General Chemistry Safety Instructions

Handout

Course No. 400111

General Laboratory Safety Rules

1. Absolutely no food or drink is allowed in the laboratory. This includes any form of personal water bottle and chewing gum.

2. No smoking in the laboratories. A lit cigarette may ignite flammable solvents. Food, drink, and cigarettes is another vector that could possibly expose you to hazardous chemicals.

3. Try to maintain a clean and orderly work area at all times.

4. Be familiar with your lab assignments **before** you come to lab. Follow all written and verbal instructions carefully. If you do not understand a instruction or part of a procedure, ask the instructor before proceeding.

5. Labels and equipment instructions must be read carefully before use. Set up and use the prescribed apparatus as directed in the laboratory instructions.

6. Know the locations and operating procedures of all safety equipment including the first aid kit, eyewash station, safety shower, fire extinguisher, and fire blanket. Know where the fire alarm and the exits are located.

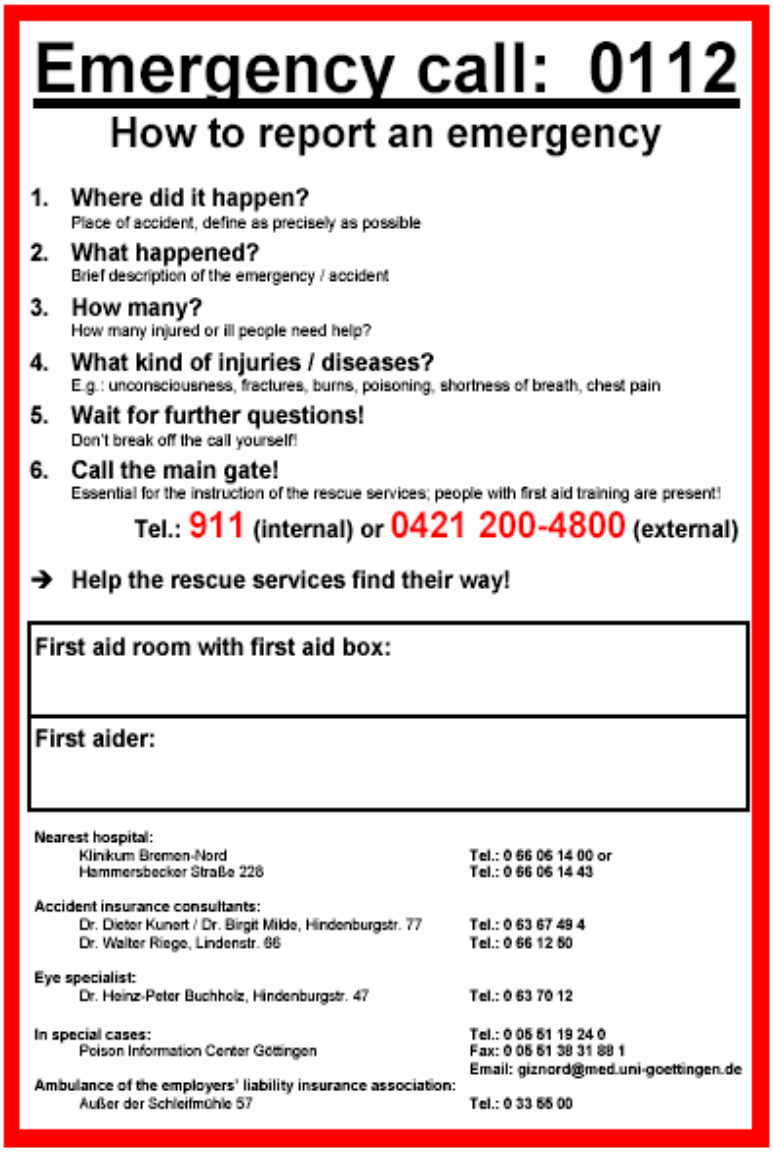
7. At any time, personal protective equipment (lab coat, safety goggles, gloves) must be worn during the experiments.

8. Report damaged electrical equipment immediately. Look for things such as frayed cords, exposed wires, and loose connections. Do not use damaged electrical equipment.

9. Never leave anything that is being heated or is visibly reacting unattended. Always turn the burner or hot plate off when it is not in use.

10. Dispose all chemical waste properly. Never mix chemicals in sink drains. Sinks are to be used only for water and those solutions designated by the instructor. Solid chemicals, metals, matches, filter paper, and all other insoluble materials are to be disposed off in the proper waste containers, not in the sink. Check the label of all waste containers twice before adding your chemical waste to the container. Cracked or broken glass should be reported and cleaned before placing in the special container for "Broken Glass."

11. Anyone attempting to conduct any unauthorized experiment will be subjected to immediate expulsion from the course.



Emergency call: 0112

How to report an emergency

1. **Where did it happen?**
   Place of accident, define as precisely as possible
2. **What happened?**
   Brief description of the emergency / accident
3. **How many?**
   How many injured or ill people need help?
4. **What kind of injuries / diseases?**
   E.g.: unconsciousness, fractures, burns, poisoning, shortness of breath, chest pain
5. **Wait for further questions!**
   Don't break off the call yourself!
6. **Call the main gate!**
   Essential for the instruction of the rescue services; people with first aid training are present!

Tel.: 911 (internal) or 0421 200-4800 (external)

➔ **Help the rescue services find their way!**

First aid room with first aid box:
First aider:

Nearest hospital:
Klinikum Bremen-Nord — Tel.: 0 66 06 14 00 or
Hammersbecker Straße 228 — Tel.: 0 66 06 14 43

Accident insurance consultants:
Dr. Dieter Kunert / Dr. Birgit Milde, Hindenburgstr. 77 — Tel.: 0 63 67 49 4
Dr. Walter Riege, Lindenstr. 66 — Tel.: 0 66 12 50

Eye specialist:
Dr. Heinz-Peter Buchholz, Hindenburgstr. 47 — Tel.: 0 63 70 12

In special cases:
Poison Information Center Göttingen — Tel.: 0 05 51 19 24 0
Fax: 0 05 51 38 31 88 1
Email: giznord@med.uni-goettingen.de

Ambulance of the employers' liability insurance association:
Außer der Schleifmühle 57 — Tel.: 0 33 66 00

As of 12/05

ALARM PLAN

for fire and explosion hazards

Keep calm!

1. Alarm

- first, activate the fire alarm or call **0-112**
- then inform the main gate immediately at **911**
- use the available fire extinguishers to fight the fire (without endangering yourself!)

2. Evacuation of the building

- at the sound of the fire alarm / megaphone announcement
- leave the building calmly
- close the doors, but never lock them

3. Escape routes

- Hall and staircase
- Window and fire ladder
- Don‘t use lifts!

4. If escape routes are not accessible

- close the doors
- attract attention
- wait for the fire brigade

5. Go to an assembly point outside the building

- keep a safe distance from the building
- be sure that everyone has left the building by finding your colleagues

Firemen, police officers and authorized staff of the university decide on any further measures.

ASSEMBLY POINT

Our assembly point is the campus green. Stay there and wait for further instructions!

Personal Protective Equipment

Eye Protection: *The only TWO you have*

It is imperative that eye protection be worn at all times. Regular glasses, sunglasses, or safety glasses will not be tolerated as acceptable forms of eye protection. Thus, safety goggles are required at all times in any active chemistry laboratory; it is departmental policy as well as state law. Safety goggles are designed to prevent any sort of chemical from coming into contact with your eyes and will also fit over regular glasses forming a seal from drips. Consider concentrated sodium hydroxide (NaOH); it can burn a hole through your cornea in a matter of seconds. These goggles are also designed with a one-way air-flow system to prevent condensation from occurring inside your mask and to keep out hazardous chemicals. Remember, you can get along with only one kidney. You can even get along with only one eye. No eyes, however, would be downright inconvenient. Since there's no way to predict what your neighbor might accidentally splash into your face, always wear eye protection whenever working in the chemistry labs. Also, goggles are designed to cover your eyes, not your forehead. The skin on your head is around a quarter of an inch thick, about the same thickness as your skull. The brain is quite well-protected. Your cornea has no protection whatsoever, so make sure that your goggles are over your eyes.

If your eyes come in contact with chemicals immediately use the emergency eye shower. Rinse at least for 10 minutes and contact an eye specialist.

Skin and Body Protection

Clothing

Every student must be wearing the following:

Shorts or **short skirts** are **not acceptable**. Wearing long pants provides a small layer of protection between any spilled chemicals and your delicate layer of skin. Long dresses are also acceptable in replacement of pants.
Closed toed shoes are a must. *Again, sandals will not give you a layer of protection against chemical spills and falling equipment.* On a lesser note, it is advisable to wear underwear at all times . If a chemical does come into contact with your clothing, you may be required to step into the safety shower and to remove an article of clothing. There is no privacy curtain for this shower. Overall, try to avoid clothing made of Nylon or other extremely flammable material. It can melt to your skin causing more severe burns. **Cotton** is the best material to be wearing.

Also, long hair must be tied back/secured behind one's head to prevent it from falling into chemicals or straying into an open Bunsen burner. The smell of singed hair is such that it will induce vomiting in some people, let alone what it will do to the person with burnt hair.

If you are not wearing long pants and closed toed shoes, you will be sent home from the laboratory to obtain them!
And always remember:
The greater amount of skin that is covered by clothing, the smaller the risk of exposing your skin to dangerous chemicals.

Personal Protective Equipment

Gloves

Gloves are our defense against the absorption of chemicals by our skin. But it must be realized that not every type of glove will protect you from every chemical. Latex gloves, which most people would use, do not protect you from most chemical exposures. Consider what happens when you choose the wrong glove.

Wrong Glove = Dead

Professor Karen E. Wetterhahn, a world-respected scientist on mercury poisoning and former dean at Dartmouth University died ten months after spilling approximately two drops of dimethylmercury on her disposable latex gloves. Researchers later determined that it took only 15 seconds for the material to penetrate the gloves.

The gloves of choice, if you choose to wear them, for general chemistry students are the latex or green nitrile gloves. These disposable gloves provide a good amount of protection against a variety of inorganic and organic chemicals. Remember, these gloves are only one-time use gloves and they are designed to deal with chemical spills and initial chemical contact.

Always remember to wash your hands before you leave the lab.

Do not touch notebooks,pens or someone´s face while wearing gloves!!!!!

Chemistry Safety Rules

Liquid Reagents:

When you need a liquid reagent, select a clean container of suitable size, take it to the reagent shelf with you, pour into the container whatever amount you need and take it to your desk.
Excess toxic reagents should be poured into the appropriate waste containers in the hood. Small amounts of non-toxic reagents (e.g. solutions of NaCl,$NaHCO_3$,etc) may be washed down the sink.. Never dump anything into the sinks in the hoods. But for your own awareness, here is a list of chemicals we don't want to put down the drain, leave in the trash can, or allow them to evaporate:

- acidic or basic solutions, with pH <5 or >10
- flammable or water-immiscible solvents (acetone, chloroform, etc.)
- solutions or solids containing the following elements: Be, Cr, Mn, Ni, Cu, Zn, As, Se, Ag, Cd, Ba, Hg, or Pb
- any waste or excess reagent which contains materials known to be toxic
- any waste or excess reagent which contains materials known to be carcinogenic
–any material which, upon drying if wet, can undergo explosive,e.g. any azide, cyanide, or sulfide
Remember, all the waste containers are found in the waste hood

Never return excess material to reagent bottles!

Solid Reagents:

Do not insert spatulas or any other tools into the reagent bottles to avoid cross contaminations. Solid reagents are removed from the stock bottles by pouring them into a clean container or onto a piece of weighing paper.
Excess amount of toxic reagents should be poured into the appropriate waste containers in the hood.

Transporting Chemicals:

Chemicals must stay in the laboratory unless they are transported in a sealed container inside a rubber carrier. Rubber carriers are located in the back of the laboratory and in the stockroom. Do not walk around the building carrying an open beaker of chemicals in your hands because you need to show something to your instructor. Leave the beaker on your bench top and call the instructor.

Diluting Acids and Bases:

NEVER POUR WATER INTO CONCENTRATED ACIDS OR BASES! it can boil and spit dangerously. Highly exothermic reaction.
Concentrated acids and bases can be safely diluted by pouring the reagent into water while stirring it carefully and continously. NEVER ADD CONCENTRATED ACID TO CONCENTRATED BASE OR VICE VERSA!

PIPETTING AND PIPET BULBS:

Always use a rubber pipetting bulb to fill your pipet. NEVER FILL A PIPET BY USING "MOUTH SUCTION"

Do not walk around with a filled pipet.

Never point and squeeze a pipet bulb at yourself or anyone else. You may think the blast of air that comes out is FUNNY, but if someone sucked acid or base into the bulb and didn´t clean it out, you might be spraying a corrosive chemical instead of air.

Tasting and Smelling

Many chemicals in the laboratory are toxic. Therefore, never taste a chemical unless you have been specifically requested to do so. If you are instructed to smell a chemical, do so by keeping the vessel away from your face and carefully fanning the vapors towards your face with your hands and sniffing gently.

Read Labels Carefully:

Before you take chemicals from any bottle, read the label carefully. Many chemicals have similar names and formulas (e.g. potassium sulfite (K_2SO_3) and potassium sulfate (K_2SO_4)). Sometimes two solutions of the same chemical are provided in different concentrations or purities. It is obvious that the use of the wrong reagent can spoil an experiment. In extreme cases, the choice of the wrong chemical can cause a serious accident.

Pictograms and Hazard Codes

T Toxic, **T**$^{+}$ Very Toxic

 Any substance that is harmful to living tissues when applied in relatively small dose. Examples of toxic chemicals are potassium cyanide (KCN), heavy metal compounds, and barium.

N Dangerous for the environment

 Relatively rare with laboratory chemicals (most of which pose some environmental hazard if not disposed off correctly), these require particular care to be taken on disposal. Example: Ammonia solution (NH_4OH)

C Corrosive

 Any solid, liquid or gaseous substance that burns, irritates, or destructively attacks organic tissues (skin, mucous membranes, lungs, stomach, etc.). Examples of corrosive chemicals are bromine, hydrochloric acid (HCl), sodium hydroxide (NaOH), nitric acid (HNO_3), sulfuric acid (H_2SO_4), potassium hydroxide (KOH) and acetic acid (CH_3COOH).

F Highly Flammable, **F**$^{+}$ Extremely Flammable

 Any solid, liquid, vapor, or gas that will ignite easily and burn rapidly. Examples of flammable chemicals are acetone, ether, methanol, ethanol, acetylene, propane and magnesium metal.

O Oxidizing

 Any material that yields oxygen readily to stimulate the combustion (oxidation) of organic matter. Examples of oxidizing chemicals are nitric acid, ammonium dichromate, ammonium nitrate, potassium permanganate and hydrogen peroxide.

E Explosive

 A chemical substance that undergoes a rapid chemical change (with the production of gas) on being heated or struck.

Pictograms and Hazard Codes

Xn Harmful, **Xi** Irritant

 This symbol covers a wide range of (sometimes relatively minor) hazards – with precautions such as avoid contact with skin, do not breathe, etc. best to refer to relevant data sheets for details.

B Biohazard

 A biohazard (biological hazard) implies a risk to the health of humans caused by exposure to harmful bacteria, viruses, or other dangerous biological agents or organisms, or by a material produced by such an organism. Biohazards can present their risk either directly through infection or indirectly through damage

R Radioactive

 The change of one radioactive nuclide into a different nuclide by the spontaneous emission of radiation such as alpha, beta, or gamma rays, or by electron capture. The end product is a less energetic, more stable nucleus. Each decay process has a definite half-life.





Way to emergency exit Fire extinguisher Emergency telephone

First aid


Emergency shower Emergency eye shower