

APPROVED BY

*/digitally signed/*

Tiina Linder  
Senior Specialist for Health and Safety  
University of Tartu  
Personnel Office

## **Safety Instructions in Laboratories of Analytical Chemistry No 4-34/PR/49**

### **General**

- Think before performing any actions in the laboratory! If you are unsure about something ask the supervisor for explanation.
- It is prohibited to work alone in the laboratory.
- Each experiment must be planned and, if needed, discussed with the supervisor.
- Observe also other students activities and draw their attention to necessary precautions. If violation of safety rules is intentional, inform your supervisor or lab-technician.
- Be prepared for accidents! Only student who has passed special training may work with instruments, which use electrical current, natural gas or are other way potentially dangerous.
- Keep your working place clean! Spills or pieces of substances can damage instruments, clothes or skin.

### **Working with glassware**

- Work calmly, do not hurry!
- If some glassware breaks, inform other people so they wouldn't hurt themselves. Thereafter clean up all pieces of glass and substances. Ask other students or supervisor to help you. For picking up small pieces of glass use wet paper.
- If you need to put hosepipe on glass tube, wet the glass tube with water or vacuum grease and protect your hands with gloves or towel.

### **Electricity**

- Prior to using electrical appliance make sure that electrical outlet, socket and cable are intact and the voltage is suitable for the instrument.
- While switching on an electrical instrument, keep the other hand in your pocket.
- If some part of electrical instrument heats up unexpectedly, electrical sparks are produced or it smells like burnt, immediately stop working with the instrument and pull the cable out of the electrical outlet.
- If instrument is burning, pull its cable out of electrical outlet or cut the electricity using main braker of the laboratory.
- **Never** use water to extinguish a burning electrical instrument! Only powder- or CO<sub>2</sub>-extinguishers may be used.

- Inform your supervisor if an appliance acts unexpectedly, e.g. produces strange sounds.

## Chemicals

### General

- Wear safety goggles and rubber gloves when working with toxic or corrosive substances. Wear special apron if needed.
- Toxic volatile chemicals must be handled in the fume hood.
- Wear lab coat while working in laboratory.
- Always use rubber bulb for pipetting. Do not use mouth to provide suction even when the substances are not toxic – it's not hygienic.

### Safety using chemicals

 	<p>E: Explosive</p> <ul style="list-style-type: none"> <li>• Avoid shocks, flames, sparks and heating.</li> <li>• Work with minimal amounts and work cautiously.</li> <li>• Do not work alone!</li> <li>• Extremely explosive peroxides are formed while storing <b>ethers (diethyl ether, tetrahydrofuran, diisopropyl ether, ...)</b>. Before using such chemicals consult your supervisor. The same applies when using old bottles with “unknown” substances.</li> <li>• Explosive are also <b>azides</b> (organic and salts of metals) and <b>peroxides</b>.</li> </ul>
 	<p>O: Oxidizing</p> <ul style="list-style-type: none"> <li>• Avoid contacts with flammable materials.</li> <li>• Never mix with organic substances.</li> </ul>
 	<p>F: Highly flammable F+: Extremely flammable</p> <ul style="list-style-type: none"> <li>• Avoid flames, sparks and heating. Do not work near open flames.</li> <li>• This category includes almost all <b>organic solvents</b> (except chlor-organic).</li> <li>• <b>Burning chemicals must not be extinguished with water</b>, use CO<sub>2</sub>-extinguisher, fire blanket or sand.</li> </ul>
 	<p>Xn: Harmful Xi: Irritating</p> <ul style="list-style-type: none"> <li>• Avoid all contacts with body.</li> <li>• This (above) applies to most chemicals.</li> </ul>

 	<p>T: Toxic  T+: Very toxic (incl. carcinogenic, teratogenic, mutagenic)</p> <ul style="list-style-type: none"> <li>• Avoid all contacts with body, avoid inhaling vapors or dust.</li> <li>• Examples of some toxic substances: <b>benzene, methanol, chloroform, carbon tetrachloride, tetrahydrofuran, acetonitrile.</b></li> <li>• Work under the fume hood, wear safety goggles and rubber gloves.</li> </ul>
 	<p>C: Corrosive</p> <ul style="list-style-type: none"> <li>• Protect skin (rubber gloves), eyes (safety goggles) and clothes (lab coat), if needed also respiratory system (work under fume hood and/or wear mask).</li> <li>• Examples: <b>mineral acids (sulfuric acid, hydrochloric acid, nitric acid, ...), alkalis (sodium and potassium hydroxide), bromine, ammonia.</b></li> </ul>
 	<p>N: Dangerous for the environment</p> <ul style="list-style-type: none"> <li>• Waste (residues) needs special management.</li> <li>• Examples: <b>chloroform, carbon tetrachloride ...</b></li> <li>• <b>Use as small amounts as possible.</b></li> </ul>

### *Chemical waste*

- As a rule, chemical waste is not disposed to sink.
- Residues of acids and alkali must be neutralized.
- Residues of solvents are collected to special bottles. **Caution! Chemical waste must not be mixed without control – some substances can cause explosions!** When in doubt ask supervisor!

### **Using fume hoods**

- Check proper functioning of fume hood prior starting your experiment.
- Switch on the ventilator and lamp of the hood. Shield of the hood must be positioned as low as possible (between your eyes and experimental apparatus).
- Fume hood is not the place for long-term storing of chemicals or chemical waste.
- Chemicals which are not needed for the experiment should be removed.
- If you spill chemicals under the hood clean it up as soon as possible.
- Consider using additional safety equipment while working in fume hood (goggles, gloves, safety apron, mask ...), especially when using dangerous substances.
- In case of failure of the fume hood, inform your supervisor or lab technician (lab no. 324).

## **Natural gas**

- Before opening the main valve, check if all local (on the tables) valves are closed.
- Before starting to work, check the gas pipes (rubber or plastic part). If needed replace piping.
- Be careful with long hair when working with open flames.
- If the flame of burner has gone out, immediately switch off the gas.
- Do not bend down over burning burner.
- Flames must not be left unattended.
- Before leaving the laboratory, close the main gas valve.

## **Working with bottled gas (cylinders)**

- Before starting to work, you will be given special instructions.

## **What to do if ...**

- Save yourself first, and then help others. Saving instruments or materials comes last.
- Inform your supervisor or lab technician.
- Call emergency service, **112**– the same number throughout Europe.

Composed by

*/digitally signed/*

Ivo Leito  
Professor of Analytical Chemistry  
Head of Chair of Analytical Chemistry