

5. Top Eight of the Non-Compliances of Good Laboratory Practice

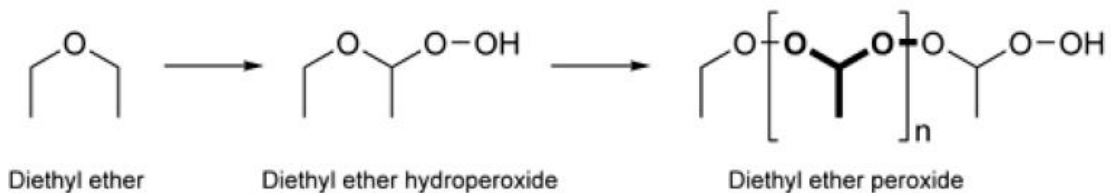
All pictures in the following slides were taken during routine laboratory inspections. They are real photos and were not taken from the internet.

Number 1:

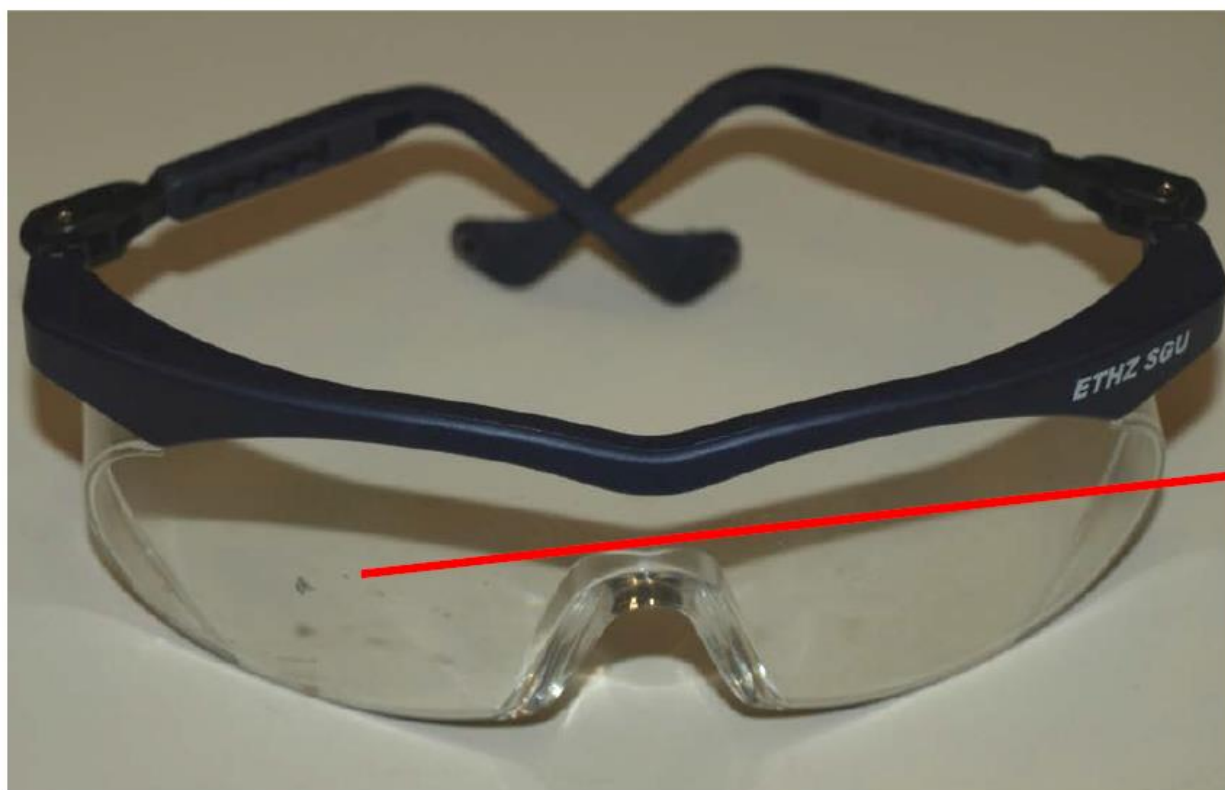
Failure to wear safety goggles

There is no argument for this issue. You only get one pair of eyes in your lifetime. Protect them!

Diethyletherperoxide

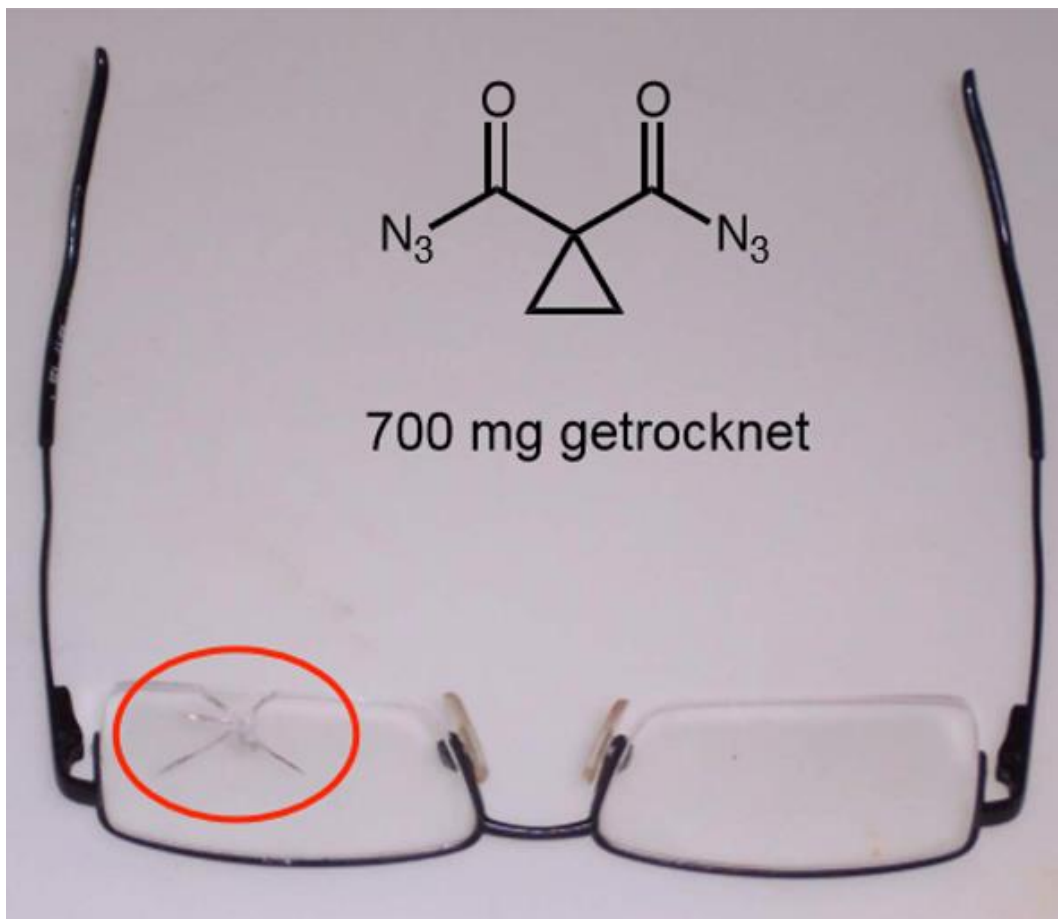


Pictures: **Safety goggle after Diethyletherperoxide-explosion**



Reminder: contact lenses are forbidden in chemical laboratories; **reading glasses are not safety goggles** – they do not offer sufficient protection.

Reading glass after acyl-azide-explosion accident



Chemical labs: Attention!

Not appropriate!



Appropriate!



Keep reminding!



Insufficient protection....

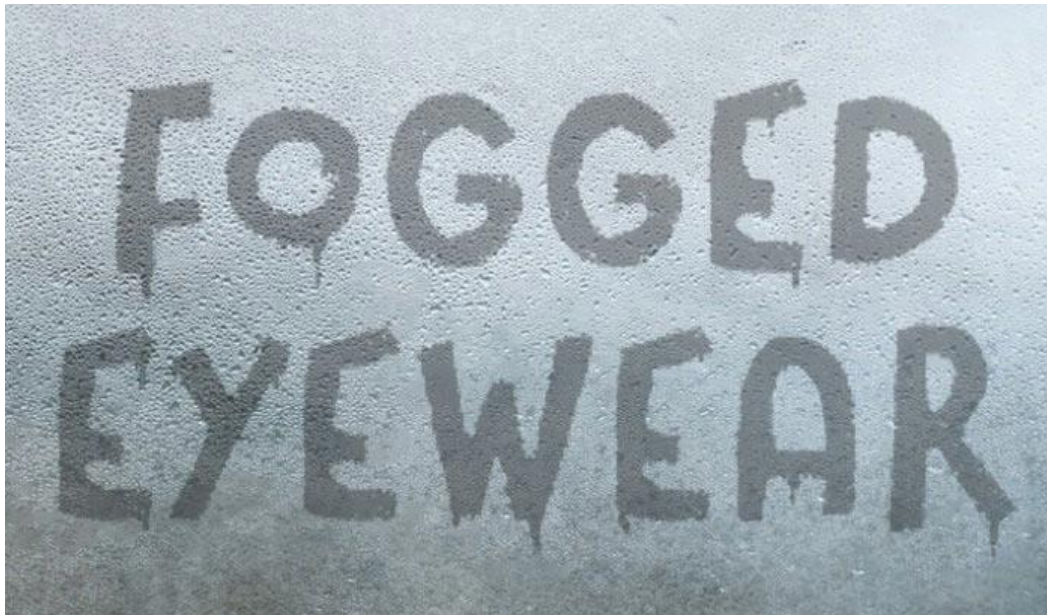
- Without safety goggles!
- With ill-fitting goggles and open gaps!

Reminder: contact lenses are forbidden in chemical laboratories; reading glasses are not safety goggles.

Sufficient protection!

We are happy to help! Contact:
Safety officers, assistants, HCI-Shop

With the so-called “diver goggle” **is the danger of the inside fogging**. You don't always have to wear these. But if there's a risk of splashing, use these.



Obligatory fit and quality check of safety goggles:

Before new employees and students can work in the laboratories, the **safety officer or assistant** must check the fit and quality of their safety goggles. The safety officers and assistants should specifically check whether there are any open gaps when wearing the safety glasses where liquid could splash in the face. In case of poor fitting of the goggles, a better version must be purchased in the HCl shop.

Important: A **contaminated eye** must always be rinsed with water for at least 10-15 minutes! ***Two-people method:*** One person holds the contaminated eye open while the other flushes the eye with water.



Important: Accident victim have always to go in eye clinic or to the doctor for a medical eye check (with accompanying of an employee).

Number 2: Wearing lab coats outside the lab. Not wearing lab coats at all.

Lab coats are used to protect our skin and clothes from chemicals and dirt. Accordingly, lab coats should be washed regularly and renewed as needed.



safe side

dangerous side

hair bound

No sharp objects

No watch, jewelry

Clean Lab Coat

Closed shoes



open hair

Necklaces

Scarves

Sharp objects

watch

jewelry

Dirty Lab Coat

Open shoes

Before you leave the laboratory, hang your lab coat on the coat rack. Never go to public areas with dirty lab coats.



PLEASE
**Remove Lab Coats
Before Entering**
Mensa!



Enjoy your Food without chemicals!

**REMINDER: GAS MODULES ARE NOT COAT HANGERS!
USING THEM AS SUCH WILL DESTROY THE REGULATION VALVES.**



In addition: Always take off your gloves when you leave your laboratory, even if you did not work with dangerous chemicals.



**Remove gloves before
leaving lab!**

Number 3: Eating and drinking in the laboratory

Alcohol/Drugs =
Concentration loss,
Misjudgment

Don't believe me?
Have a look at what
we found during the
laboratory service
inspection!...





Beer Fridge

Carl Theodor	1 CHF
Löwenbräu	2 CHF
Budweiser Budvar	2 CHF

HAPPY HOUR
16.00 to 17.00 every Friday**

Fick dir







PhD students Flow Chart

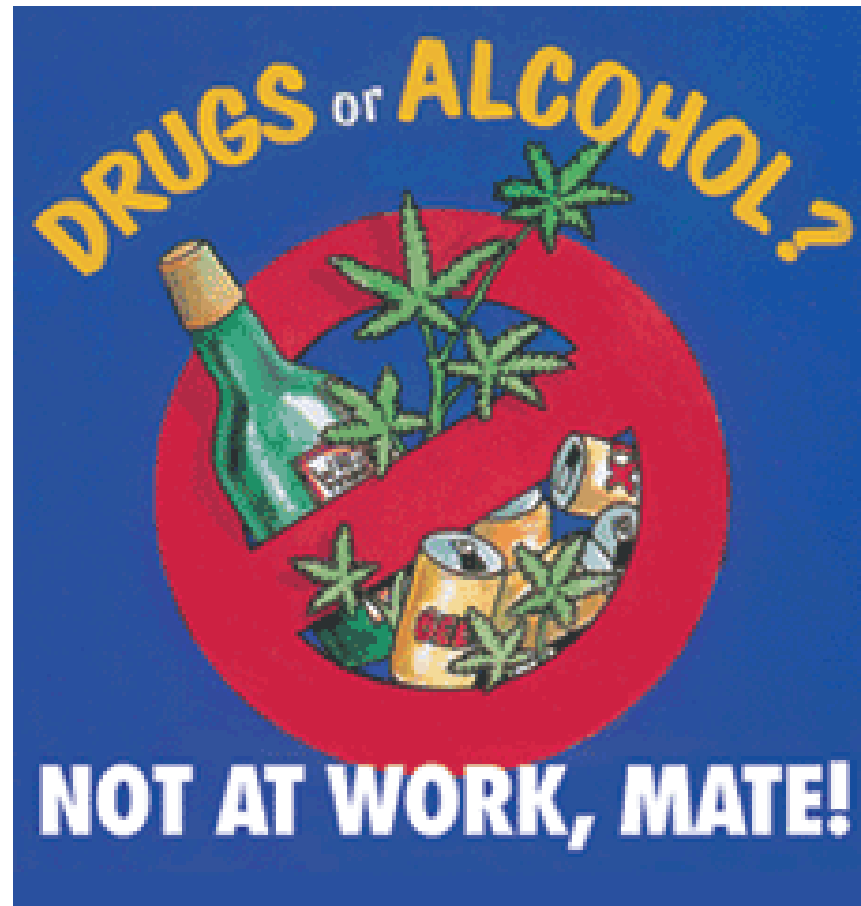


Drink a beer!

In addition to drinking alcohol: Students have been throwing parties



Remember: Just as drugs and alcohol are forbidden when driving, the same laws and rules apply to work of any kind, and are especially dangerous and forbidden in laboratories.



Eating in the laboratory is strictly forbidden, stupid and extremely dangerous.





What many people don't know: The use of empty food, cosmetic and pharmaceutical containers as storage for chemicals of any kind is strictly prohibited.

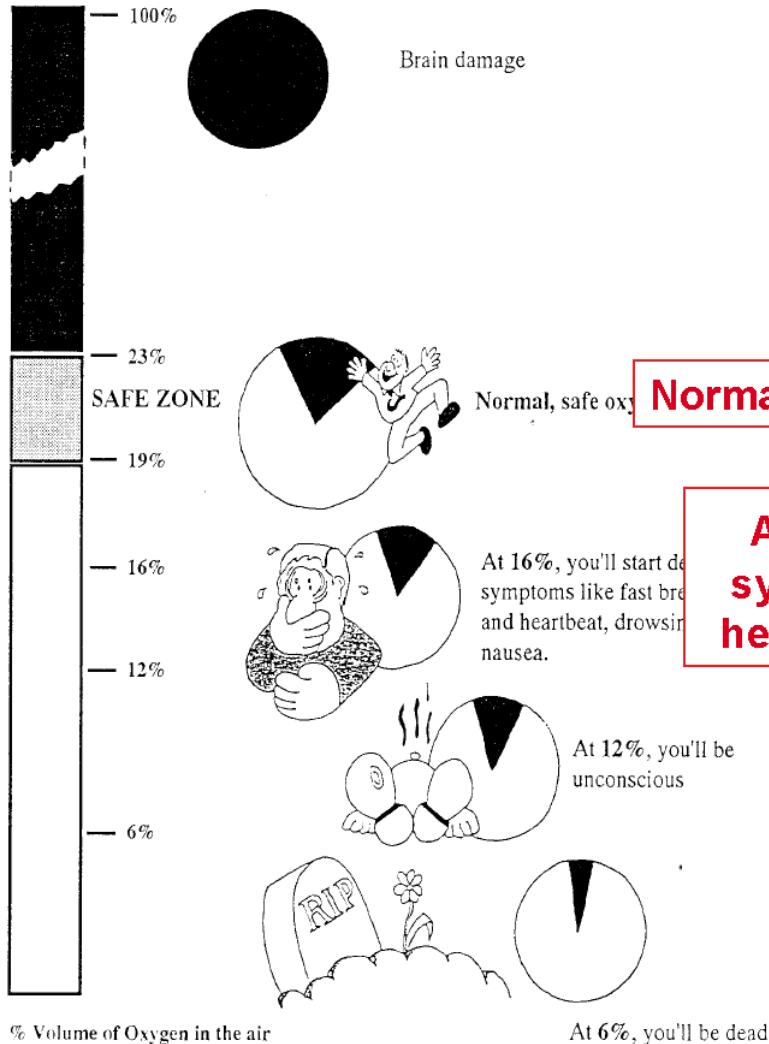


Important: Samples that are being used for analysis or other laboratory experiments must be clearly labeled as such.



Number 4: Careless handling with Dry Ice, CO₂ and LN₂

In closed or small rooms, the invisible killers CO₂ and LN₂ can reduce the oxygen in the breathing Air



Oxygen O₂

Normal Safe Oxygen Levels

At 16%, you'll start developing symptoms like fast breathing and heartbeat, drowsiness and nausea

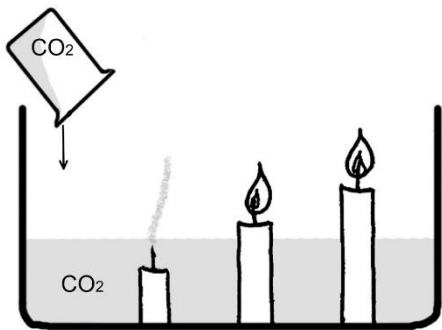
At 12%, you'll be unconscious

At 6%, you'll be dead

CO₂ is an invisible killer. Symptoms of carbon dioxide toxicity include high blood pressure, flushed skin, headache and twitching muscles. At higher levels, you could experience panic, irregular heartbeat, hallucinations, vomited and potentially unconsciousness or even death.



Volume % in air	
1%	Green
3%	Blue
5%	Purple
8%	Red



Main symptoms of Carbon dioxide toxicity

**Volume %
in air**

- 1%
- 3%
- 5%
- 8%

Visual

- Dimmed sight

Auditory

- Reduced hearing

Central

- Drowsiness
- Mild narcosis
- Dizziness
- Confusion
- Headache
- Unconsciousness

Skin

- Sweating

Respiratory

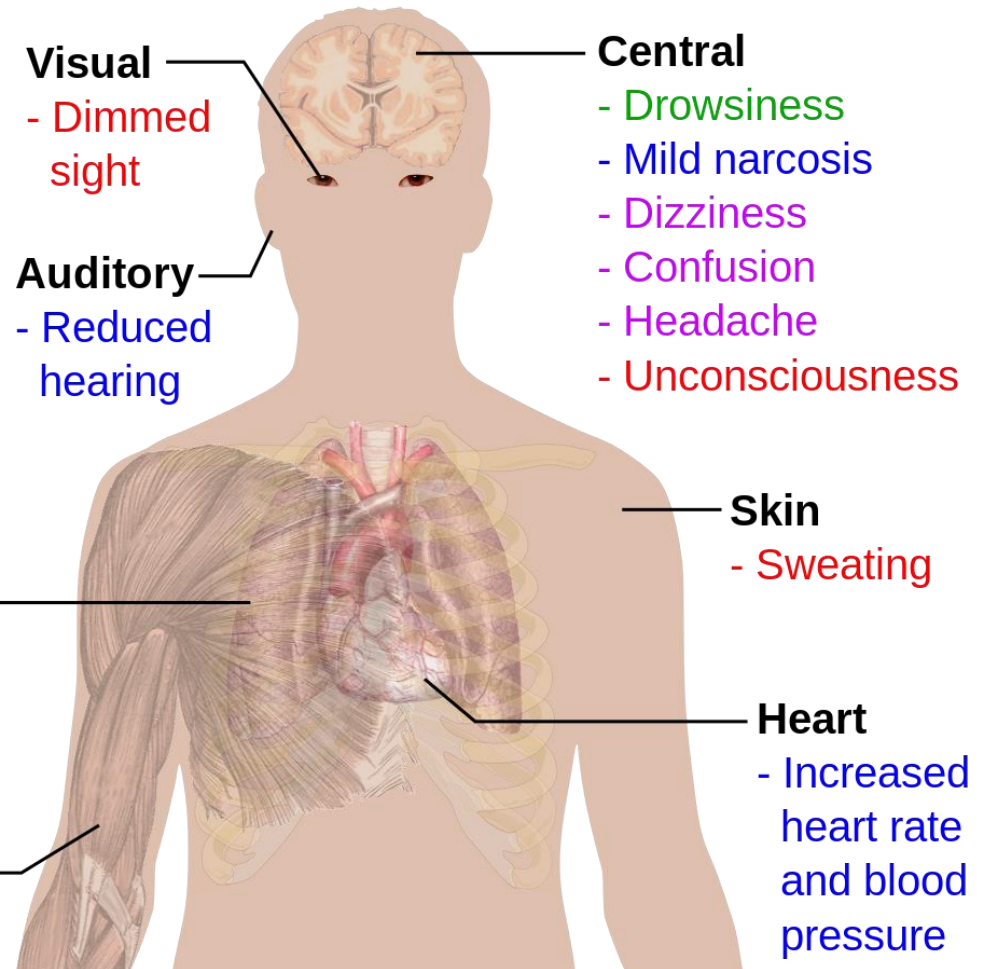
- Shortness of breath

Heart

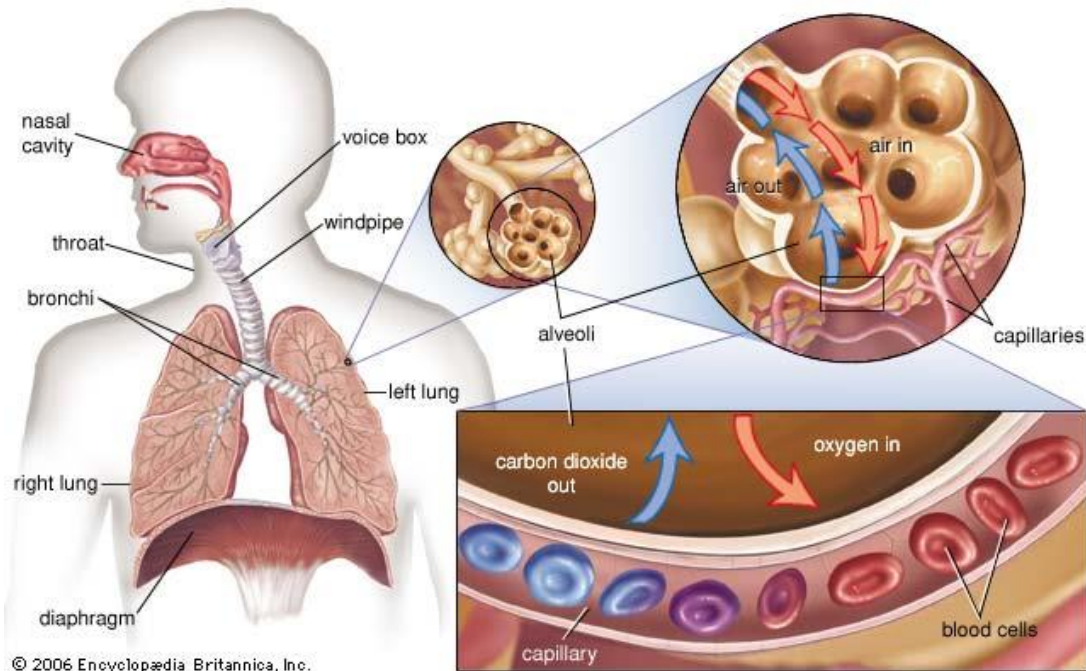
- Increased heart rate and blood pressure

Muscular

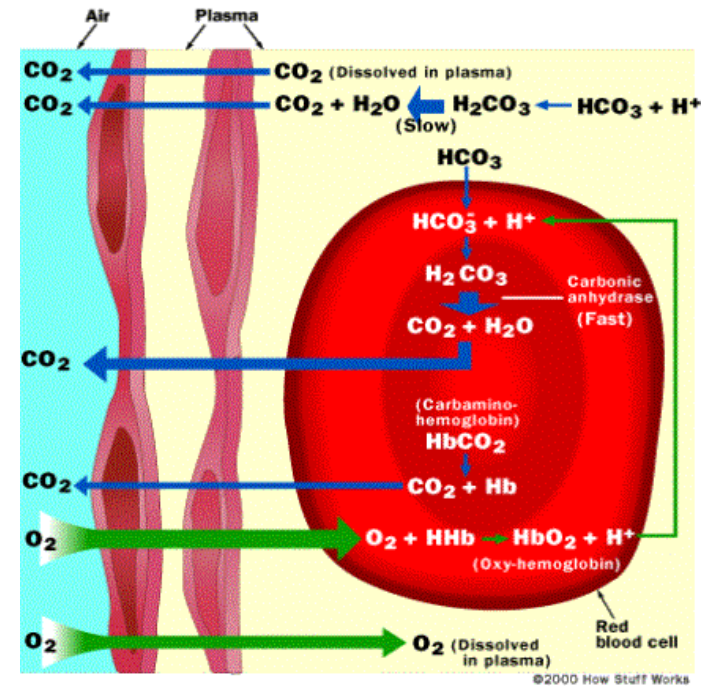
- Tremor



In the blood, carbon dioxide dissolved in physiological and slightly increased concentration activates the respiratory center of the brain. **In extreme cases, higher amounts of CO₂ can lead to respiratory arrest.**



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CO₂ can cause poisoning

Example: -80°C Deep Freezers. Using the CO₂ back-up system, temperature can be maintained between -50° C and -70° C. In closed or small rooms there is a risk that the CO₂ content in the air increases, caused by leaks.



CO₂ is an invisible killer. Where CO₂ is stored and handled in large quantities, required a gas monitoring.



Store dry ice in an insulated container, but not in those where overpressure can build up. The thicker the insulation, the slower it will sublimate. Keep **proper air ventilation** wherever Dry Ice is stored. Do not store Dry Ice in unventilated rooms, cellars or autos. The sublimated Carbon Dioxide gas will sink to low areas and replace oxygenated air. Inhalation of the gases can lead to poisoning or even suffocation.

Never store dry ice in - 80°C - Freezers. Furthermore, frozen products must be stored in clearly labeled racks instead of in a chaotic way as shown below.



Number 5: Careless handling with smelly chemicals

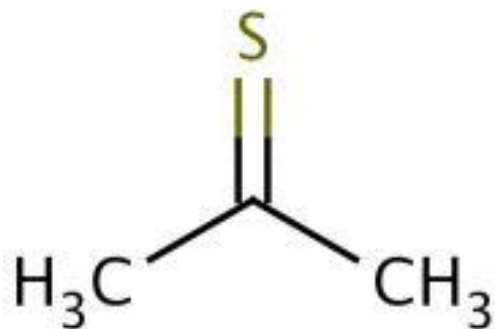
Do not work with foul-smelling chemicals anywhere outside of a fume hood! Many of us use foul-smelling chemicals every day – however, these must only ever be opened inside the fume hood.



For example **Mercaptoethanol** is considered a "severe" poison, causing "irritation to the nasal passageways and respiratory tract upon inhalation, vomiting and stomach pain through ingestion, and potentially fatal absorption if it contacts the skin".



Thioacetone (2-Propanethione) is the world's smelliest chemical. You can smell one drop of this substance from 1/2 km away.



Pray That Your Nose
Never Knows This
Putrid Perfume!

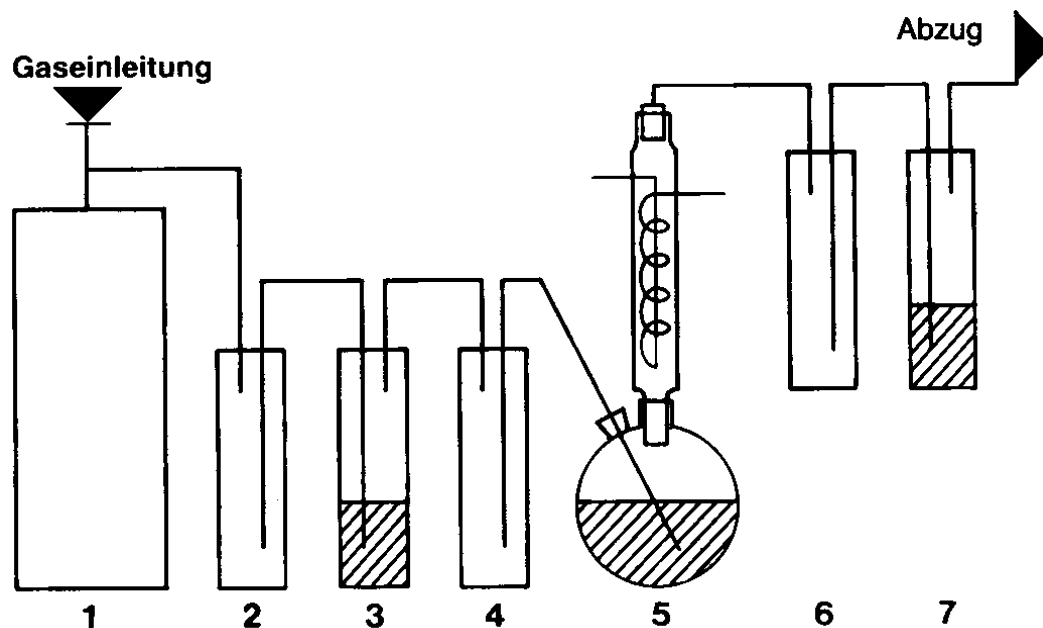


Working with foul-smelling chemicals outside the fume hood is a hazard not only for you but for everyone in the building. **This could lead to an evacuation.**



Preventing the emission of foul smells from chemical reactions

Foul smells or dangerous emissions of all kinds must be eliminated or minimized as much as possible with special devices, in order to reduce their impact. In the case of injecting gases into liquids, devices must be installed to prevent the liquid from streaming back into the gas line or the supply vessel, e.g. in case of a pressure drop on the gas line (see figure below). All gas injection equipment must have a pressure-outlet with an exhaust gas line directly into the laboratory exhaust system. An intermediary bubble counter additionally allows the control of gas absorption in the reaction.



Gas washing vessels

Number 6: Messies & bad waste management

Case 1: Office Messies



About 10% of workers in the HCI are Messies!





Case 2: Bench Messies!

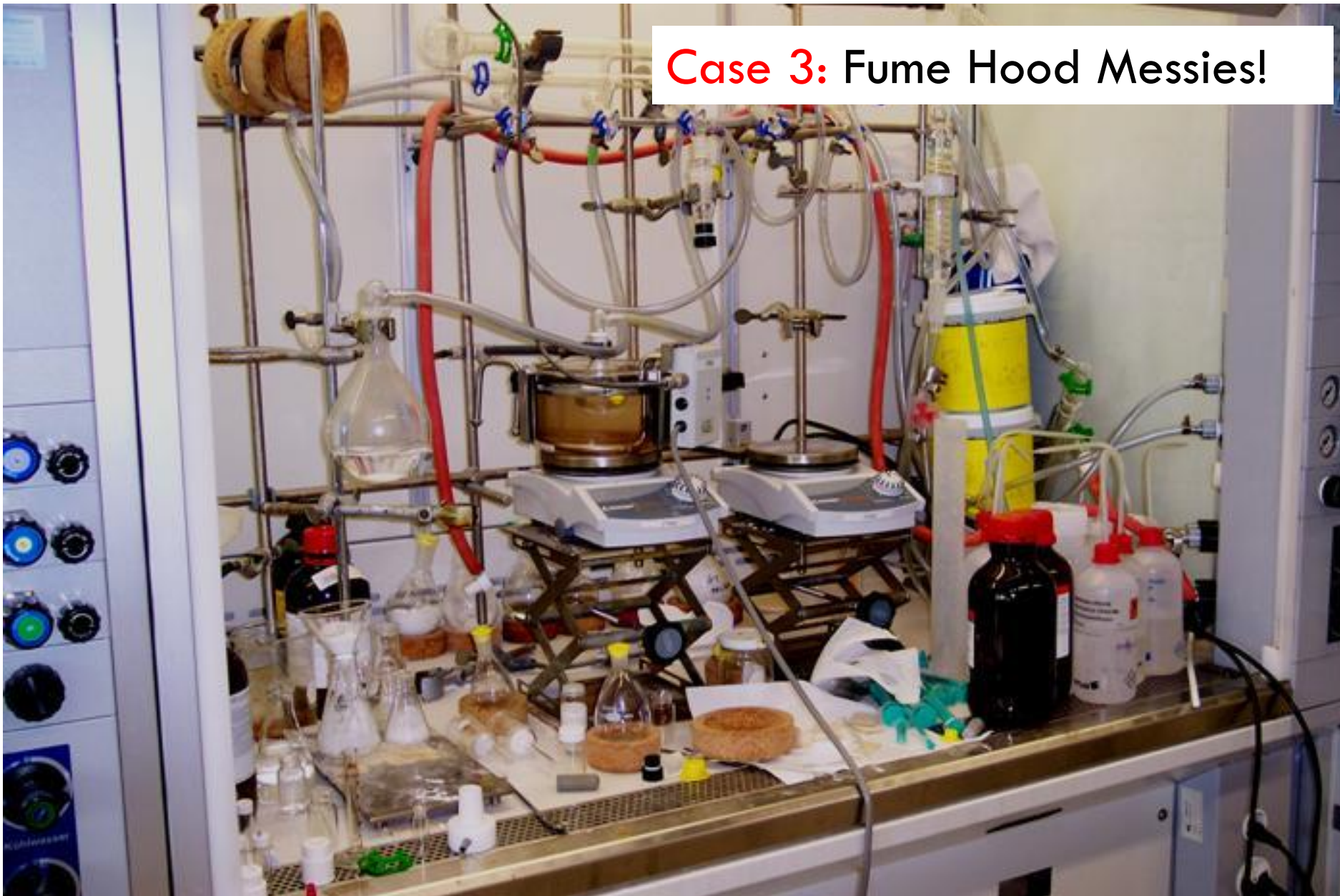
Thanks for not getting things from my bench and making my life harder.
Sorry for writing the obvious.
E.P.

K10G
MORAS



immediately after use P

Case 3: Fume Hood Messies!



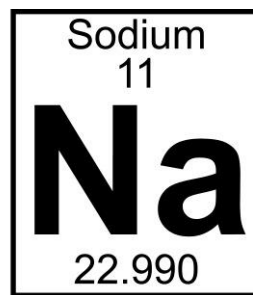


Case 4: Messies storing the chemicals!





Found in a chemical cabinet: elemental sodium wrapped in foil! Like a potato for grill party, only a little more dangerous!





These look like they have been here since the Bronze Age, after being stored near acid baths.

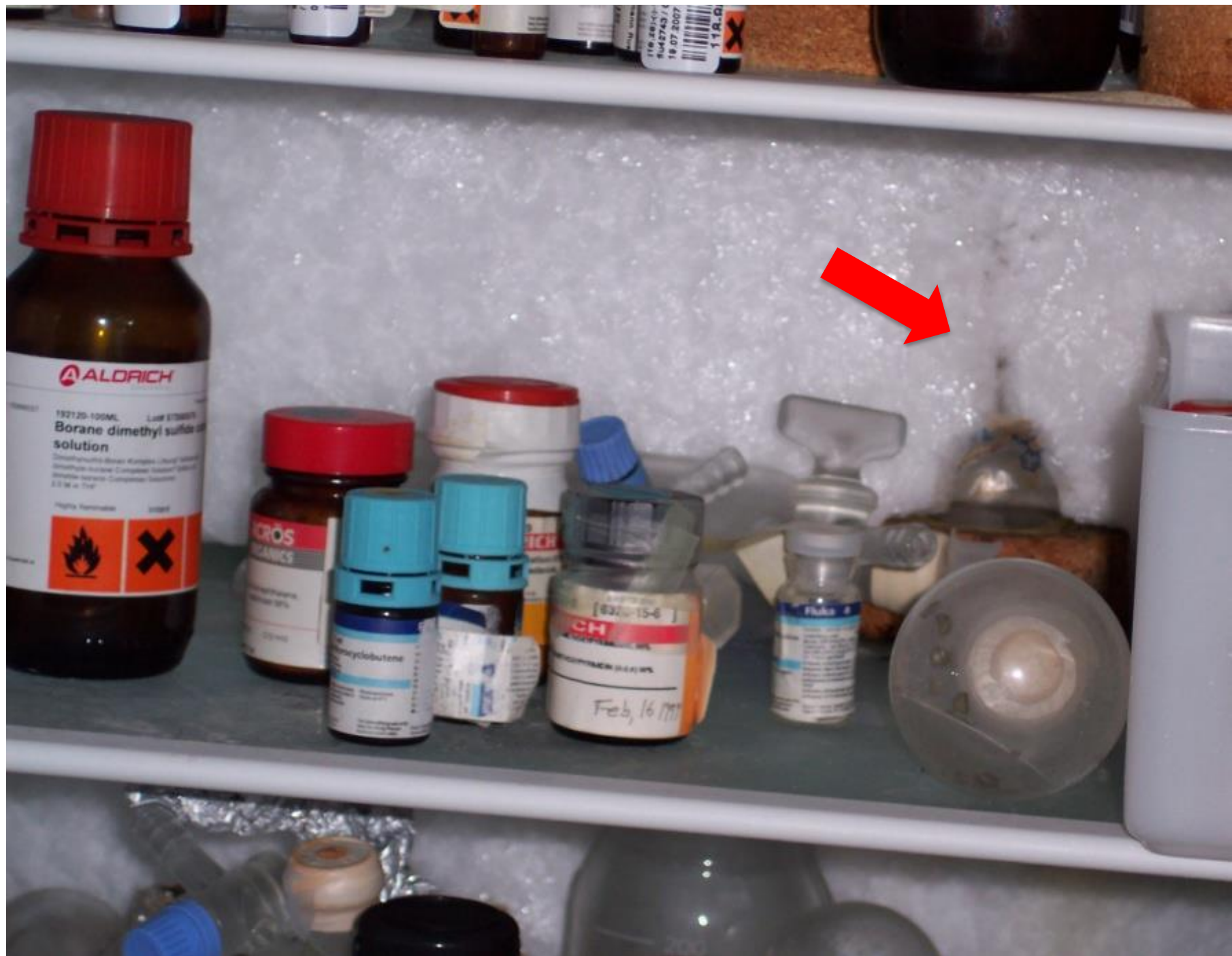
What they're supposed to look like.



Each container = 350 CHF

Case 5: Freezer Messies!





The absolute record of an icy refrigerator!



Case 6: Plant massacres!

In addition, we have also noticed an alarming number of plant massacres in the laboratories.







Case 7: Bad waste Management

Waste Disposal in the laboratories is an issue that the students don't like. Because this topic is so unpopular, there are many risks present which could cause accidents.

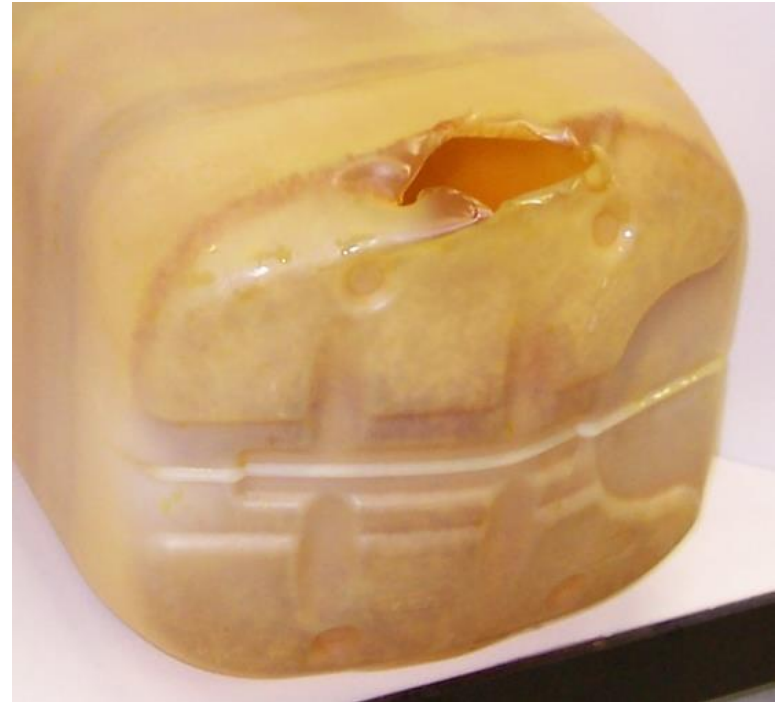




Here is a typical accident caused by incorrect waste handling. Students disposed of metals and acids in the canister. This led to high gas pressure and an explosion. Two people suffered acid burns, luckily with no permanent health damage.



Membranes contained in the screw caps are often considered to be overpressure protective membranes. However, they do not react if the pressure rises suddenly. If there is a risk of overpressure, the screw caps may only be screwed on loosely.



All necessary information on the disposal concept in HCI can be found in our Safety and Environmental Manual for the HCI Version 2024.

Disposal Guideline HCI





IMPORTANT NOTICE:

The SE Management Team has the right to close down laboratories, work benches and hoods if they are believed to be a hazard due to hoarding and over-filling. We have had to shut down 8 laboratories in the past 2 years.

Number 7: Turning a blind eye to safety facilities

Case 1: Blocking
Laboratory
Doorways









In order to obtain the building ventilation balance: Balcony doors may not be open!

Case 2: Laboratory Windows Must Not Be Blocked

What you see here is not a view into the laboratory, but rather an affixed photo.

Very clever – but please don't do this.

In case of emergency we need to be able to see through the window into the laboratory. Thus, we can make a better estimation of the situation.



The exception: Laser Laboratories








Only laser laboratories are allowed to have sealed windows - this is for everyone's safety.

Case 3: The door labeling

Always make sure that the door label is updated and correctly labeled. The template for the door label can be ordered via chab-safety@chem.ethz.ch



H314		Notfall: 888	
Departement	CHAB	Institut	LOC
Labortyp	Synthese		
Gruppe	Prof.	Tel:	
Safety Officer	Name	77777	
Laborchef	Name	77777	
Namen der Personen im Labor			
Gefahren:		Vorschriften:	
 		  	

G292		Notfall: 888	
Departement	CHAB	Notfall:	888
Praktikum	Name des Praktikums		
CHAB Hotline	chab-safety@chem.ethz.ch	34812	
PraktikumsleiterIn Frühlingssemester			
Name			22904
PraktikumsleiterIn Herbstsemester			
Name			22908
Gefahren:		Vorschriften:	
 		 	

Case 4: Access to rescue materials
Fire extinguishers must always be accessible!







This is the reason why we do not leave first aid kits in laboratories. You can always find a small first aid kit in the emergency niche in the corridor or ask for a trained medic via 888.

Case 5: Gas cylinders

Gas cylinders must always be chained securely in an upright position.



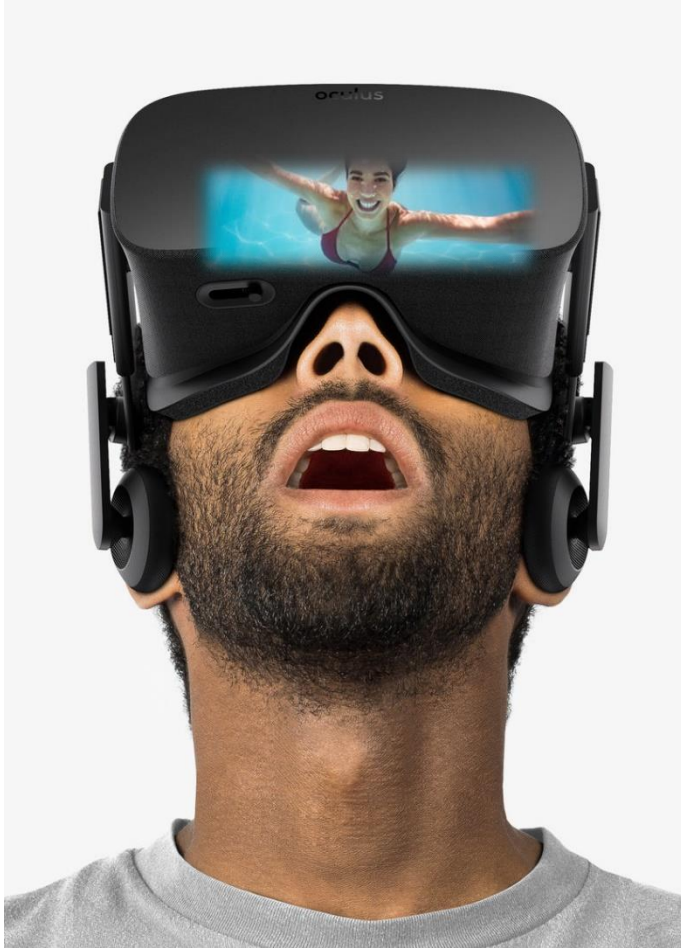
If one of these bottles tilts and falls on the floor, would the reducing valve be able to withstand the impact?



We must take great care in making sure that gas cylinders are **stored properly** and with **extreme caution** (see the Safety Handbook for more details.)



Case 6: virtual reality headsets, headsets or sound systems



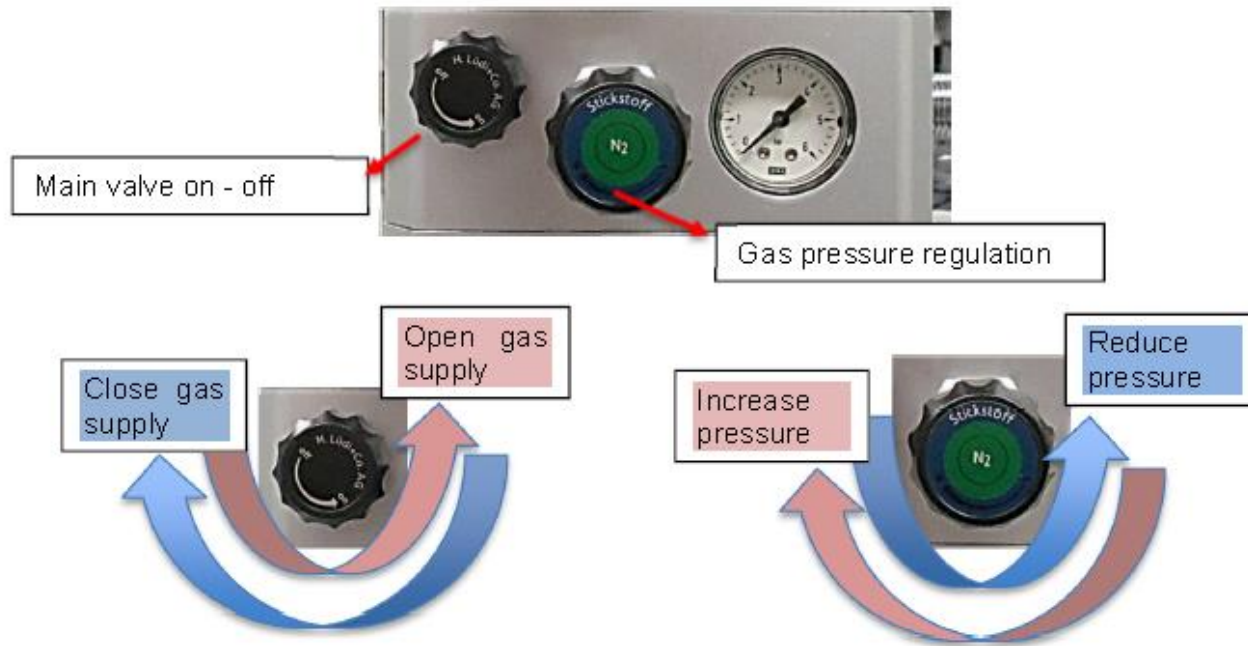
Using virtual reality headsets, headsets or sound systems blocking noise increase the risk of accidents. Sound/radio equipment may only be used with permission of the supervisors and must never be perceivable outside the personal area. In case of unacceptable noise or disco-like situations, the laboratory service will remove the equipment.

Persons unable to hear the alarm because of headsets or headphones act on their own responsibility.

Number 8: Failure to read instruction manuals



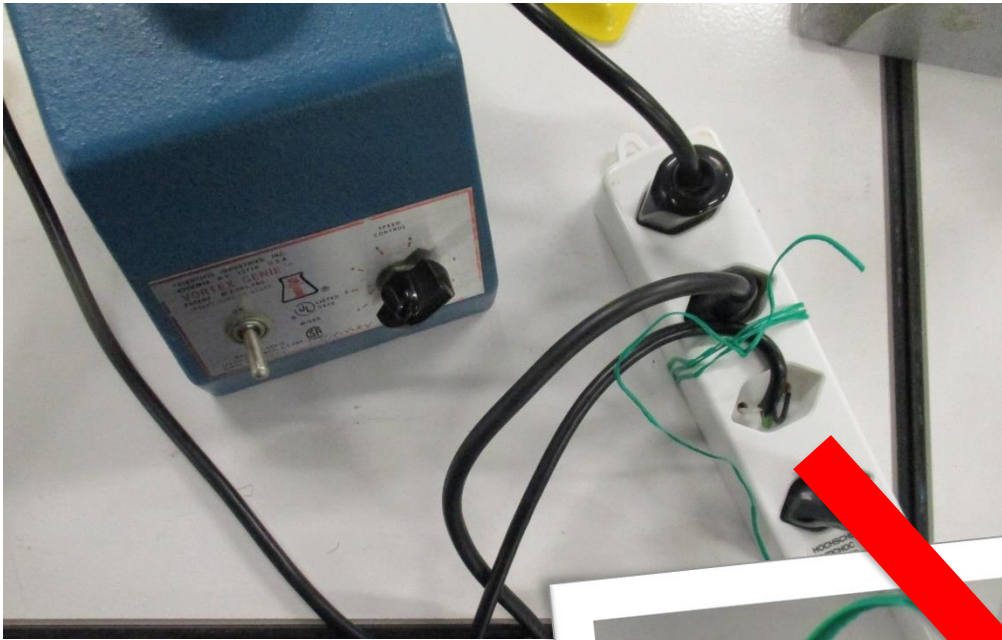
The users always turn the control valves the wrong way!
Therefore, the valves often become jammed or damaged.



Important: The gas module can only control the gas pressure, not the amount of gas. A different valve is used for the regulation of the gas quantity.

or this... using household appliances to perform syntheses? The laboratory service will confiscate such devices immediately.





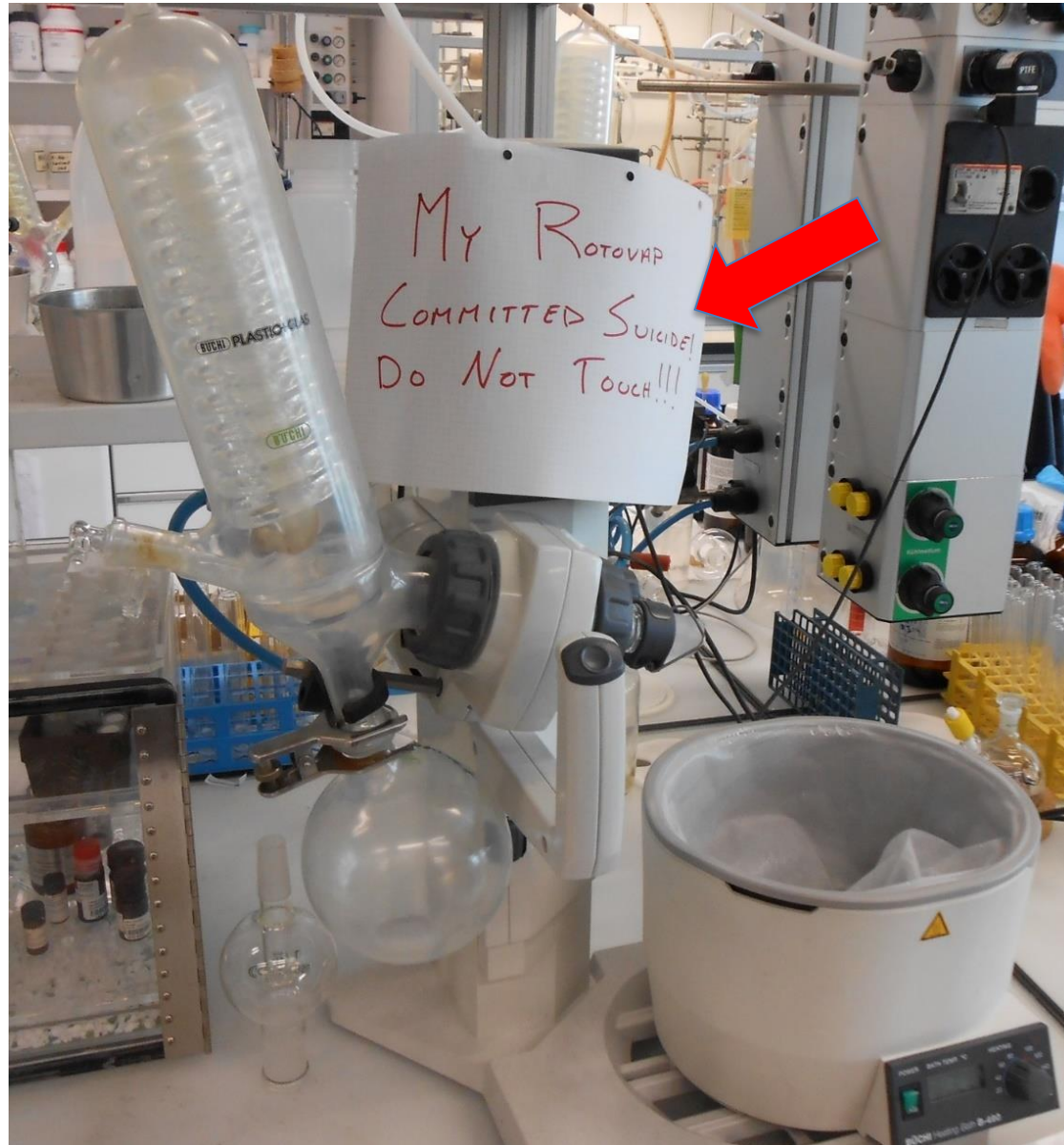
or this.....
improvised hazardous
electricity connections...



Laboratory devices must be maintained on an ongoing basis.



Devices that are not used as intended usually end in this way



The **operation of safety-relevant infrastructures** is increasingly being explained by videos. Use existing QR codes or visit our website.



Handling media column



Training video LN2 filling station for tanks

