



CONFIRMED:  
Ordinance No. 1-7 by the chairman of the Board of AS Audentes  
On the 29th of May, 2012.

## **SAFETY INSTRUCTIONS FOR PERFORMING EXPERIMENTS IN THE CHEMISTRY CABINET**

### **1. INTRODUCTION**

The introduction of the employee to the safety instructions at hand (primary instruction) will take place after the formalization of the employment and after the introductory instructions by the competent personnel designated by the employer.

Supplementary instruction will be carried out in the following cases:

- Imposing of new occupational health and safety guidelines or legal regulations or changes in existing requirements;
- Changes in the job management or after an intermission of more than three months;
- Replacements or upgrades of technology or working equipment;
- Transferral of the employee to another job or significant changes in his/her assignments;
- if the employee violated occupational safety requirements, which caused or could have caused an accident at work;
- Regarding work or activities not included in the assignments or duties designated in the contract;
- When the department manager or the employee considers it necessary;
- When the labour inspector considers it necessary.

The content and length of supplementary instruction is determined by the employer.

The introductory, primary and supplementary instructions and trainings and the permission to carry out independent work will be registered in appropriate records, diary or database.

The employee will confirm the instructions, trainings and working permission with his/her signature.

### **The employee's obligations and rights.**

The employee is obligated to:

- Participate in the creation of a safe working environment by following the occupational health and safety requirements;
- Follow the work and resting time arrangements established by the employer;
- Undergo a medical examination in accordance with the established procedure;
- Guarantee according to the training and instructions from the employer that his/her work does not endanger his/her own or other people's life or health and would not pollute the environment;
- Immediately notify the employer or his representative and the working environment officer about an accident or the risk of a dangerous situation, occupational accident or a health disorder impeding the fulfilment of assignments;
- Fulfil instructions regarding occupational health and safety made by the employer, working environment specialist, occupational health doctor, labour inspector or working environment officer.

**It is prohibited for the employee to work while under the influence of alcohol, narcotics or toxic substances or under the influence of psychotropic substances.**

Upon violation of safety requirements by the employee, he/she will be responsible according to the disciplinary liability law.

The employee has the right to:

- Demand personal protective equipment that meet the requirements of the working health and safety demands;
- Obtain information regarding the risk factors in the working environment, working environment risk assessment results, measures to avoid damage to health, results of health inspection and the orders to the employer by the labour inspector;
- In case of a serious, imminent or unavoidable accident leave their position and the dangerous area;
- Immediately notify the employer or its representative or working environment officer regarding the refusal to work or stop working, should otherwise a health risk risk to him/her or others occur or it would not be possible to fulfil the environmental safety requirements;
- Demand a temporary or permanent transfer to another job or a temporary relief in working conditions according to the decision by the doctor;
- Demand transfer to a suitable day work, when nightly work is contraindicated according to a doctor's decision and the employer can transfer the employee to a responding position;
- Receive compensation regarding work related injuries in accordance with the procedures established by the Government of the Republic;
- Contact working environment officer, working environment representatives, workers trustee and local work inspector, if the means and provided equipment does not guarantee safety in the working environment.

### **Health check of the employee**

The necessity for a health check is determined by the risk assessment or legal acts in force and will be carried out during the working time at the expense of the employer. The health control of an employee starts with a primary health control during the first month of commencement and later after a period designated by the occupational health doctor, not less than once in 3 years.

## **2. GENERAL REQUIREMENTS**

- 2.1.** In the chemistry cabinet, it is forbidden to store foodstuff and to dine or use laboratory glassware as dishes.
- 2.2.** All work must be carried out with maximum caution.
- 2.3.** Chemical analyses can be carried out only with the amounts, concentrations, devices and according to the conditions provided in the regulations.
- 2.4.** It is forbidden to determine chemical reagents through tasting.
- 2.5.** Upon smelling, the spreading fumes or gases must be scattered with a hand movement. On desks, it is forbidden to evaporate toxic gases or substances emitting acids or substances emitting  $\text{NH}_3$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{HCN}$ , and other gases.
- 2.6.** Clean containers, which must be properly cleaned after the use (according to the specific instructions), must be used for the experiments.
- 2.7.** All containers containing reagents must be labelled.

- 2.8. It is prohibited to throw materials creating fire and explosion hazard (alkaline metals, white phosphorus, sulphide) into the trash bin or the sink; these must be collected in a container provided for that purpose.
- 2.9. The premises must be kept clean.
- 2.10. The access to fire extinguishers must be kept clear.
- 2.11. Flammable liquids can be stored only in metal containers and in hermetically sealed non-breakable containers.
- 2.12. All heating devices must be switched off, and gas and water faucets must be closed.
- 2.13. The work with toxic substances must be stopped, if the ventilation of the fume hood is not working.
- 2.14. First aid equipment must be kept in a secure and easily accessible location.

### **3. BEFORE THE START OF EXPERIMENTS**

- 3.1. Wear special clothing in case of necessity;
- 3.2. Check the condition of the workplace;
- 3.3. Remove unnecessary items from the workplace;
- 3.4. Check the intactness of working equipment and laboratory devices to be used.

### **4. WORK IN THE CHEMISTRY CABINET**

- 4.1. The teacher is obliged to keep the workplace clean, avoid from any spillage of chemical reagents to the working desk and remove any unused laboratory dishes and equipment from there.
- 4.2. The front glass panel of the fume hood must not be lifted higher than 20-30 cm during the work under the fume hood, so that only hands would be in the fume hood and everything could be watched through the glass.
- 4.3. While evaporating a solution in a beaker, that is acquired through filtration or washing, it must be properly mixed in advance because of the differences of densities between the lower layer (primary solution) and the top layer (rinsing water), as there is a threat of splashing out.
- 4.4. The mixing and dilution of chemical substances which is accompanied by an emission of heat, must be carried out in heat resistant or porcelain dishes.
- 4.5. To avoid burns caused by splashing of a liquid, it is forbidden to lean over a dish containing a boiling solution.

### **5. SAFETY INSTRUCTIONS REGARDING WORK WITH TOXIC AND CORROSIVE SUBSTANCES**

- 5.1. Inexperienced employees are not allowed to work with extremely hazardous substances without supervision.
- 5.2. All operations regarding toxic fumes must be carried out in the fume hood.
- 5.3. Substances emitting corrosive or toxic dust must be grounded in the fume hood.
- 5.4. Safety goggles must be worn upon grounding of alkaline and other solids. Substances must be grounded in the appropriate location.
- 5.5. Following precautions must be followed upon the use of concentrated acids and ammonia (NH<sub>3</sub>):  
Safety measures:
  - Bottles must be kept in an iron cupboard;
  - Liquids must be poured only using a siphon or a funnel;
  - Acid and alkali bottles larger than 5L must be transported only in specific baskets;

- Concentrated HCl, HNO<sub>3</sub> and NH<sub>3</sub> must be poured only under the fume hood;
- **To avoid splashing upon dilution of concentrated H<sub>2</sub>SO<sub>4</sub>, the acid must be poured into the water and not the opposite;**
- Acids, alkalis, and other corrosive and toxic substances must not be sucked through the pipette with mouth, this requires the use of dispensers.

**5.6.** The dilution of concentrated H<sub>2</sub>SO<sub>4</sub> and any warmth emitting substance is permitted only in glass or porcelain containers. It is forbidden to pour hot liquids into glassware with thick walls.

**5.7.** Upon work with bromine:

- The experiments must be carried out in the fume hood;
- Avoid inhalation of bromine gases;
- Protect eyes from bromine fumes;
- Protect hands, because bromine causes wounds that are difficult to heal;
- Rubber gloves must be worn when transferring large amounts of bromine;
- Always wipe off the drops on the neck of the bottle when pouring, because bromine spreads easily.

Notice: After accidental inhalation of bromine gases, sniff ammonia and go immediately to fresh air.

**5.8.** Mercury is stored in special storage rooms or thick-walled hermetically sealed glass containers or metal containers.

**5.9.** Mercury is to be used only on a specific base to prevent any mercury from reaching the working desks or floor. Any such case must be reported to the head of the laboratory. It is forbidden to warm the mercury in an open container.

**5.10.** Concentrated nitric acid, sulfuric acid and hydrochloric acid used in the work must be kept in thick walled up to 2 litre containers under the fume hood on a plastic or porcelain base.

**5.11.** Hot, flammable and low-boiling liquids (ether, alcohol, acetone, toluene, ethyl acetate, etc) may only be kept in the laboratory in the necessary amount needed for the daily work and in a safe distance from heaters.

**5.12.** Toxic substances must be stored in a special locked cabinet and they must be properly labelled.

**5.13.** Work with concentrated acids and bases without special personal protective equipment (glasses, gloves, etc.) is prohibited. It is recommended to use an additional rubber apron for the work with fuming nitric acid.

**5.14.** Acidic and basic leftovers to be discarded must be neutralized and collected to a special container. Concentrated acids and bases must not be poured into the drainage.

**5.15.** Hydrogen peroxides must be stored as flammable and explosive materials.

**5.16.** All dry pure reagents, particularly alkalis and alkaline metals, must be taken using a porcelain spoon or spatula.

## **6. WORKING WITH HOT GASES AND FUMES**

**6.1.** It is not allowed to burn hydrogen and other combustible gases and vapours without checking their purity.

**6.2.** Before collecting the gas to an already consumed gasometer, the water must be poured out and replaced with fresh one, because the water in the gasometer may contain dissolved gases that may create dangerous mixtures.

**6.3.** Before adding any gases to the gasometer, a sample must be taken from the contained gas.

- 6.4.** It is forbidden to keep acetylene or hydrogen in the gasometer (without the corresponding special permission).
- 6.5.** Residues of the previously present gas must be removed by blowing or sucking through the bottle, before leading a gas through the used washing bottle.
- 6.6.** Gas must be kept in the gasometer under hydrogen.
- 6.7.** Regarding accidents, when larger amounts of toxic gases or vapours are released into a room (e.g. bromine fumes or the breakage of a concentrated nitric acid bottle), the teacher of the chemistry cabinet must act as follows:
- Ask everybody to leave the room, not breathe inside the room and close the doors after leaving the room.
  - Not run to the window while breathing,
  - Open or in extreme cases break the window to ventilate the room and exit the room.

## **7. WORKING WITH BURNING LIQUIDS**

- 7.1.** Work with combustible and easily explosive liquids (sulfur, carbon, ether, benzene) must be carried out with particular care:
- Do not store them on tables in large quantities;
  - Do not store them opened;
  - Pour small amounts of liquids only away from open flame and heat sources;
  - All open flames must be extinguished while pouring large amounts of liquid in the room;
  - Do not pour liquids into the sink;
  - Do not heat liquids directly on a heating body, but instead on a reflux condenser with water bath.
- 7.2.** It must be ensured, that the oil does not warm up to explosive temperatures during the work with oil baths.
- 7.3.** Do not lean directly on the container in which a liquid is boiling, or to which a desired fluid is being poured into, to avoid splashing into the eye.
- 7.4.** Flasks may break upon the distillation of flammable liquids. To avoid the spread of any liquids, the flasks must be wrapped in a special heat resistant clothing and a sand bath must be placed under the apparatus.
- 7.5.** Distillation on an open flame is allowed only for the non-combustible, non-toxic or non-corrosive liquids.
- 7.6.** For the distillation requiring long term or intensive heating, the work desk must be covered with a heat resistant cloth.
- 7.7.** Act according to the following, if any explosive liquid is accidentally spilled on the floor:
- Extinguish all burners immediately and turn off all electrical heating systems;
  - Close the doors and open the windows;
  - Using a towel or a cloth, collect all the spilled liquid into a bottle with a wide neck from which it is possible to pour the liquid into a container with a cap;
  - Ventilation can be stopped after the smell of the spilled liquid is totally disappeared.
- 7.8.** Upon the ignition of a flammable liquid (breakage of a flask):
- Extinguish the burner;
  - Remove containers with flammable substances;
  - Cover the flame with heat resistant clothing, in case of necessity use sand or an extinguisher;
  - A fire brigade must be called for if the extinguishing is impossible. Only water soluble liquids (e.g alcohols and acetone) may be extinguished with water.

**7.9.** Upon ignition of clothing:

- Do not run;
- Cover yourself with a blanket, coat or felt to extinguish the flame.

**7.10.** Burning phosphorus or alkaline metals must be extinguished using sand.

**7.11.** If electric wiring gets ignited and it is not possible to turn off the power, it is forbidden to use water or extinguishing liquids - use non-conductive materials (such as sand).

**8. WORKING WITH PRESSURIZED CONTAINERS**

**8.1.** The guidelines for the work with pressurized gas cylinders and containers must be stored directly in the workplace.

**8.2.** Compressed gas cylinders must be kept in a separate specific room.

**8.3.** The work with cylinders must be immediately terminated, if:

- The pressure exceeds the allowed limit;
- The main elements of the cylinders show damages;
- Manometer is not functioning and the pressure can't be monitored using other devices.

**9. WORKING WITH HEATING ELEMENTS**

**9.1.** Upon the use of heating elements:

- Be especially careful not to break or knock them over;
- Do not let the reservoir heat excessively.

**10. WORKING WITH FLAMMABLE AND EXPLOSIVE SUBSTANCES**

**10.1.** The following precautions must be followed:

- Wear safety goggles;
- Use a safety net;
- Use thick-walled glass.

**10.2.** Substances emitting oxygen must be mixed with burning substances with special care.

**10.3.** It is forbidden to work simultaneously with open flame in the fume hood.

**10.4.** Any spillage of water into oil must be avoided during the work with oil- or paraffin baths, as the water under the oil layer overheats and oil will be splashed out.

**10.5.** Before opening glass containers with heat sealed caps containing various substances, the glassware must be cooled and it must be done so increasingly in relation to the lower boiling temperature

**10.6.** Used dishes must be washed immediately, because the contained flammable substances may create explosive mixtures with air for a long time.

**11. WORKING WITH ELECTRIC DEVICES AND APPARATUS**

**11.1.** The electrical equipment and apparatus may be used by persons who are familiar with the design of the device/apparatus and with the working principles and know the necessary instructions for use and safety guidelines for the use of electrical apparatus.

**11.2.** Before turning on the apparatus (device), its operating state, right switching and grounding must be checked.

**11.3.** The use of electric devices is life threatening and therefore forbidden in explosive and chemically active environments that damage metal or isolations.

**11.4.** The working area must include a working socket to plug in electrical devices.

- 11.5.** It is forbidden to touch the terminals and wires with damaged insulation without personal protective equipment. This is life threatening!
- 11.6.** The electrical equipment may only be turned on immediately before the beginning of the work.
- 11.7.** Any work must be stopped immediately, when one or many of the following faults occur on the device:
- Defects in the connector, cable or on the lead through.
  - Irregular work of the switch;
  - Smoke or smell characteristic to the burning of insulation;
  - Cracks or breakage of housing, handles, protective covers;
  - Any detected flaws and failures must be reported for the elimination of the faults to the head of the administration or a repairman;
  - Discovery of even the slightest of insulation breakages, because of which slight stinging can be felt upon touching the device.
- 11.8.** To avoid dangerous situations and occupational injuries, it is forbidden:
- To leave plugged-in devices alone without supervision;
  - Give a device to another employee without the right to use it;
  - Implement tension through pulling on the wires and cables, or hang weights on them;
  - Exceed the maximum work duration without intermission;
  - Dissemblance or fixing of the device without a special permission.

## **12.WORKING WITH GLASS**

- 12.1.** After preparing the cutting line on glass tubings, they must be pulled, not broken off.
- 12.2.** Use a towel or cloth for putting the cork on top of a glass tube or inserting the tube to a rubber hose.
- 12.3.** The neck of a dish must be held with a towel, when placing the tube on a flask or a thin walled dish.
- 12.4.** Large beakers filled with liquids may be lifted only with two hands.

## **13.FIRST AID IN CASE OF ACCIDENTS**

- 13.1.** The victim must be taken immediately outside to fresh air and a doctor must be contacted in case of a poisoning. In case of difficulties in breathing, the victim must be released from any restraining clothes and artificial ventilation must be carried out in case of necessity.
- 13.2.** In case of thermal burns, the burnt location must be moistened with a solution of ethyl alcohol or potassium permanganate or bandaged with a burns salve. Assistance by medical personnel is necessary in case of serious burns. When clothing is ignited, the flame must be extinguished first by covering the victim with a woollen blanket or heat resistant cloth. Remove the clothing from the victim in severe cases, place him/her on a clean blanket and call a doctor.
- 13.3.** The burnt location must be immediately rinsed with a large amount of water and smeared with a neutralizing agent in case of burns caused by caustic substances (acids, bases). The eyes of the victim must be flushed with a large amount of water before visiting a medical institution in case of chemical burns.
- 13.4.** In case of an electric shock, where the victim stays connected to the conductive parts, the current must be immediately turned off. If the current can't be quickly switched off, then the helper must isolate his/her hands with dielectric rubber gloves

or dry clothing, step on a non-conductive base, and separate the victim from conductive parts. It is forbidden to touch the victim with unprotected hands.

- 13.5.** Chemistry cabinet must have a first-aid kit in a easily accessible place with medicines and bandages and applicable instructions for use.

#### **14. FIRST AID REGARDING POISONINGS WHILE WORKING WITH REACTIVES**

**14.1. Ammonia.**

Inhale hot water vapour. In addition, provide milk, lemon juice or mild vinegar solutions to drink.

**14.2. Gasoline.**

Provide means to induce vomiting, rub the body and provide artificial ventilation, also provide Valerian drops.

**14.3. Phosphorus.**

In case of phosphorus poisoning provide means to induce vomiting (1g copper sulphate to 2-3 L of water). Provide pieces of ice. Do not provide milk or fats.

**14.4. Iodine.**

Provide starch paste or sodium sulfate solution (15g per 200g of water). Provide 100 ml at once, thereafter 1 tablespoon every 10 minutes.

**14.5. Chlorine.**

Bring the victim to fresh air. Provide mild solution of ammonia in ethanol for sniffing. Place a cold compress on the chest and throat.

**14.6. Chromic acid.**

Immediately call a doctor, because it is necessary to perform a gastric lavage, provide milk, egg white, a solution of calcium hydroxide in sugar water.

**14.7. Nitric oxide.**

Immediately allow to inhale pure oxygen. Thereafter send to a doctor.

**14.8. Mercury compounds.**

Induce vomiting. Provide milk or egg whites to the victim until the arrival of the doctor, also you can provide activated charcoal (with water) or magnesium hydroxide.

**14.9. Lead Compounds.**

Provide a solution of sodium sulfate (1:10) or magnesium sulfate with warm water (1:10) for drinking, also provide milk, egg whites, activated charcoal (in large quantities).

**14.10. Carbon monoxide.**

Take the victim immediately to a well-ventilated room and provide oxygen for breathing. If the victim shows difficulties in breathing, provide artificial ventilation, call for a doctor immediately.

**14.11. Hydrochloric acid.**

Call a doctor immediately. Provide a solution of magnesium or sodium oxide (2:300), milk or oil emulsions for drinking. In case of obstructed breathing provide artificial ventilation.

**14.12. Oxalic acid.**

Call a doctor. Provide castor oil, chalk powder mixed with water or magnesium carbonate. Induce vomiting.

**14.13. Sulfuric acid.**

Call a doctor immediately. Provide a solution of magnesium or sodium oxide (2:300), milk or oil emulsions.

**14.14. K-permanganate.**

Provide water, induce vomiting. Provide milk, egg white or starch paste.

**14.15. Sodium fluoride.**

Provide lime water or a 2% solution of calcium chloride for drinking.

**15. AFTER WORK**

**15.1.** Close the gas faucets and turn off heating elements and electric devices.

**15.2.** Used laboratory dishes must be emptied before washing and slightly rinsed.

**15.3.** Hands must be washed with a soap and disinfectant after finishing with any work.

**15.4.** Place the special clothing in the dedicated cabinets.

**16. ACTIONS IN CASE OF A RISK OF ACCIDENT OR FIRE**

The employees must employ precautions according to their best knowledge and applicable technical supplies in case of a serious and eminent risk of an accident even without an immediate contact with the direct boss. Employees must leave the working place quickly and safely in case of a serious and imminent risk. An employee who left the workplace or the endangered area in case of a serious and imminent risk on his own, may not be punished or placed in a disadvantageous situation. In case of a fire it is necessary to ensure peoples' safety and quick evacuation or rescue from the endangered area.

**The person who detected the fire is obliged to:**

- Inform the emergency centre (tel. 112) about the location and nature of the fire, along with his/her last name and a phone number to forward the message and answer the questions from the emergency service.
- Warn endangered people;
- Close the doors and windows and turn off the ventilation to prevent the spread of the fire;
- Start with the extinguishing if possible;

Upon the arrival of the fire- and emergency team, the person who discovered the fire or the representative of the building administrator must inform the head of the team:

- Regarding the starting location and possible extent;
- Potential threat to humans;
- Other possible dangers that may be involved with the fire (explosions, dangerous chemicals,
- electric devices, etc).

**17. USED LITERATURE AND APPLICABLE LEGISLATION**

1. Occupational Safety and Health Act (RT I 1999, 60, 616; 2000, 55, 362; 2001, 17, 78)
2. Activities submitted to the occupational health and safety requirements (RT I 2007, 42, 305)
3. Occupational health and safety requirements regarding use of work equipment (RT I 2000, 4, 30)