Rules for Safe Work in the Laboratory
Guidelines for 1st year students of FKKT

Oktober 2007

CONTENTS

1 HISTORICAL DEVELOPMENT OF HEALTH AND SAFETY AT WORK

Since old ages there has been awareness of hazards, or potential risks for injuries and damage, as well as knowledge how to prevent these in almost every area. Written historical records exist which prove that health and safety is not a new discipline; it has been recorded and preserved through numerous historical records:

1. In an old Chinese document called »Ping Yuan Hon Lum« we can find a warning about the hazards from wood. A certain tree *rhus vernicifera*, is mentioned which was used as a material for making lacquer.

2. About 400 AD Hypocrates wrote about injuries which resulted from various handcrafts and artistic activities and these were referred to as occupational injuries.

3. In 1531, Paracelsus studied silicosis and other mining diseases, as well as other diseases caused by lead and mercury.

4. In 1746, a Dutch man, Goldschmidt, invented a thimble to protect finger tips of seamstresses.

5. Year 1785 was a turning point which was characterised by the beginning of industrial era in England when steam engine was introduced to textile industry.

6. In Slovenia, we have an important document, which was produced after World War I, entitled »Guidelines for supervisors of units«; written for nail manufacturing and metal craft cooperatives in Kropa and Kamna gorica. The exact date of this publication is unknown, it is estimated that it was written between 1920 and 1930.

2 INTRODUCTION

During your chemistry studies you will spend a lot of time in laboratories. Doing practical work in laboratories you will first come in contact with various chemicals which will become part of your every day routine. Chemicals are all around us: at the workplace, urban environment, and nature. Chemicals are used practically everywhere for different purposes (technology, science, food, agriculture, medicine). Laboratory exercises in particular can be a cause for many incidences at work if not carried out properly. If you were asked how much you know about safe use of chemical substances, you would probably be puzzled. Therefore, it is a duty of all Faculty members to prevent such events.

The purpose of training students for safe work in laboratories is twofold:

- To make students aware that by proper handling with laboratory apparatus and chemicals they can protect themselves against injuries and health risks which arise from laboratory work;

- To learn how to apply safety procedures and implement these into their regular practice, both during studies and later in their careers.

3 HEALTH AND SAFETY AT WORK

Health and safety at work encompasses knowledge, procedures and measures to ensure safe and healthy workplace which is a precondition for a successful work during the whole worker's career.

3.1 LEGISLATION

Basic provisions for health and safety at work are laid down by the Constitution of R Slovenia: Art. 66 provides that the state shall create opportunities for employment and work, and shall ensure the protection of both by law, while the right to a healthy environment is a constitutionally protected right and refers to the working environment as well. The basic act which regulates the field of health and safety at work in Slovenia is the Health and Safety at Work Act (Official Gazette RS, No. 56/99 and 64/01), which was adopted in June 1999 and came into force on July 28, 1999.
Deriving from the Health and Safety at Work Act (hereinafter: HSWA) there are numerous other regulations which specifically regulate particulate areas, e.g.

- Health and safety for workers exposed to various risks,
- Health and safety by categories, the so called vulnerable workers,
- Health and safety of workers working with specific equipment,
- Health and safety in particular working environments.

The basic principles of HSWA derive from international legal order in the area of health and safety at work. Two relevant documents are European directive 89/391 ES and the Convention of International Labour Organisation (hereinafter: ILO) No. 155 from 1981, ratified already by the old Social Federative Republic of Yugoslavia, and later adopted by the Republic of Slovenia as a legal heritage. The Directive 89/391 was adopted on June 12, 1989 in order to introduce measures for improving health and safety of workers. The main provisions of the Directive are: risk assessment, informing workers, training of workers, involvement of workers in decisions on health and safety issues at work, and medical surveillance. The Directive forms a legal framework and provides guidelines (Art 16) for the adoption of more specific directives related to risks which originate from work processes. Thus, based on Art. 16 of the Directive 18, particular directives have been adopted (e.g. directive on threshold values, chemical factors, manual movement of loads, work equipment, etc.). The ILO Convention No. 155 is particularly important since it defines some basic concepts related to health and safety at work (e.g. worker, workplace, and health). By this convention, it is the responsibility of every member state, to design, adopt and when necessary revise policy in the field of health and safety at work together with their social partners.

Art. 6 of HSWA lays down some basic principles of health and safety at work referring to:

1. avoiding risks,
2. assessing the risks which cannot be avoided,
3. eliminating the risk at the source,
4. adapting the work to an individual,
5. implementing measures for maintaining and improving health,
6. adapting to technical progress,
7. replacing dangerous with non-dangerous or less dangerous conditions.

According to the above, priority is given to collective safety measures, rather than individual or general measures.

Work injuries
Work injury is any unwanted or unexpected event which can cause injury and/or material damage. Occupational injury is an injury which is the result of a direct mechanical, physical or chemical impact on the body due to a sudden movement, or some other physiological change in human organism, if such injury is related to performing work, for which the injured worker has been insured.

Responsibilities of FKKT students for safe work
Safety at work at FKKT is regulated by the Safety statement with risk assessment which defines the duties and responsibilities of individuals for safe work. The responsibilities of students for safe work at FKKT are:

- before starting work in the laboratories, students must be instructed on safety procedures, the guidelines for safe work and sign a statement that they have been informed about the conditions and instructions for safe work in the laboratories,
- to take a test in safety at work and fire safety before the study programme begins,
- to comply with the rules for safe work and to strictly follow the instructions of their superiors,
- to properly use and maintain personal protective equipment,
- to give first aid,
- to rescue people in cases of an accident,
- to fight fire.

All the above responsibilities are taken from the Rules and are explained in more detail further below.

It is the subject teachers who are responsible for safe work of their students. Students must be acquainted with possible risks for injuries and measures to be taken. On the other hand, it is the duty of students to comply with the rules set out by their superiors.

3.2 SAFETY STATEMENT WITH RISK ASSESSMENT

According to the provisions of HSWA (Art 14) (Official Gazette RS, No. 56/99 and 64/01), adopted on June 28, 1999, the employer is responsible for preparing a Safety statement with risk assessment. By law, risk assessment is referred to as ″Safety Statement″ and is defined as a document which contains description of the work process with identification of the hazards, and assessment of the risks for injuries and health, and determines safety measures. The purpose is that no one should suffer from injuries or contract a disease due to work. In risk assessment the employer identifies any possible hazard related to work and if the hazards exist, steps must be taken to reduce the hazards to the acceptable level. Detailed instructions for preparing the safety statement are given in the Rules for making safety statement with risk assessment (official Gazette RS, No. 30/00). As already said, safety statement with risk assessment is the responsibility of every employer, regardless of the size of the enterprise or institution and represents a written record on the policy of the employer for ensuring health and safety at work. With this statement the employers clearly express awareness about their responsibilities for ensuring health and safety at work and possible consequences if the rules are not observed. Therefore, safety statement is the employer's tool for identifying possible hazards for safety and health of the employees. The ultimate goal is to minimise or eliminate the hazards. Risk assessment is a continuing process for improving the level of safety and developing safety culture in the company. For this reason this documents needs to be regularly revised and measures changed as necessary.

3.3 MEASURES FOR SAFE WORK IN A LABORATORY

Further on we shall concentrate on the measures for safe work in a laboratory, where numerous imminent dangers for injuries and health exist. We need to be aware that accidents may occur also outside laboratories (e.g. stairs, transportation to school, working with a computer, improper lifting of loads, roller skating, etc.). Therefore, the purpose is to strive for developing a safety culture in all areas, not only at school.

3.3.1 LABORATORY HAZARDS

There are many potential hazards in the laboratory; in addition to »constant« hazards, e.g. broken glass, cutting equipment, splashes, injuries of spine due to incorrect lifting of objects, electrical shock, there are more chemistry specific hazards, e.g. corrosive materials, flammable and radioactive substances and uncontrolled chemical reactions.
The main sources of hazards in the laboratory can be due to:

- toxic chemicals
- flammable regents,
- radioactive substances,
- compressed gases,
- deep frozen gases,
- hazardous equipment.

Laboratory equipment may cause fire, burns, electrical shock, cuts and explosions. Other health risks may be due to toxic substances which are routinely used in chemistry and other laboratories. Many flammable substances may be explosive under specific conditions.

Chemistry laboratories are characterised by a large number of hazardous substances which exist in small quantities. However, the majority of accidents in the laboratory, in spite of numerous chemicals and other equipment which represent imminent danger, are due to injuries caused by broken glass, and for this reason we are going to talk about these first.

3.3.1.1 General laboratory glassware hazards

Most of the injuries occur due to improper use of glassware. Broken glass can cause severe cuts. In handling with glassware we need to avoid extreme temperature changes. Glassware must be heated gradually and slowly. The same goes for cooling down glassware. When handling with hot glass objects you should always wear suitable gloves.

General rules in handling with glassware:

1. Never use cracked or damaged glassware. Faults on glass objects always start on the surface. Therefore, if you see any faults (cracks, scratches), you should not use such glassware and discard it.
2. In assembling or inserting laboratory glassware with non-polished edges into apparatus, you must always use appropriate gloves (e.g. see gloves in Fig. 1)
3. Do not try to remove ground glass stoppers from the bottles by force. In such cases always ask for assistance of the laboratory supervisor.
4. Always cool down hot glass objects slowly.
5. Sealed glass containers must never be heated.
6. Use only special glassware for vacuuming (lowering pressure).
7. Always use both hands when lifting or moving bottles.
8. Use rubber gloves when cleaning glassware.

Fig. 1: Gloves used for the protection against cuts (Source: Katalog osebne varovalne opreme ZAVAS)

3.3.1.2 Electrical hazards

Installations and equipment which transmit and use electricity are always present in our natural as well as in our working environment. In laboratories too, numerous electrical appliances are used for heating, cooling, mixing, pumping, and also for performing physical measurements.

3.3.1.3 Electrical shock and impacts on human body

Electrical shock is caused by the passage of electric current through the body. Most frequently this occurs in:

- Direct contact with an electrical conductor (a phase lead, part of electrical appliance or installation), under voltage (Fig. 2, top);
- Indirect contact with exposed conductible parts, which is often due to improper insulation (Fig. 2, bottom).

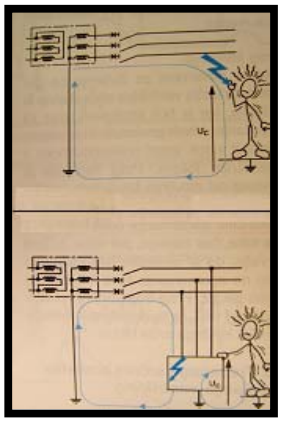


Fig. 2: Direct and indirect contact with electricity (Source: Delo in varnost, 6/2005)

Fig. 3: Example of burns on skin (Source: Delo in varnost, 6/2005)

There are numerous factors which influence the level of injuries due to electrical shock:

- Current amplitude (level).
- Type of electric current (an alternating sinusoid current can damage the tissues to a certain degree, while with direct current, twice or three times stronger current would be necessary for the same type of injury).
- Period of exposure.
- Frequency of the alternating current.
- The route electricity makes while flowing through the body (the most dangerous is the route through the region near the heart).
- Resistance to electrical shock (experiments have shown that humans are more resistant to electricity during sleep as when awake).

Electrical current of 25 mA can cause injuries of the respiratory system. Values greater than 50 mA can cause unconsciousness; and death above 100 mA. The consequences depend also whether we have only touched an object charged with electricity and withdrew the hand instantly, or held the object so that the current passes though the heart.
A wet finger which comes in contact with 110 V can cause the electricity to pass with 7-10mA through the body. The impacts of injuries due to electrical shock are presented in Fig. 3.

Whenever possible, electrical equipment must be installed in such a manner as to eliminate risks in case of a spill of water or chemicals. If water, or a chemical, is spilled over electrical equipment, the appliance needs to be switched off immediately and not be used until it has been dried. If electrical shock occurs in damp or moist conditions, consequences are even more severe: water on skin has a hundred times lesser resistance than dry skin. It also needs to be taken into account that skin can be damp due to perspiration or a spilled substance.

Repairs on electrical equipment can be performed only by professionally trained people. In case of damage, incorrect performance or deficiencies on electrical equipment the person supervising laboratory exercises must be immediately notified.

Some general rules for working with electrical appliances:

1. Use the extension cord only if necessary and only for a limited period of time. Remove the extension immediately after use.
2. Before using electrical appliances make sure that the insulation is not damaged or missing or that wires are not damaged.
3. Report any fault or deficiency immediately to the FKKT personnel.
4. Make sure that the working surface on which the electrical appliance is placed is not wet.
5. Make sure there are no flammable materials nearby.
6. Make sure that the switches on the appliances are in OFF position before you plug in the apparatus. This will prevent causing a spark in the socket.
7. Before cleaning or replacing parts of the apparatus, make sure that the switch is in OFF position.
8. Never handle with electrical equipment if your hands are wet or sweaty, and never stand on wet floor.
9. Never pull the cord with force from the socket.
10. After finishing work in the laboratory, make sure that all apparatus has been switched off.

3.3.1.4 Chemical hazards

Chemical hazards depend on the hazardous properties of chemicals (flammable, explosive, toxic, corrosive, radioactive, oxidising, dangerous for the environment, etc.). Classification of chemical hazards is given in Chapter 5.1.

General rules for handling with chemicals in a laboratory

1. Consider that a mixture of chemical is at least as dangerous as the individual constituents of the mixture.
2. Never use chemicals which are not labelled.
3. Read labels carefully to make sure you are using the right one. Read labels three times: before the use, during use and after the use. Carefully read the labels and compare with experimental procedures. Check the name, the formula and concentration.
4. Immediately label the container into which you have put a sample.
5. Do not combine substances unless specifically instructed to do so.
6. Never taste any chemicals. Mouth pipetting is forbidden.
7. Prevent any contact of chemicals with skin or eyes.
8. Always add acid to water, never the other way round.
9. Never pour water into a chemical which has been heated above 90°C.
10. If a mercury thermometer has broken, report the case to the FKKT personnel.
11. Before using a Bunsen burner make sure that there are no flammable liquids in the vicinity.
12. Do not dispose of chemicals into the sewage system.
13. Do not take chemicals from the laboratory without notifying the supervisor of the laboratory.
14. Do not place chemicals too close to the edge of laboratory bench or shelves.
15. Do not expose chemicals to the sources of heat (radiators, sunlight)
16. Never store chemicals in food packaging materials.
17. Treat every unknown chemical as a hazardous substance.

3.3.2 LABORATORY SAFETY GUIDE

The basic rules for safe work are contained in the Laboratory safety guide. The rules apply to all laboratories at FKKT and to all persons working in laboratories: teachers, students, cleaning staff, and visitors. Since the provisions from the Laboratory safety guide are essential, they are given in full text in the Attachment No. 1. Laboratory safety guide should also be displayed in every laboratory. Further on we are going to present individual rules. Separate rules which refer to a particular laboratory, or a particular exercise will be given to students separately. Make sure that you always comply with the rules, regardless whether they are laboratory safety guidelines, written orders, or only oral instructions given by the teacher, assistant, or laboratory technician. Not complying with the rules means that you may be removed from laboratory exercises.

3.3.3 PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR LABORATORY WORK

Personal protective equipment is a means for reducing risks for injuries or illness resulting from workplace hazards. PPE is defined as any piece of clothing, device or any other means intended to wear to protect the worker against injuries. Working without PPE is forbidden if the risks and hazardous impacts can not be removed beforehand by technical or organisational preventive measures. The prescribed PPE must be worn for the purpose for which it was intended. Refusing to wear PPE where it has been prescribed can lead to accidents or occupational diseases. The following two pictures show injuries caused by a splash when the person was not wearing safety glasses.

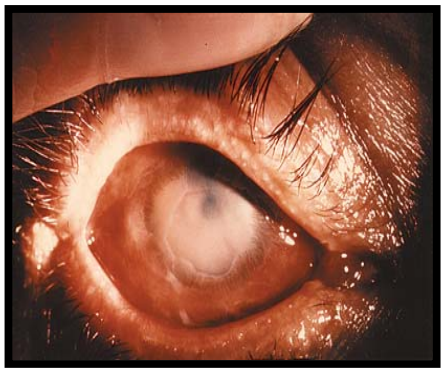


Fig. 4: Eye injury caused by the splash of lime

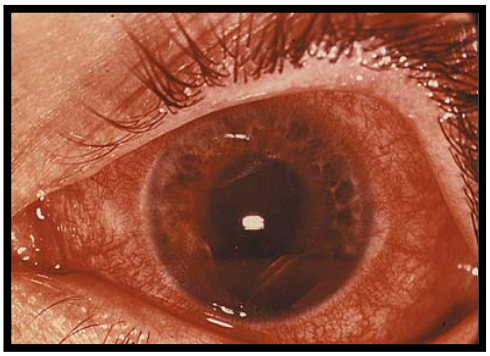


Fig.5: Eye damage caused by severe inflammation

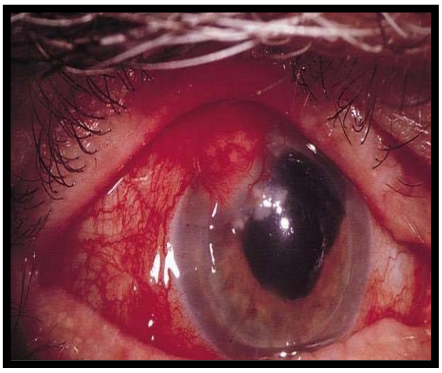


Fig. 6: Eye injury caused by an angle grinder

Fig. 7: Eyes remained protected by the use of safety glasses.

3.3.3.1 Safety glasses

Safety glasses protect eyes against mechanical and optical hazards and splashes of chemicals and liquids. There are two types of safety glasses which are used in laboratories:

1. safety glasses with side shields,
2. goggles (which give a good facial seal).

You should always wear safety glasses with side shields when working in a laboratory. Those who wear prescription glasses or contact lenses should wear goggles. Both types of glasses can be purchased from FKKT. Some laboratory exercises may require additional protection: for example, when working with corrosives you need to wear goggles and a face shield. Working with laser beams requires different eye protection. All additional protective equipment for face and eyes is available in the laboratory. Glasses may cause a certain level of discomfort or irritation. However, remember that pain may be stronger and last longer.

Fig. 8: Goggles give a good facial seal

Fig. 9: Safety glasses with side shields

3.3.3.2 Laboratory coat

Laboratory coat must be made of 100% cotton material, with long sleeves and appropriate length, reaching below knees. White colour is recommended for lab coats. Lab coats are buttoned with snap fasteners. A lab coat must be purchased individually and must be properly fitted.

Fig. 10: Laboratory coat

3.3.3.3 Gloves

Gloves are classified according to:

- Type of work (heavy duty work, precision operations, etc.)
- Types of hazards (cuts, burns, chemicals, etc.)
- Hand size

During laboratory work you will be handling with different chemicals which involve different hazards. Sometimes latex gloves would be inappropriate, so you will get a different type of gloves.

Fig. 11: Different types of gloves for laboratory work

3.3.3.4 Footwear

It is forbidden to wear mules or sandals in a laboratory. Appropriate footwear should cover and protect the whole foot and allow for comfortable and safe walking. High-heeled shoes or shoes with slippery soles are considered inappropriate.

3.3.3.5 Maintenance of PPE

Cleaning and maintenance of PPE is the responsibility of students. Do not wear worn out and torn lab coats.

The lenses of safety glasses should be cleaned regularly. Using water and dry cotton cloth should suffice. Make sure to use a cloth which does not leave fibres on glass surface (e.g. a textile handkerchief). You should take care not to damage the lenses or scratch them. Glasses with cracked lenses or broken frames should not be used.

3.3.4 HYGIENE

You are going to work with many chemicals hazardous to your health. To avoid the intake of such substances you need to follow some safety rules:

After working in the laboratory wash your hands thoroughly.

1. Things which are strictly forbidden:

- Drinking or eat in laboratories,
- Smoking (this refers to all premises of FKKT),
- Bringing in food or beverages or keeping them in the laboratory refrigerators,
- Storing chemicals in food packaging materials,
- Mouth pipetting.

3.4 EMERGENCY PROCEDURES

Emergency is defined as any incident which results in:

- injuries, health impact, or occupational disease,
- fire and/or explosion,
- damage on tools and equipment,
- material damage,
- environmental damage.

In case of emergency you should immediately call the person responsible for supervising the laboratories.

Due to the possibility of an incidence during working in the laboratory, there should always be two people present at a time!

3.4.1 EMERGENCY RESPONSE

1. Giving first aid in cases of injuries,
2. Notifying the FKKT members on the incidence.
3. Following the instructions of the FKKT members .

The emergency centre telephone number (fire brigades and ambulance) is **112**. When you contact the emergency centre you need to give answers to the following questions:

WHAT happened and describe the event (fire, explosion, collective accident, etc.).
WHERE it happened (location, e.g. Aškerčeva 5, 3rd floor).
WHO is reporting the accident (name and surname).
WHAT happened.
HOW MANY casualties were involved.
WHAT injuries are involved.
WHAT were the circumstances.

3.4.2 FIRST AID

The following equipment is available for giving first aid:
- First aid cabinets,
- Eye wash stations or squirt bottles,
- Emergency showers.

Before you start working in the laboratory you will be acquainted with the location of the above equipment as well as the nearest telephone location.

Fig. 12: First aid cabinet

Fig. 13: Eye wash and emergency shower

3.4.2.1 Giving first aid in particular cases

The most frequent injuries in laboratories which require first aid giving are:
- cuts,
- burns,
- splashes of corrosive substances.

Procedures in giving first aid:

a) CUTS: clean the cut and cover with bandage or apply a patch.
b) BURNS: cool the burn under running cold water. Do not apply any ointments.
c) SPLASHES WITH CORROSIVE SUBSTANCE: When a corrosive substance gets in contact with skin it is extremely important that you **immediately start washing the area with water**. If the substance has splashed in the eye, use the eye wash or running water from the tap and irrigate the eye for at least 15 minutes. In cases of splash on the body, use a safety shower.
Splashes into yes can be prevented by using goggles with a tight fit or a face shield. Use gloves and lab coats made from acid-resistant materials.

3.4.3 FIRE, EXPLOSIONS

Safety Procedures in cases of fire and explosions are given in Chapter III- Fire Safety.

3.4.4 ALMOST-ACCIDENTS

Almost accident is an event which might lead to an incidence. Almost-accidents are irregularities which do not cause harm to persons or material damage (e.g. if a gas cylinder has fallen and remained undamaged, not causing any harm to the environment).

In the event of an almost-accident you should notify the FKKT personnel.

3.5 HAZARDOUS SUBSTANCES

What is the definition of a hazardous substance, or how do we know that a certain substance is hazardous? Hazardous substances are chemicals or biological preparations which can cause

- injuries, illness or even death to humans and animals,
- human extinction,
- damages or destruction of machines, equipment or infrastructure.

3.5.1 CLASSIFICATION OF HAZARDOUS SUBSTANCES

Based on the Rules on classification, packaging and labelling of hazardous substances hazardous properties of substances are determined by their:

– physical and chemical properties,
– properties causing damage to health,
– properties hazardous to the environment.

According to the Chemicals Act (hereinafter: CA), Official Gazette RS, No. 65/03 and 47/04, Par. 10, Art. 2, hazardous chemicals are classified by their properties into the following 15 groups:

1. explosive;
2. oxidising;
3. extremely flammable;
4. highly flammable;
5. flammable;
6. highly toxic;
7. toxic;
8. harmful;
9. corrosive;
10. irritant;
11. sensitizing;
12. carcinogenic;
13. mutagens;
14. teratogenic;
15. dangerous for the environment.

How do we know that a substance we are using is hazardous? This specific information is available from the labels on containers and safety data sheets.

3.5.2 LABELLING HAZARDOUS SUBSTANCES

Every market available chemical product carries the following information:

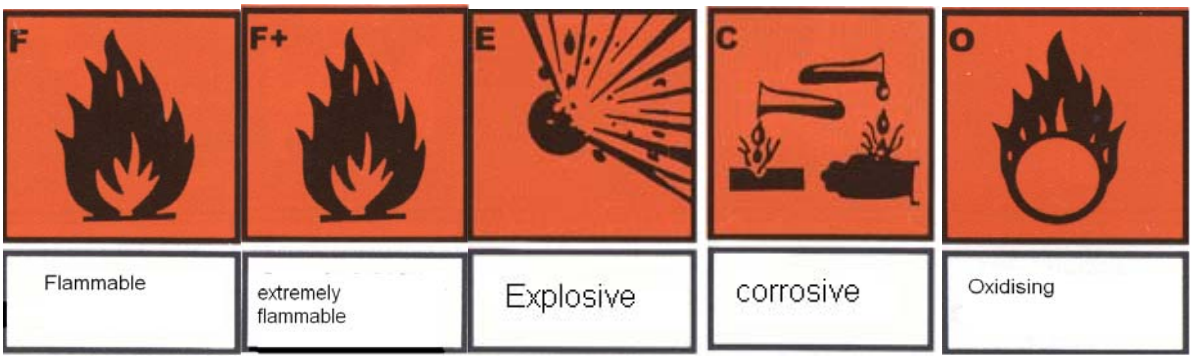
1. **Name of chemical (name and trade name, rational molecular formula, CAS number),**
2. **Manufacturer (name, address and telephone number),**
3. **R and S phrases (which may be either a code or a text),**
4. **Hazard symbol (one symbol or more, i.e. the main and the additional hazard).**

An example of labelling is given in Fig 14.

Fig. 14: Label on a bottle

3.5.3 HAZARD SYMBOLS

Hazard symbols are square symbols on orange background with black lettering. The symbols are additionally marked by a letter which denotes the hazard. There are ten hazard symbols:



Dangerous for the environment | Toxic | Extremely toxic | Harmful | Irritating

3.5.4 **R** AND **S** PHRASES

R phrases are **risk warning** phrases and describe dangerous substances, while **S** phrases are **informing** phrases and refer to the measures which need to be taken when handling with a hazardous substance. R and S phrases are coded. The list of all R and S phrases is given in Attachment 2.

Fig. 15: R and S phrases displayed in a laboratory

3.5.5 MATERIALS SAFETY DATA SHEETS

Materials safety data sheets are forms containing the data on the properties of hazardous substances. This is a document, which any legal or natural person, producing or supplying hazardous substances must provide to the users for the sake of protection of health and environment and health and safety at the workplace. Safety data sheets are regulated by the provisions of the Rules on classification, packaging and labelling of dangerous substances (Official Gazette RS, No. 35/05). By this regulation materials safety data sheets are compulsory for all substances and preparations which are classified as hazardous. Safety data sheets are recommended for the substances and preparations which are not classified as hazardous, especially in implementing the systems of quality assurance and environmental protection. Safety data sheets are also compulsory for substances and preparations, listed under indents 8 and 9 of the attachment to the IV Directive 67/548 ES on the Approximation of laws and other regulations related to the classification, packaging and labelling of dangerous substances (e.g. metals in massive form, liquefied natural gas, etc.), which need to be labelled according to special requirements.

A materials data safety sheet contains data in the following order:

SAFETY DATA SHEET *DATE OF ISSUE.……*
(or DATE OF REVISED ISSUE.……)

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1. Chemical product and company identification.
2. Composition/information on ingredients.
3. Hazards identification.
4. First aid measures.
5. Fire fighting measures.
6. Accidental release measures.
7. Handling and storage.
8. Exposure control/personal protection.
9. Physical and chemical properties.
10. Stability and reactivity.
11. Toxicological information
12. Ecological information.
13. Disposal considerations.
14. Transport information.
15. Regulatory information.
16. Other information.

3.6 WASTES

Wastes, containing hazardous substances are called hazardous waste. Hazardous wastes must never be disposed of into waste containers or sewage system.
At FKKT there is a uniform system of marking containers for waste chemicals. The containers are marked with special labels and contain the following information:
1. Type of waste chemical,
2. Hazard symbol,
3. Chair unit,
4. Date of disposal,
5. Signature of the person responsible for disposing of waste to the storage facilities.

An example of the label for waste chemicals is given in Fig. 16.

As can be seen from the table below, the framework of the label is different for every type of waste chemical.

Table 1: Labels for waste chemicals

Type of waste chemical	Framework colour	Hazard symbol
Liquid waste inorganic acids	Red	Corrosive
Liquid waste bases	Blue	Corrosive
Halogenated solvents	Green	Flammable
Non-halogenated solvents	Black	Flammable

For other types of waste chemicals the framework colour is black.
Bulk chemicals must be removed and disposed of according to the instructions of the FKKT personnel.

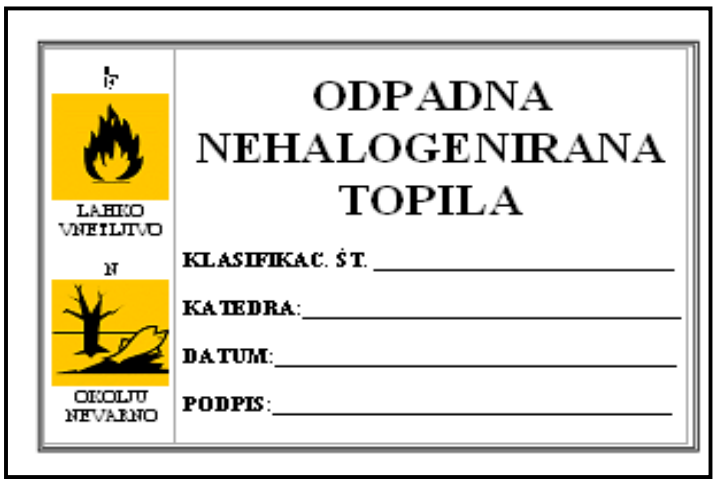


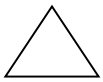
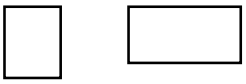
Fig. 16: Label on a waste chemical

3.7 SAFETY SIGNS

The purpose of safety signs is to alert people of a hazard in a work area in a simple and clear way. Safety signs differ in colour and have the following meaning:

- prohibition (red)
- mandatory (blue)
- rescuing (green)
- warning of danger (yellow)

Table 2: Meaning of colours and geometrical shapes of safety signs

Colour	*Contrasting colour*	*Meaning*	*Indication*	*Geometrical shape*
RED	WHITE	Prohibition	Prohibits/forbids an action	
BLUE	WHITE	Mandatory	Mandatory use of personal protective equipment	
YELLOW	BLACK	Danger	Indicates a potential hazard (fire, explosion, obstruction..)	
GREEN	WHITE	Safety information and instructions	Evacuation route First aid	

4 FIRE SAFETY

It is the responsibility of all FKKT students to be informed about potential hazards of fire and explosions in laboratories. Students need to know how to respond in case of an incidence of fire.
Article 46 of the Health and Safety at Work Act, (Official Gazette. RS No. 3/07) lays down:
»Anyone noticing a potential danger of fire or explosion, or noticing fire, needs to eliminate hazards, and suppress fire if that can be done without endangering themselves or others. If fire cannot be suppressed, the emergency phone number, or police should be called immediately. Others who are able to assist by communication means or means of transportation need to offer help.«

Fire is a process of rapid combustion which spreads uncontrollably in space and during which heat, combined with smoke, toxic gases and flames is released. Rapid combustion may result in explosion.
Explosion is an extremely rapid oxidation reaction or decomposition which results in elevated temperature, pressure, or both.

4.1 FIRE SAFETY CODE AT FKKT

Fire safety code determines the measures for ensuring fire safety at FKKT.

By the Act on the prohibition of use of tobacco products (Official Gazette RS, No. 60/2007) and Fire Code of FKKT it is forbidden:

- To smoke in all premises of FKKT and its functional grounds (access ways, parking lots, areas for waste bins, fire emergency stairs);
- To use open flames except laboratory burners which must be used in such a manner as to ensure safety from fire,
- To use electric muffle-furnaces and cookers (the use of such is permitted only upon previous written permission if this be necessary for the teaching process);
- Disposing of cigarette ends into waste containers or courtyards. Ashtrays are located in the park at the Rimski zid.

Crucial provisions of the Fire Safety Code are given in the Summary of the Fire safety Code (see attachment 4). The Summary is posted on every floor at FKKT, Aškerčeva 5.

Provisions of the Fire Safety Code which refer to students:

a) Fire preventive measures and procedures

Before starting experimental work in laboratories, students must be trained on the procedures for safe and healthy work, must be acquainted with safety guidelines, and pass a special laboratory safety test, sign a statement, certifying that they have been informed about the rules and conditions for safe work and fire safety in the laboratories.
If a small fire breaks out, students must take part in fighting the fire and follow the instructions of their FKKT superiors.

b) Procedures in the case of fire

In cases of fire, students must follow the instructions of their FKKT superiors.

c) Procedures after the fire

After the fire students need to follow the measures and procedures given by their FKKT superiors.
Corridors, transport routes and access to fire extinguishers and electricity distribution cabinets must be always free.

Every premise at FKKT has an evacuation plan or a map for that particular floor, showing the location of fire extinguishers, hydrants and directions of escape. On every floor the evacuation route is also marked with standard notices or stickers.
There are fire extinguishers and hydrants provided for fighting fire. Should you activate a fire extinguisher you need to immediately notify the superiors.

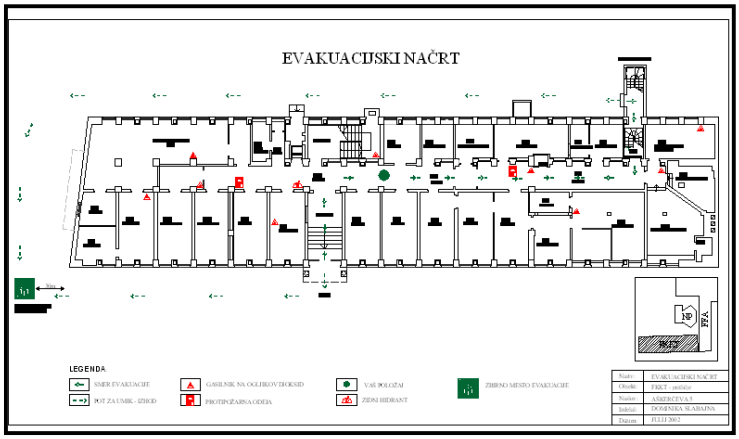


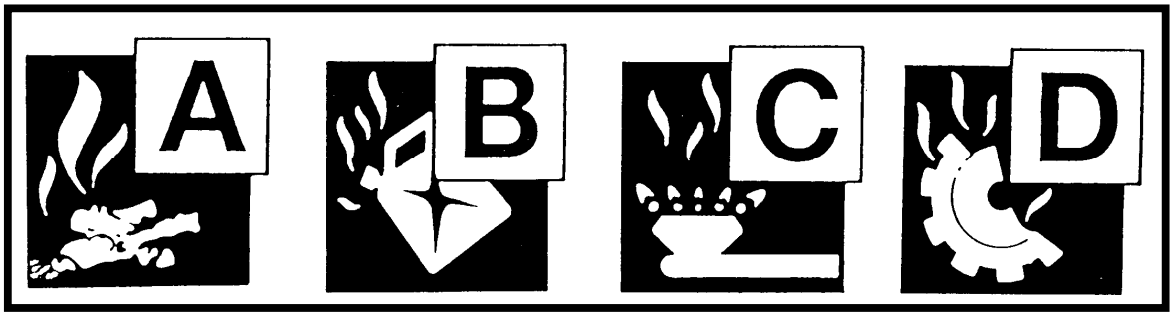
Fig. 17: Evacuation plan

4.2 BASIC PRINCIPLES IN FIGHTING INCIPIENT FIRE

1. Stay calm and think what needs to be done to eliminate the hazard and to prevent the spreading of fire. If there have been casualties, start rescuing them first.
2. Switch off all electrical appliances and close gas supply. Switch off electric lights only if there is sufficient daylight.
3. Close windows and doors to prevent draught.
4. Remove all objects and substances away from the fire and heat.
5. Attempt to fight fire.
6. If the situation is uncontrollable, immediately call fire brigades at 112.
7. In case of fire in the open air, approach the fire from downwind side.

4.3 FIRE EXTINGUISHING AGENTS

In order to properly select a fire extinguishing agent, you need to know something about fire classes. In fire fighting, the fires are classified according to one or more fire classes, each designating the fuel involved in the fire, and thus the most appropriate extinguishing agent. There are five classes of fire:



Class A: Combustibles.
Class B : Flammable liquids.
Class C : Flammable gases.
Class D : Combustible metals (aluminium, magnesium).
Class F: Cooking oil or fat (kitchens using fryers, e.g. McDonalds).

Every fire extinguisher carries a sign which indicates which type of fire it is suitable for.

At FKKT there are two types of fire extinguishers:
- Manual and transportable fire extinguishers,
- Water supply with hydrants.

Fig. 18: Manual fire extinguisher

Fig. 19: Transportable fire extinguisher

In fighting incipient fire use a fire extinguisher located nearby (Fig. 18). Indoor fire hydrants are used by the FKKT personnel in case it is impossible to suffocate the incipient fire with fire extinguishers and if there is a danger that fire might spread.
On every floor at FKKT there is an indoor fire hydrant stored in a cabinet, marked with letter H.

Fig. 20: Indoor fire hydrant

4.4 FIRE EXTINGUISHERS

Fire extinguishers are either manual or transportable, and differ according to the type of fire extinguishing agent (powder, foam, water, CO_2).

4.4.1 CO_2 FIRE EXTINGUISHERS

The most frequent type of fire extinguishers is the CO_2 fire extinguisher. Symbols CO_2-3, CO_2-5, CO_2-30 denote the mass of agent in kg.
The pictures below show two types of CO_2-5 manual fire extinguishers, which differ in the type of valve and the handle:

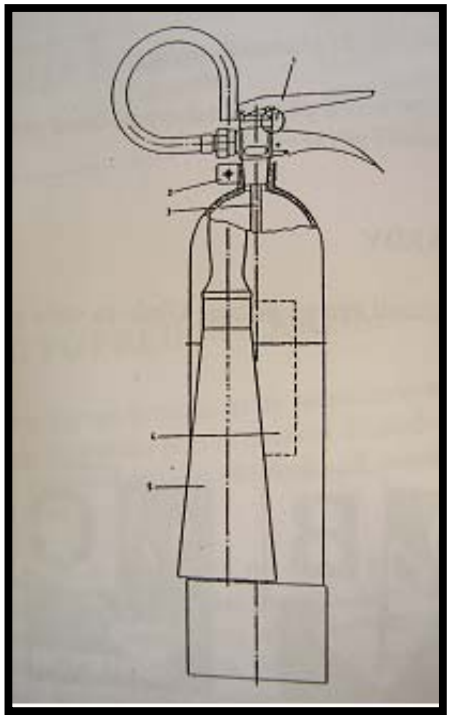


Fig. 21: CO_2 Fire extinguisher with a clamp

LEGEND:
1 = Valve
2 = Clamp (left), Handle (right)
3 = Riser
4 = label
5 = nozzle

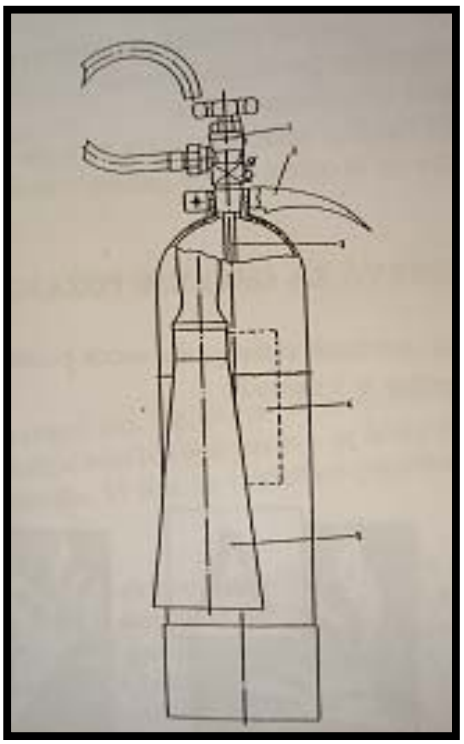


Fig. 22: CO_2Fire extinguisher with a handle

Manual and transportable CO_2 fire extinguisher are suitable for fighting incipient or small fire on electrical appliances under low or high voltage, electrical installations, electronic devices, telephone, radio and TV sets and computers. Both, manual and transportable fire extinguisher, operate on the same principle. Upon the release, liquid CO_2 which has been in the cylinder under high pressure, cools down to– 87.5 °C and changes into bits of dry ice of carbonic acid. One part of CO_2 freezes, the rest changes into gas. The crystals are tiny and invisible. Upon the release a mist if formed due to the air condensation.
The advantage of such extinguishers is that the valve mechanism allows the user to temporarily stop operating the extinguisher, meaning that you can proceed as needed according to the size of fire. Fire extinguishers also work on different trigger mechanism shown in Fig. 21 and 22 (lever or valve).

4.4.2 DRY CHEMICAL FIRE EXTINGUISHERS

At FKKT we have only manual S-9 class fire extinguishers. This type of fire extinguisher is used for class A, B and C fires. The extinguishing effect depends on the type of powder. Types A B C powders (universal) work on the principle of heterogeneous inhibition which means that the chain reaction of radicals has been inhibited. During the first phase radicals bind to the surfaces of particles of salt which stops chain reaction. During the second phase the powder falls on the burning surface and forms a kind of slag which suffocates incandescence.

LEGEND:
1 = Label
2 = Button
3 = Handle
4 = Cylinder
5 = Front label on fire extinguisher
6 = Carrier
7 = Nozzle

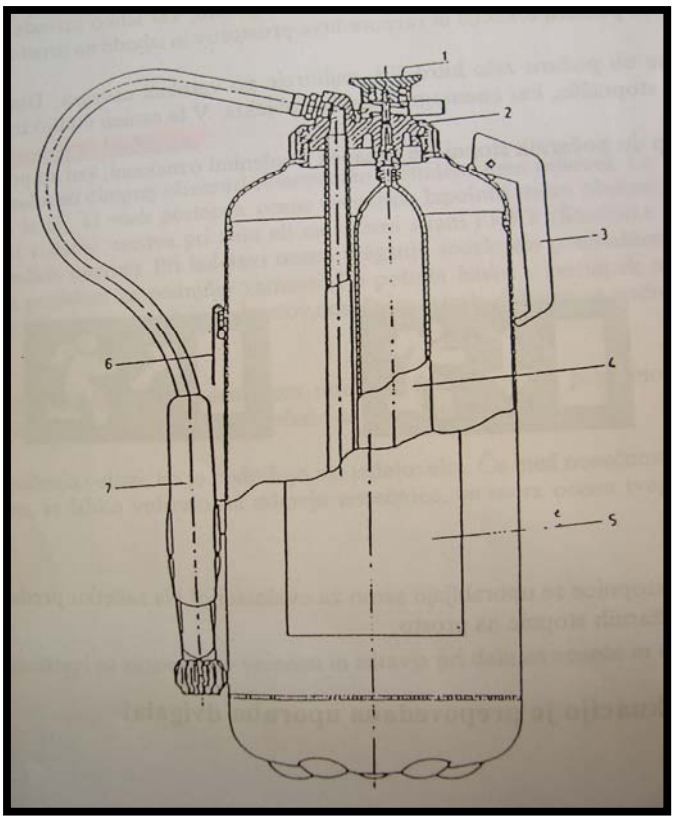
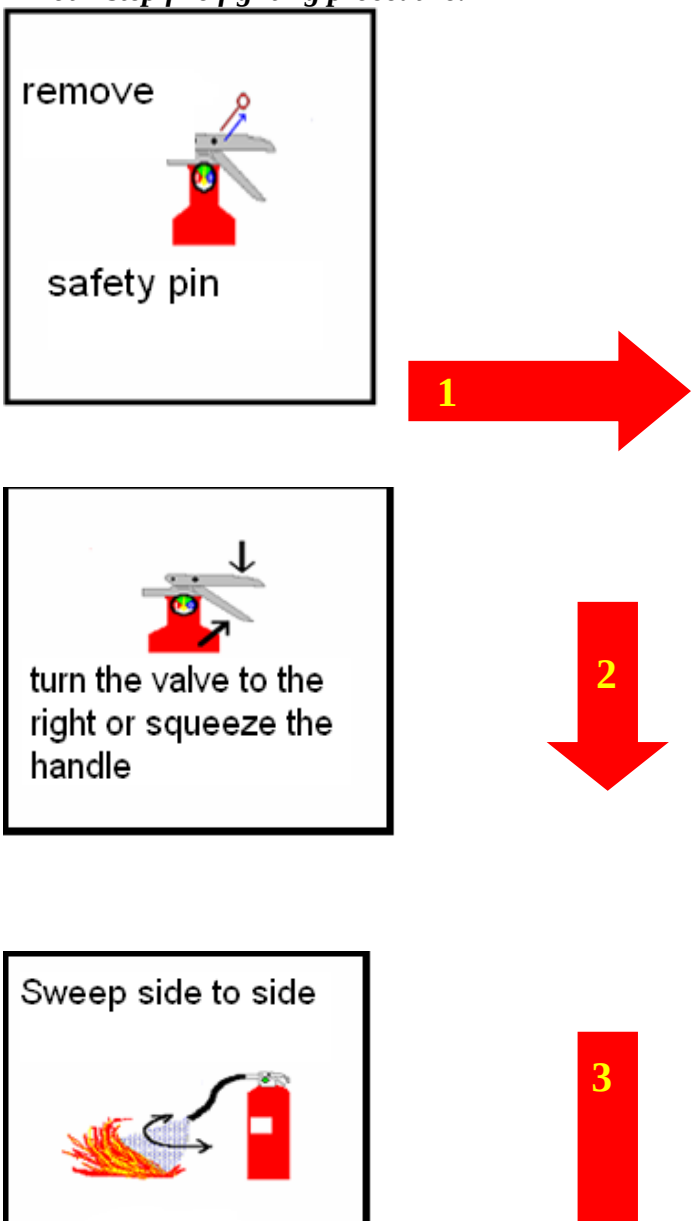


Fig. 23: Cross section of an S-9fire type fire extinguisher

4.4.3 FIRE FIGHTING PROCEDURE FOR IN-DOOR FIRES

1. Operate the extinguisher from a safe distance: put in on the floor 1-3 metres away from fire.
2. Hold the handle on the nozzle with one hand.
3. Using the other hand unscrew the valve (Figure above left) or pull out the safeguard and press down the handle (Figure above right).
4. Aim at the base of the fire: direct the gas jet so that the centre of the blaze is covered, starting from the edge of fire and moving towards the centre in a sweeping motion.
5. Fight fire with several fire extinguishers simultaneously rather than using one after another.

A Four-step fire fighting procedure:

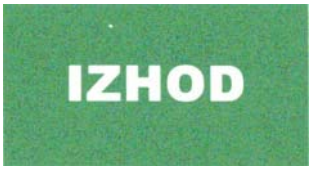


4.5 EVACUATION

In the event of fire all people in the building (except those who are giving first aid or helping to fight fire) must be evacuated.
During fire flames and gases evolve and spread quickly. Special attention needs to be paid to smoke which contains toxic gases and fumes (carbon monoxide, hydrogen cyanide, etc.). In such environment, one can quickly lose sense of orientation, cannot find escape which all leads to panic. To avoid this, it is good to know the location of escape routes and the layout of the floor.

Smoke from fire spreads quickly moving up the stairs, and raises vertically up from one floor to another, which may hinder the evacuation of people from the building. For this reason the fire stairs, which are accessible from every floor level should be used.

Access to fire stairs is marked with green signs, as shown in pictures below:



Fire stairs can only be used for evacuation purposes! Before the start of semester, students will be demonstrated where the escape routes are and how to get out using fire stairs.

Elevators should never be used for evacuation!

4.6 ALARM SIGNALS

Four different alarm signals are used for natural or other disasters and have the following meanings:
1. warning of a danger,
2. imminent danger,
3. all clear,
4. alarm horn test.

Duration and types of alarm signals are shown in Attachment No. 5. Alarm symbols are posted on every corridor. When you hear an alarm sound, you need to follow the instructions of your superiors.

At FKKT we use manual sound alarm devices (Fig. 24 and 25). The person who has noticed an incident needs to alert other personnel, visitors and students occupying premises on the floor. Warning devices are basic and most important elements of the fire safety system. Basically there are two types of fire alarm systems: automatic and manual. Automatic systems are triggered automatically, or linked with the fire safety centre. Manual fire alarm systems are triggered by pushing a button.

4.6.1 MANUAL FIRE ALARM SYSTEMS

Manual fire alarm systems are the most common elements of fire protection, and are used both, indoors and outdoors. The person, who has noticed fire can alert other people in a reliable and documented way and triggers automatic actions, programmed in the system of fire reporting. After detecting fire, the alarm systems can immediately trigger suitable measures. Manual fire alarm systems make a good supplement to automatic alarm devices and are located in every building in easily accessible and visible places, near the endangered premises, and on all major escape routes and exits. The correct way of installing the alarm systems is 20 metres from the corridor. Every exit should have one location for a manual alarm which could be accessed from every corridor. Manual fire alarm device is activated by pushing a button.
Manual fire alarm systems operate on the principle of an electrical switch, installed in a special housing. There are different varieties: the German model requires breaking the glass and pushing the button, while with the British model the alarm goes off automatically after the glass has been broken. The latter has also a seal cap which needs to be removed before breaking the glass. The alarm signal of manual alarms in considered reliable and any misuse of the system is not even considered.

Fig. 24: Manual fire alarm system

Fig. 25: Manual fire alarm system

5 RISK ASSESSMENT AND PROTECTIVE MEASURES FOR ENSURING HEALTH AND SAFETY OF PREGNANT STUDENTS AND NURSING MOTHERS

According to the Rules on the methods for preparing risk assessment (Official Gazette RS, No. 30/00) every employer is obliged to prepare a special health and safety statement relating to pregnant women and nursing mothers. The content and scope of the safety statement is laid down by the Rules on health protection of pregnant women and nursing mothers (Official Gazette RS, No. 82/03). For this reason FKKT too is obliged to make a risk assessment for all operations where there is a risk of exposure to health hazards which might have negative impacts on pregnant women and nursing mothers. This statement defines the type of risk, the level and duration of the exposure to health hazards and implementation of suitable safety procedures.
Due to a large variety of operations which are performed in FKKT laboratories it is impossible to identify in advance the workplaces which are unsuitable for pregnant women and nursing mothers. Hence, it is not possible to introduce safety measures for such workplaces. Therefore, hazards can only be defined individually, depending on the location a woman is working in, the risks involved, the scope of hazards, and the period of exposure to such hazards.

5.1 RISK ASSESSMENT PROCEDURES FOR FEMALE STUDENTS

In case of pregnancy a female student must notify the Students office as soon as possible. The Vice-dean for undergraduate programmes is responsible for carrying out the risk assessment procedure. A special form needs to be filled in (Statement for pregnant women – Š). The form can be obtained in the Safety Officer's office or downloaded from the FKKT web page (Študijske zadeve → Navodila za nosečnice in mlade matere). The risk assessment is prepared jointly with the authorised occupational medicine doctor and the vice-dean responsible for safety. If necessary, other professionals may be involved in preparing the risk assessment, e.g. gynaecologist, a course director, the pregnant student, and a professional responsible for health and safety and fire protection of the employees.

The original completed form is kept in the Students Office, while the pregnant student, the signatories, and course directors receive a copy of this document.

The measures stated in the risk assessment become effective immediately after the document has been signed by all persons involved. Should any changes in the teaching process occur during pregnancy which might have impacts on the health of the pregnant student, the risk assessment procedure must be renewed. The sample of Risk assessment and safety measures for pregnant women and nursing mothers is given in the Attachment No. 5.

6 ATTACHMENTS

1. Laboratory safety rules.
2. R and S phrases.
3. Summary of Fire safety code.
4. Alarm signals in cases of natural disasters and other incidents
5. Risk assessment and safety measures for pregnant women and nursing mothers (Form).

Pursuant to Health and Safety at Work Act (Official Gazette No. 56/99 and 64/01) and Art. 77 of the Statute of the Senate of the University of Ljubljana, and Art. 69 of the Rules on organisation and operation of FKKT, and by the decision of the 36th Senate meeting of Feb 22, 2013, FKKT has adopted Annex No 2 to the Rules on safety at work with risk assessment:

LABORATY SAFETY RULES OF UL FKKT

1. Scope

1.1. Laboratory safety rules shall apply to laboratories of FKKT, UL.

1.2. Every person entering the laboratory: employees, students, and other visitors (hereinafter: users) must comply with the laboratory safety rules.

1.3. In addition to Laboratory safety rules the users need to comply with the provisions of Health and Safety Statement with risk assessment, Instructions for safe work during student exercises, Fire Order, Materials Safety Data Sheets and other guidelines and oral instructions.

2. Definitions

The concepts used in these Rules shall have the following meaning:

2.1. **Hazardous laboratory operations** are procedures and operations which may lead to risks for injuries or cause health damage. These include:
- Working with hazardous or unknown chemicals,
- Risks due to exposure to biological factors,
- Working at increased or decreased pressure and/or temperature conditions,
- Working with electrical equipment under voltage above 1 kV,
- Working with ionising radiation sources,
- Using moving equipment which involves risks,
- Working on heights.

2.2. **Hazardous chemicals** are substances or preparations having at least one of hazardous properties: explosive, oxidising, flammable, self-reactive, self-heating, pyrophoric, corrosive, toxic, harmful to health, irritating, carcinogenic, mutagenic, toxic for reproduction, dangerous for the environment, or gases under pressure, or materials and mixtures which produce flammable gases in contact with water.

2.3. **Head of the laboratory** is a university teacher or assistant appointed by the Head of the Chair of FKKT, a regular employee with responsibilities for ensuring health and safety at work and fire safety, as provided by indent 3.3. of the Safety Statement. *http://www.fkkt.uni-lj.si/attachments/1150/izjava-o-varnosti-z-oceno-tveganja.pdf*.

2.4. **Laboratory manager** is a person appointed by the head of the laboratory, and is a regular employee of FKKT (university teacher, assistant, or senior professional) with responsibilities for ensuring health and safety at work and fire safety as provided by indent 3.4. of the Safety Statement *http://www.fkkt.uni-lj.si/attachments/1150/izjava-o-varnosti-z-oceno-tveganja.pdf*

2.5. **Threshold value** is a mean concentration of a hazardous substance in the air at the workplace which is being inhaled. It is generally not hazardous to workers if inhaled at lower values than threshold limits with exposure up to eight hours a day (40 days a week), full working hours at normal microclimate conditions provided that physically undemanding jobs are performed.

2.6. **Hazardous waste** is a type of waste containing hazardous substances, classified into one of the groups of hazardous wastes.

2.7. **Incident** is an event which results in an injury, disease, fire and/or explosion, release of chemicals, damage on equipment, material damage, or represents a risk for the environment.

3. General provisions

3.1. Laboratory safety rules must be displayed in a visible place in every laboratory.

3.2. All activities in the laboratory must be carried out in such a way as to avoid any risk for personal injuries or work-related diseases, and material damage. Operations which involve risks should be carried out under surveillance of persons who know the risks and can take protective measures.

3.3. Operating time in the laboratories is Monday to Friday from 7.00 a.m. to 8.00 p.m. and Saturdays from 8.00 a.m. to 12.00.

3.4. Working in the laboratory outside the operating time is allowed only upon written permission of the Head of the Chair. Working alone in the laboratory is not allowed. Special permission can be given only to regular employees or contractors of UL FKKT. For those performing work on instruments in infrastructural centre or centre of excellence, permission can be given under the conditions set out in the agreement between FKKT and the centre.

3.5. In case hazardous operations are performed in the laboratory there should always be two persons present.

3.6. Faulty apparatus (holders, containers, burners, supplies, measuring instruments, etc.) and faulty electrical appliances must not be used. All defects should be immediately reported orally or in writing to the laboratory manager.

3.7. Drinking, eating and smoking in the laboratories is strictly forbidden. It is also forbidden to keep food in laboratory refrigerators.

3.8. Access to exits, fire stairs, fire extinguishers and electrical switches must not be obstructed.

3.9. For cleaning laboratories, the provisions of the Annexes to Laboratory safety rules with risk assessment No 29 and 30 should be applied (»Instructions for safe work in cleaning laboratories«) *http://www.fkkt.uni-lj.si/si/?704.*

3.10. For every laboratory a risk assessment has been made according to the checklist for laboratories *http://www.fkkt.uni-lj.si/attachments/1122/2-kontrolnik-za-laboratorij.pdf.* The duty of the head of the laboratory is to inform persons working in the laboratory on risk assessment and to update it in cooperation with the office for safety if the conditions in the laboratory have changed and if any new risks have emerged.

3.11. If pregnant women, or breastfeeding mothers use the laboratory, a risk assessment needs to be made on a special form which is part of the annex to Safety statement with risk assessment.

3.12. Using mobile phones or other multimedia devices in a laboratory is forbidden except in emergency cases.

4. Personal Protective Equipment

4.1. All users of the laboratory must be informed about the types and use of personal protective equipment and how to access it.

4.2. Depending on the type of work and operations the users must wear personal protective equipment as described in manufacturers' instructions, material safety data sheets, guidelines for work, generally accepted rules, standards and regulations of R Slovenia.

4.3. All persons in the laboratory must wear a laboratory coat and safety glasses with suitable side shields at all times.

4.4. Wearing mules and sandals in the laboratory is forbidden. Long hair must be tied back.

5. Handling with chemicals

5.1. The head of the Chair or research group is responsible for keeping a file with materials safety data sheets for all commercially available hazardous substances used in the laboratory.

5.2. Before using hazardous substances the user must be informed about their potential risks and preventive measures. University teachers (course managers), or project leaders must assess risks for the whole working procedure prior to the commencement of laboratory work and based on materials data safety sheets take suitable protective

measures and inform the researchers and laboratory technicians on these measures. The measures must be prepared in a written format and the head of the chair or project leader must be notified.

3.3.1.1

5.3. Chemicals, stored in the laboratory must be suitably arranged in an order. Quantities should be kept to the minimum. Every laboratory must keep records on stock and the laboratory manager is responsible for updating the list of chemicals. Maximum allowed quantity per chemical is 2.5 L (exceptions may be approved by the head of the laboratory).

5.4. In storing chemical the guidelines for joint storing of hazardous chemicals according to the following table should be considered: *http://www.uk.gov.si/fileadmin/uk.gov.si/pageuploads/pdf/Pravilnik_skladiscenje_-_priloga_II.pdf.* Quantities of chemicals stored in a laboratory should not exceed the capacities of cabinets for storage.

5.5. Containers with hazardous chemicals need to be labelled with safety signs. Samples kept in smaller containers need to be labelled so as to allow identification of the user. If such samples are meant to be stored for a longer period of time, they need to be kept in larger containers and properly labelled.

5.6. It is forbidden to store chemicals in containers used for food.

5.7. Extremely toxic, carcinogenic or mutagenic substances and materials, as well as substances toxic for reproduction, must be kept locked and supplied to the user only in quantities necessary for carrying out the experiment and upon Written order for supplying chemicals. The person, responsible for the storage of such chemicals, must not be the user of these chemicals.

5.8. Operations in which hazardous substances evolve gases, vapours, steam, aerosols or dust, should be performed in a fume hood. The laboratory manager must ensure that concentrations of carcinogens or mutagens in the air do not exceed threshold values and needs to provide the procedure for such work.

5.9. In transporting and decanting chemicals it is necessary to take proper measures to prevent spills. Spilt hazardous liquids must be immediately absorbed with an absorbing agent and disposed of as hazardous waste (see indent 9.5.).

5.10. It is necessary to use suitable devices for pipetting. Mouth pipetting is strictly forbidden.

5.11. It is the responsibility of the laboratory manager to determine which chemicals and the conditions under which they are allowed to be stored in a laboratory.

5.12. It is forbidden to purchase or take deliveries of chemicals which are have not been commercially packed.

5.13. It is forbidden to purchase or use explosive and radioactive substances.

6. Handling with gas cylinders

6.1. Make sure that during transportation and storage cylinder valve caps are securely in place. Transportation of cylinders is allowed only with special hand trucks.

6.2. At all times (during transportation, storage or use) the cylinders must be secured from tipping over and protected against heating above 50° C (sun heat, burners, furnaces, radiators, etc.).

6.3. Only equipment which is suitable for the gas in the cylinder, or the pressure and temperature in it should be used.

6.4. If the valve on the cylinder cannot be opened by hand, the cylinder needs to be marked and removed from use, and the manufacturer should be notified.

6.5. A gas cylinder which has not been used (attached to the instrument) for more than a month, needs to be removed from the laboratory to the cylinder storage room, while cylinders with flammable, toxic and oxidising gases need to be removed from the laboratory after every use.

6.6. The user should follow the recommendations of the manufacturer for each particular gas used.

7. Wastes

7.1. Different types of wastes must be collected separately in disposed of in containers.

7.2. Only chemicals and wastes which do not contain hazardous material can be disposed into sewage or waste containers.

7.3. Wastes must be treated according to the Annex No. 31 Safety statement with risk assessment: Treatment of hazardous waste *http://www.fkkt.uni-lj.si/attachments/1145/31-ravnanje-z-nevarnimi-odpadki.pdf .*

7.4. Disposing of wastes on passages, evacuation balconies or roof terraces is forbidden.

7.5. Wastes must be disposed of on a daily basis.

8. Hygiene

8.1. After finishing a job in a laboratory it is necessary to wash hands thoroughly. Other parts of body which have been exposed to hazardous substances should be cleaned as necessary.

8.2. Laboratory coats which have been used in a laboratory should not be worn in libraries, lecture and seminar rooms, cafeteria, or outside faculty premises.

9. Emergency situations

9.1. In case of an incidence the head of the laboratory, or one of the authorised persons from the list displayed next to the Laboratory safety rules, needs to be immediately notified about the event.

9.2. Injured persons should be immediately given first aid. First aid cabinets contain the list of authorised persons with telephone numbers for giving first aid. Locations of first aid cabinets are given in the evacuation plan.

9.3. In case of a serious event call **112**, i.e. Notification Centre (fire brigades, first aid).

9.4. In case of emissions of toxic or flammable gases or vapours or in cases of large spills, all people in the laboratory must be evacuated. Only rescuing teams wearing protective equipment may enter such laboratory.

9.5. In case of spillage of chemicals users should apply the Guidelines for emergency situations in case of spills: *http://www.fkkt.uni-lj.si/attachments/2887/navodilo_za_ravnanje_v_primeru_razlitja_kemikalij.pdf* and take measures provided for in materials safety data sheets.

9.6. Initial fire must be suppressed with the fire fighting equipment available and all persons should be evacuated.

9.7. In case of failing to suppress fire the janitor of the building should be notified immediately, or emergency number should be called (Notification Centre). Detailed instructions on procedures in case of fire are given in the Summary of Fire Order.

9.8. Location of fire fighting equipment is presented in the evacuation plan.

This Annex enters into force after the approval of the Faculty Senate and shall be published on notice boards of FKKT.

Prof. Dr. Anton Meden,
The Dean of UL FKKT

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