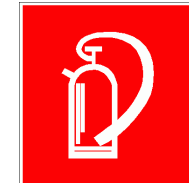
Sanitätsraum



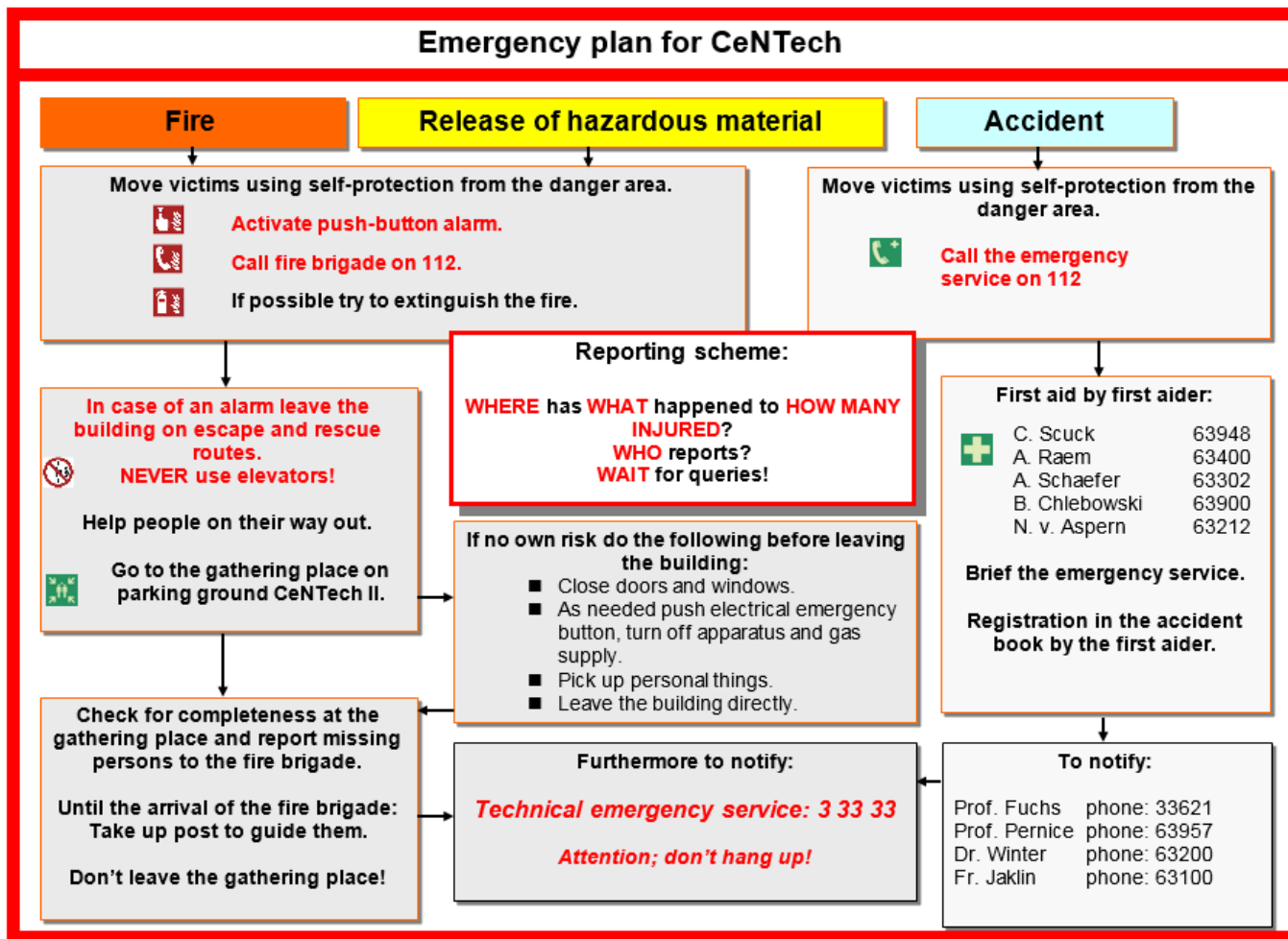
First aid kit:

See notices for alert plans and escape plans,  
ask the safety inspector.

Fire extinguisher, Fire detector



## Emergency plan for CeNTech





## What's to do in case of danger?

### **NO PANIC**

Stop any activity

Close doors but don't lock them

Get injured people under shelter

Warn other people

Use emergency exits

Seek accumulation points

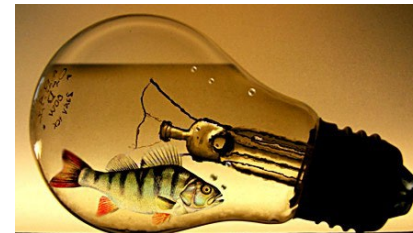
Check for completeness

Wait for orders

Only the fire brigade releases the building



## Matters of course, part 1



- Always wear goggles, lab coats and sturdy shoes inside the labs
- Do not wear or store lab coats in the office
- Do not touch door handles, phones, keyboards etc. with contaminated gloves
- **No eating, no drink, no smoking, no cosmetics** in the labs
- Familiarize with safety installations (e.g. fire extinguisher, first aid kits, fire blanket, showers, emergency pathways and emergency exits)
- Handle (hazardous) chemicals with care
- Handle toxic materials only in fume hoods and wear gloves (**keep in mind: the density of latex gloves is limited [max. 30 min.]**)

## Matters of course, part 2

- Keep toxic materials under lock
- Avoid the release of toxic materials especially gases and aerosols
- Keep fume hoods closed when nobody is working there
- Keep solvent cabinets closed
- Only store little amounts of chemicals in the lab during the working time
- Leave labs and devices in proper condition after use
- Do not bypass or demount safety equipments
- Journalize ALL injuries (**Verbandbuch**)



## Hazardous materials

Hazardous materials are substances or preparations, which are



harmful, corrosive, dangerous for the environment, flammable, oxidizing, explosive, toxic, carcinogenic, teratogenic, mutagenic,

have other chronically harmful properties or from which dangerous or explosive substances or preparations may be derived or be released.

Substances of unknown hazardousness have to be handled like hazardous materials. Hazardous materials can be incorporated by inhalation through the lungs or absorption through the skin, the mucous membranes or the digestive tract.



## Hazardous materials

Also hazardous materials are:

- Radioactive substances
- Dangerous biological materials from biotechnology and genetic engineering
- Materials which can transfer pathogens

## Basic rules, part 1



- Without having received a safety instruction it is not permitted to enter any lab, use any technical devices or chemicals.
- Before starting work check all equipment by visual control concerning integrity.
- Before handling hazardous materials make sure you are aware of the risks and hazards of these materials (e.g. using chemical catalogues, safety data sheets).
- Hazard (“H-phrases”) and precautionary (“P-phrases”) of used chemicals must be known.
- Hazardous materials has not be kept or stored in containers which could be confused with foodstuffs.

## Basic rules, part 2



- Flammable solvents as well as flammable and highly flammable materials may only be kept in refrigerators with explosion-proof interiors.
- In the case of drying materials which could release hazardous, explosive vapors in a dry oven, protective measures against bursting must be taken.
- Flammable solvents has to be kept in the laboratory only in amounts *necessary for the work in hand*. Larger amounts of solvents have to be stored in the safety cabinets (working place: max. 1 L, solvent cabinet: max. 5 L in glass bottles, max. 10 L in break-proof containers).

## Basic rules, part 3

Every laboratory storage bottle has to be labelled with the name of the substance and the hazard symbols and H- and P-phrases.

		<p><b>Diethylzink</b>            EG-Nr.: 209-161-3; EG-Kennzeichnung 500 g <span style="float: right;">CAS: 557-20-0</span></p>	<p>Texte:</p> <p>H</p> <p>EUH</p> <p>P</p>
		<p>Entzündet sich in Berührung mit Luft von selbst. In Berührung mit Wasser entstehen entzündbare Gase, die sich spontan entzünden können. Verursacht schwere Verätzungen der Haut und schwere Augenschäden. Sehr giftig für Wasserorganismen mit langfristiger Wirkung.            Reagiert heftig mit Wasser.            Von Hitze / Funken / offener Flamme / heißen Oberflächen fernhalten. Nicht rauchen. Freisetzung in die Umwelt vermeiden. Schutzhandschuhe / Schutzkleidung / Augenschutz / Gesichtsschutz tragen.            BEI KONTAKT MIT DEN AUGEN: Einige Minuten lang behutsam mit Wasser ausspülen. Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter ausspülen. Bei Exposition oder Unwohlsein: Sofort GIFTINFORMATIONSZENTRUM oder Arzt anrufen.            Nur für gewerbliche Verbraucher!</p>	
		<p><b>Inverkehrbringer</b>  <b>PLZ, Ort</b>  <b>Straße und Hausnummer</b>  <b>Telefonnummer für Unfälle</b></p>	

## Basic rules, part 4



- Inhalation of vapours and dusts as well as contact of hazardous materials with skin and eyes is to be avoided.
- Keep lab doors closed.
- Keep the amount of hazardous materials as low as possible.
- High reactive materials (e.g. alkaline metals, peroxides, hydrides, Raney-nickel) must be converted into less hazardous materials directly after usage.
- Female employees are obliged to report a pregnancy to the management of the Institute immediately (according to § 5 MuSchG – Act for the Protection of Mothers in the Workplace).



## Basic rules, part 5



- The use of potential harmful chemicals only is permitted after agreement with the group leader. Before starting any work the conditions of waste disposal must be clear.
- Vessels with used liquid chemicals has to be closed in a way that no overpressure will occur (caps with valve). The vessels must be stored in safety cabinets which are connected to the exhaust system.
- For security reasons any work with chemicals is prohibited if the tap water is cut off.
- Unattended experiments has to be labeled explicitly (kind of experiment/ reaction, date, run-time, name, phone number for contact).

## Basic rules, part 6



- Any experimental work should be done during the normal working time (7:00 to 19:00). At least one second person must be present near by.
- If any damages of devices are determined (e.g. damaged gas lines, power lines, water pipes, safety equipment, electrical insulation) take action to repair it immediately. In case of visible failure the use of the device has to stop until it is repaired.
- The radionuclide lab only has to be entered in presence of an authorized person. Only people who got a valid briefing from the radiation protection officer are allowed to work inside the control zone.

## No go, part 1



- Do not build up stumble-traps (do not store any stuff in the area of motion)
- Do not use gas bottles without fixing them (clamp on the wall)
- Do not use vacuum devices without protection shields
- Do not deposit waste in the drains (there is no neutralization in CeNTech!)
- Do not switch on/off devices without detailed instructions (high voltage pulses!)

## No go, part 2



- Do not enter the laser room without eye protection when laser works (watch the laser sign outside the lab!)
- Do not enter the clean room without clean room clothes (incl. head and foot cover)
- Do not handle liquid Nitrogen without protection (eye, hand, body)
- Do not breath or sniff nano particles (nobody knows what's going on yet)
- Do not convert labs to discotheques (loud music drowns cries for help!)



## Preventive occupational medical care

- Employees have the right to induce medical investigations by own request (**Wunschvorsorge**).
- In case of certain hazards the employer has to offer medical investigations (**Angebotsvorsorge**).
- In case of significant hazards a medical investigation is mandated (**Pflichtvorsorge**).
- Preventive occupational medical care is done by the company medical officer.
- The results are stored in a precaution register.

## Liquid Nitrogen



Only to be handled by instructed people.

Consider instruction manual for decanting and transport of liquid Nitrogen.

Use protective equipment

- protection apron
- protection goggles
- protection gloves

Sufficient ventilation

## Use protection equipment ...

**WRONG**



**RIGHT**



## Use of freight elevator / passenger elevator ...

**WRONG**



**RIGHT**



No transport of liquid Nitrogen in the passenger elevator!  
No transport of people in the freight elevator!



## Hazards of liquid Nitrogen



**Risk of suffocation!** 1 liter liquid Nitrogen = 700 liters gas (0,7 m<sup>3</sup>).  
Gaseous Nitrogen is more heavy than air and replaces Oxygen in air tight rooms.

O <sub>2</sub> -concentration	Symptomes
21 Vol% - 18 Vol%	reduced efficiency, → raised accident risk
18 Vol% - 13 Vol%	headache, nausea, dizzy, edema of the lungs
13 Vol% - 10 Vol%	blackout → infantile brain damage
< 10 Vol%	without live-saving measures → exitus

### Danger of extreme freezes!

Liquid Nitrogen is a cryogenic liquid with boiling point at -196 ° C.



## Where to find ...

### First aid kits:

CeNTech I:            01.10 (first aid room)

CeNTech II:            Il 2.13 (office, team assistant)  
                              Il 2.16 (tea kitchen)  
                              Il 2.03 (lab)

### Safety data sheets:

On request



## Waste collection / storage:

- Organic solvents: 10 L plastic cans
- Acids, bases: 10 L plastic cans
- Solids: 30 L wide necked barrels
- Heavy metals: aqueous acidic solution in plastic cans
- Syringes, needles, sharp-edged stuff: “Rigi-Boxes”
- Silica gel: original barrels (alternatively: 30 L wide necked barrels)
- Glass (**NO LAB GLASS!**): clean and dry in glass container (without caps!)





## Fire and emergency phone numbers

### Fire and emergency call: 112

**First aider:** Maria Jaklin (CeNTech), Tel.: -63100  
Nicole Altmann (CeNTech), Tel.: -63911  
Mr. Heemann (PI), 1. OG, Tel.: -36319  
Mr. Silder (PI), 3. OG, Tel.: -33663 (PI)

The medical care is carried out in different medical facilities:

**Eye injury :** **Augenklinik**, Domagkstr. 16, 48149 Münster  
Gate (during daytime): phone: (83) -56001 / -56002  
Station 2 (at night): phone: (83)-56029

**Toxication :** **Zentralklinikum**, Albert-Schweitzer-Str. 33, 48149 Münster  
For admission: phone: (83)-47528  
Intensive care: phone: (83)-47550 / -46245

**All other injuries :** **Chirurgische Klinik**, Jungeblodtplatz 1, 48149 Münster  
Gate (24 hours): phone: (83)-56301 / -56302  
Policlinic (daytime): phone: (83)-56313  
Emergency room: phone: (83)-56312



## Additional phone numbers

- Fire brigade / emergency call: 112
- Service department: 3 33 33
- Administrative department: 2 57 96
- Company medical office: 5 60 81, 5 58 26



## Information on the web

- <https://sso.uni-muenster.de/Physik.PI/Institut/Sicherheit/sicherheit.html>
- [http://www.uni-muenster.de/Rektorat/Sicherheit/as/as\\_inx.htm](http://www.uni-muenster.de/Rektorat/Sicherheit/as/as_inx.htm)
- [http://www.uni-muenster.de/Rektorat/Sicherheit/org/org\\_inx.htm](http://www.uni-muenster.de/Rektorat/Sicherheit/org/org_inx.htm)
- <http://unfallkasse-nrw.de/>

## Information on the web

- <https://www.unfallkasse-nrw.de/service/medien/regeln-und-schriften/regeln.html>
- <http://www.bc-verlag.de/UVVen/inh.htm>
- <http://www.uni-muenster.de/imperia/md/content/wwu/sicherheit/org/sifio3.pdf>
- [http://www.uni-muenster.de/imperia/md/content/wwu/sicherheit/org/ho\\_98.pdf](http://www.uni-muenster.de/imperia/md/content/wwu/sicherheit/org/ho_98.pdf)
- <http://bgi850-o.vur.jedermann.de/index.jsp>
- <https://sso.uni-muenster.de/intern/offiziell/notfall/index.html>



## Damaris

### Dangerous Materials Registry Information System\_Version 2



University wide list of dangerous materials of all working groups and labs.  
Access must be applied.

## IT-Security

- Don't connect USB sticks to computers without virus check (80 % of all infections are caused by USB sticks).
- Back up your data frequently.
- If applicable encrypt your data (e.g. Bitlocker).
- Don't store official data out of the University.
- Don't store data on the desktop of your computer (better use links).
- Don't forward mails to external recipients.
- Keep private computers (pLANet.X, WLAN) on an up to date patch level (system, antivirus-software, frequently used programmes).
- Don't install software from „dubious“ sources.
- Don't use Java and Flash player.
- Don't open mail attachments unconsidered (check header before!).
- Don't click any link unconsidered (watch the preview in the tray!).
- Keep passwords in a safe way and don't give it away.
- [www.wwu.de/iv-sicherheit/flyer](http://www.wwu.de/iv-sicherheit/flyer).

























