

# TS Lab Safety Rules for Chemistry Labs

(version December 2020)

This is just a compendium of some essential issues concerning the safety in a chemistry lab. For detailed information and issues that are not listed you are legally bound to inform yourself about "Working Safely in Laboratories - Basic Principles and Guidelines" DGUV Information 213-851 (<https://www.sicherheitswesen.verwaltung.uni-muenchen.de/arbeitssicherheit/infos/index.html>). You are also required to read and approve our lab's online safety webpage at <https://thornseshold.cup.uni-muenchen.de/resources/safety/>

## General Rules

- Smoking in the lab is prohibited.
- Eating and drinking in the lab is prohibited. Food and drink must not be brought into the lab!
- Chemicals must not be stored in containers that lead to confusion with food or beverages!
- All containers have to be labelled according to CLP regulation (DGUV Information 213-851).
- You have to wear protective eye in the lab!
- You have to wear adequate protective clothes such as lab coats and slip-resistant footwear in the lab! Contaminated lab coats have to be changed. Wear lab coats only in lab-like workspaces! Whenever you enter libraries, lecture halls, seminar rooms, dining halls, or social rooms put them off!
- If you wear protective gloves remove them when leaving the lab! Do not touch any device that will lead to contamination of your colleagues!
- Do not work in labs with a red light display! Do not work in a hood with a red lit flow indicator!
- All actions with hazards (e.g. CMR substances – toxic, malodourous, lachrymatory, and explosive substances, as well as working under reduced pressure (exceptions: e.g. apparatus with secured glassware, i.e. rotary vaporizers) have to be carried out in a fume hood! The functionality of the fume hood is indicated by a green LED. Note the gas mask in your lab.
- Close the sash of the fume hood after you have finished your work!
- To ensure ventilation keep the cupboards under the fume hoods closed whenever chemicals are stored there!
- Keep lab doors unlocked whenever you work therein to maintain this escape way and to enable the free entrance of another person in case of emergency! Keep the viewing windows free!
- Lab doors support fire prevention and must therefore not be put out function by the use of wedges! Keep them closed!

## Handling of Chemicals

- All substances you are handling are a potential hazard! Due to reactions - intended or not - harmless ones can transform into high risky ones! Mixtures may react in unpredictable manner.
- Certain mixtures inside waste canisters can lead to dangerous buildup of pressure, or formation of toxic species: exercise caution! Do not store waste canisters that are liable to build up pressure in your lab/hood: inform a colleague then take them immediately and carefully downstairs for safe disposal. See e.g. acetone/chloroform below.
- The upscaling of reactions can cause problems not seen when performed with small quantities of chemicals.
- Before you start an experiment you are legally bound to inform yourself about the sources of danger that arise from an apparatus (-> operations instruction) and the used chemicals! For the latter, you have to determine the respective European hazard symbols (pictograms) and risk and safety Statements (-> H and P phrases)!
- The resorption of chemicals into the body can proceed through aspiration, *via* skin, mucus membranes, the eye, and the digestive tract. Especially the resorption of chemicals through skin is always underestimated. The handling of hazards – be it solid liquid gaseous or dusty ones – with high risk potential has to be performed categorically in a fume hood!
- In order to reduce the fire load do not use containers for flammable liquids with more than 1 L capacity.
- Full bottles and storage containers - if not in use - have to be stored in the safety cabinets or storage rooms.

- The transport of hazards via staircases, floors etc., has to be done by means of buckets. It is mandatory to wear eye protection during transport too. Chemicals have to be transported in thick-walled container and in no case in typical lab glassware (e.g. Erlenmeyer flasks)!
- Highly flammable liquids are only allowed to be stored in refrigerators and freezing devices if these are explosion-proofed (non-sparking).
- Procedures involving boiling flammable liquids (distilling, refluxing) have to be done under continuous supervision.
- Take particular caution when handling alkali metals, metal amides, metal hydrides, and reactive organometallics. Strict water exclusion has to be ensured (do not use water baths, if possible use reflux condensers made from metal). In case of fire do not use the usual CO<sub>2</sub> extinguishers nor water. Instead use extinguisher sand! Residues have to be defanged in the fume hood immediately after finishing the experiment.
- Halogen containing (e.g. chloroform, methylene chloride) solvents or carbon disulfide must not get in contact with alkali metals.
- Peroxide-forming solvents (e.g. ether,) that are stored for a longer period are to be checked prior to use. In case of positive findings the peroxides have to be adequately destroyed. Bottles with such solvents have to be labelled with the date of bottling. To prevent enrichment of peroxides store ethers over KOH pallets.
- Before you work with known acutely hazardous species (including: HF, diazomethane, HN<sub>3</sub>) you must inform the safety officer. You must inform yourself fully before using such species.
- When handling cryogenics such as liquid nitrogen you have to be particularly cautious. In every case you have to wear a lab coat, protective gloves and eye protection.

### Waste disposal

- Solvent mixtures, halogen free 5 L plastic container  
(will be labelled as halogen containing no matter what content)
- Solvent mixtures, halogen-containing 5 L plastic container
- Aqueous heavy metal solutions 20 L plastic container
- Aqueous heavy metal solutions, Hg-containing 20 L plastic container
- Aqueous heavy metal solutions, As-, Be, Tl-, Se-containing 20 L plastic container
- Contaminated operating material 60 L blue plastic barrel with clamping ring
- Acetone and chloroform violently react with each other in basic conditions. Separate them!
- In order to reduce the fire load do not store large amounts of flammable waste in your lab! Dispose of it very frequently!
- Waste containers should be closed at least in the evening when you leave the lab. Do not keep them open equipped with funnels!

### Handling of instruments and apparatus

- Experimental apparatus has to be treated in such a way as to remain stable, physically manageable, and to avoid mechanical stress.
- Avoid build-up of pressure by using devices for pressure compensation!
- Critical functionalities of instruments that stop reaction runaway accidents include: electrical drive, stirrer, cooling water system, inert gas and vacuum tightness. These have to be checked in advance of feeding with chemicals and before the start of an experiment. Hoses have to be secured with hose clamps.
- When running experiments with heating, the set up must be conducted in the way that the heating source can be removed and exchanged without drastic change of the whole apparatus (e.g. ice bath swap).
- All heated apparatus must be equipped with condensers to hold back volatile flammable liquids!
- Electric devices have to be in technical proper status. Instruments with damages at cables, plugs, and contacts have to be sorted out immediately and the instrument has to be brought to repair (e.g. electrical workshop in D0)!
- When working under reduced pressure only glassware without damaged surfaces can be used (visual inspection! at any sign of cracks and asterisks, dispose of the glassware!); and no flat-sided glassware can be used (e.g. no ground-joint Erlenmeyer flasks). Evacuated glassware must not be heated one-sided! Use protective screens and plastic foils to prevent injuries from flying shrapnel due to implosion.
- When working with a high-vacuum device equipped with cooling trap(s) special care has to be taken. Be sure that no oxygen from air is condensing, and no solids block the pressure escape

routes (see operation instructions)! Watch for a timely pressure compensation to avoid flying pieces of the device due to pressure build-up!

- The usage of pressurised gas cylinders entails a high potential risk and therefore requires the strict fulfilment of the existing safety rules. (-> DGUV Information 213-851)
- Attention should be paid to the following rules: Pressure gas cylinders must be transported only with the appropriate gas cylinder wagon and with applied protection cap! They must never be lifted or carried directly at the valve device! They have to be secured with a warp or clamp during transport and at their location! Their simultaneous transport with persons in an elevator is forbidden! They have to be stored in gas cylinder cabinets!
- Be sure that every device that could cause damage or unnecessary costs is turned off! Be sure that all windows, all water taps, and all N<sub>2</sub> valves are closed!



I hereby confirm that I have been instructed about the content of the chemistry lab safety rules according to:

(1) *20201106-tslab-chemistry-lab-safety-rules-instruction-short* (this doc)  
and

(2) <https://thornseshold.cup.uni-muenchen.de/resources/safety/>

Name of the instructor: \_\_\_\_\_

Name of instructed person: \_\_\_\_\_

\_\_\_\_\_  
Place, Date

\_\_\_\_\_  
Signature of the instructed person