

**Masaryk University**

**PRINCIPLES OF FIRE PROTECTION  
AND SAFE HANDLING OF CHEMICALS**

**Editors: Mgr. Jaromír Literák, Ph.D.  
Ing. Barbora Loučková  
prof. RNDr. Jiří Příhoda, CSc.**

**Brno 2017**

# FIRE PREVENTION AND PROTECTION

## **Obligations and responsibilities focusing on fire prevention:**

- to act in such a way that does not cause the fire occurrence and does not endanger lives and health of persons, animals and properties; especially when using heating, electrical, gas and other appliances and equipment or when storing, handling or using flammable or fire hazardous substances over when handling open fires,
- observe conditions or instructions related to fire safety of products or activities,
- ensure continued access to fire extinguishers, hydrants, power distribution systems and gas, water and heating system valves,
- follow orders and observe bans ensuring fire safety at designated or fire-hazardous locations,
- not to damage, and maintain usable fire prevention items (portable fire extinguishers) and fire safety devices (e.g. hydrants), know their locations and methods of applications,
- when you see fire try to extinguish it with all available means. If not possible, immediately take measures to prevent the spread of fire and report the fire to the fire brigade (phone 150) or to the fire protection centre (extension 2929) and to a supervisor. Sound the fire alarm (by calling "FIRE"), by using the EPS emergency button or automatically, by using the electronic fire alarm sensor,
- after the fire breaks out follow instructions of the employee who handles the fire extinguishing process (or evacuation) and upon the arrival of the fire brigade follow instructions of the fire brigade commander,
- when fighting fire, natural disasters and other emergencies provide adequate personal and material assistance (unless such activity would pose a serious danger to you or to your loved ones, or if an important circumstance prevent such assistance);
- report shortcomings or deficiencies which could jeopardise fire safety to your supervisor and participate to the best of your knowledge and efforts in the removal of such deficiencies,
- report to your supervisor all fires, even those you managed to put out by yourself,
- when using electrical heaters, stoves, or machines follow instructions in the manufacturer's manual and valid fire prevention regulations with which you have been acquainted,
- before leaving the workplace, take precautions to avoid fire, emergency situations, or property damage.

## **Prohibited activities:**

deliberate and unreasonable calls to the fire brigade, abuse of the emergency phone line,

- performing work activities that may result in fires or lead to emergency situations providing that the given person does not possess the required professional skills, in particular, repairs or inappropriate interventions into electrical and heat producing appliances and equipment,
- installation and use of electrical and thermal equipment and appliances not approved by the employer,
- restricting or completely disabling the use of marked boarding areas used by fire-fighting equipment,
- damaging, misusing or otherwise preventing the use of fire extinguishers, hydrants and fire

safety devices and main shutters, valves and switches (electric power, water, gas), e.g. by storing material in front of these devices, or by installing furniture in front of them.

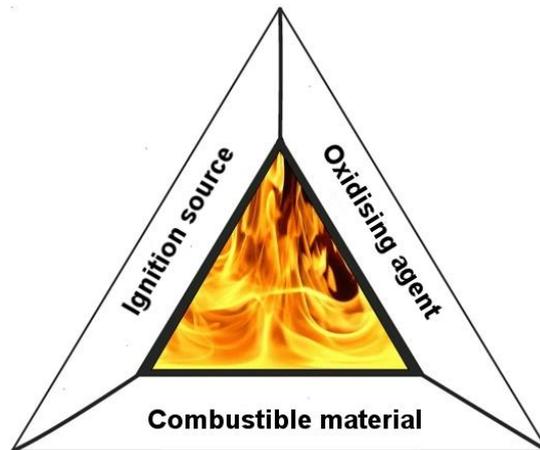
- burning out vegetation or grass-covered areas.

### Burning process

Burning is a physicochemical oxidation reaction in which the flammable substance reacts with an oxidising agent. This reaction is accompanied by the release of heat, light and by combustion emissions.

**Burning process starts and takes place under certain conditions. In order to achieve the burning process, three conditions (the so-called burning or fire triangle) needs to be present:**

- **flammable substance** (fuel),
- **oxidising agent** (air, oxygen),
- **ignition source** (heat).



*Figure 1 Fire triangle*

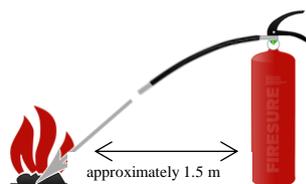
### Instructions for the use of portable fire extinguishers

Instructions how to use a particular fire extinguisher are always shown on the fire extinguisher body. All fire extinguishers are used in close proximity to the fire.

1. Remove the fire extinguisher from the holder and bring it near to the fire.



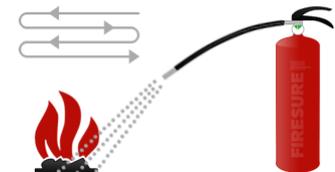
2. Remove the safety fuse



3. Focus on the fire base



4. Press the lever



5. Spray from side to side

- Always spray in the direction of the wind (draft)!
- Starts spraying from the bottom and aim into the burning centre. Never spray the flames!
- Use short controlled bursts. Never use all the extinguishing agent at once!
- If in an enclosed area make sure to have the door behind you (**make sure to have a free escape route**)!



**Fire class A:**

Burning organic solids accompanied by heat radiation, such as wood, paper, straw, coal, rubber, textiles, plastics etc.



**Fire class B:**

Burning liquids or substances which turn into liquid such as petrol, oil, paint, alcohol, wax, etc.



**Fire class C:**

Burning gases for example methane, propane, acetylene, hydrogen.



**Fire class D:**

Burning combustible metals such as aluminium, magnesium, potassium, sodium.



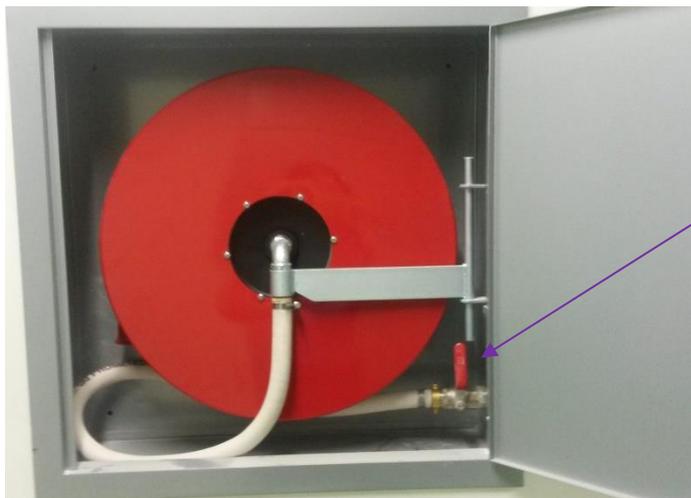
**Fire class F:**

Burning edible oils and fats - vegetable or animal fats in fryers and in other kitchen appliances and equipment.

Fire extinguisher type	Use for	Never use for
<b>Water</b>	solid organic items/substances (paper, wood, textiles) alcohols	devices under electric power, acids, vegetable fats and oils
<b>Powder</b>	flammable solids, liquids, oils, petrol, devices under electric power ( <b>universal extinguishing agent</b> )	light and flammable alkaline metals
<b>Foam</b>	solid organic substances, petrol, diesel, mineral oils and fats	devices under electric power, light and flammable alkaline metals
<b>Carbon dioxide</b>	devices under electric power	flammable dust, loose powdery materials

## Inner wall hydrant

A fire water hydrant is an independent source of water intended for fire extinguishing but it must never be used to put out fire of electrical equipment under voltage. Water hydrant is a part of the mandatory fire protection system and represents the most important component of the fire prevention and protection system. It is mostly used for the first and initial fire fighting activities before the arrival of professional fire-fighters. May also be used by the public, if necessary - it is not intended for professionals only. The length of fire hoses in the hydrant varies. It is usually around 20 m and the spraying distance is 10 m.



open the hydrant cabinet / box

open the valve

unwind the hose

turn the water on by turning the nozzle of the hose to the left

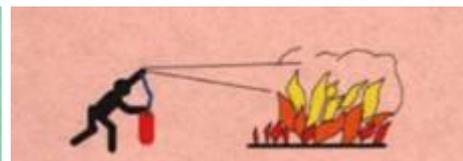
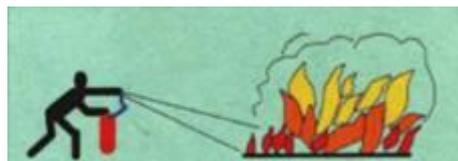
## How to put out fire correctly

### How to put out fire

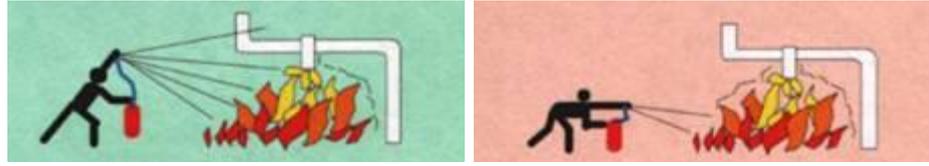
Extinguish the fire by applying the extinguishing agent in the same direction as the wind



Start at the edge of the fire



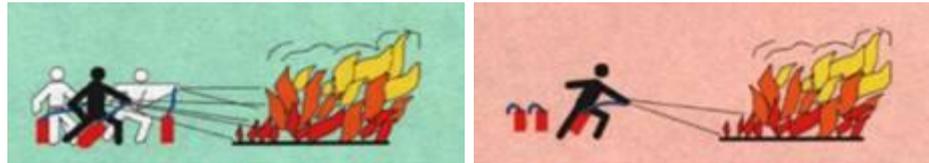
Extinguish dripping or pouring substances from top to bottom



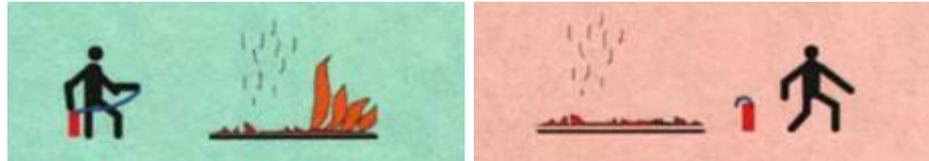
Extinguish burning walls from bottom to top



When using several extinguishers use them at the same time and not separately



Make sure the fire will not start again



After each use make sure the extinguisher is refilled. Do not return empty extinguisher back on the holder



### How to proceed when a fire occurs

- In the event of fire it is necessary to follow the fire emergency guidelines which are publicly available at each workplace and which define activities of employees and other persons in the event of fire.
- Anyone who sees a fire is obliged to use all available means to extinguish the fire. If the given person is not able to put out the fire using all available means, the person is obliged to call a fire alarm and notify persons near the vicinity of the fire to assist during the fire extinguishing process or to leave the endangered area.

## Method and location of fire reporting

Everyone is required to report a fire or to make sure that the given fire is reported to a **fire station** of the individual City Hall or to the fire centre in Brno.

The report must specify who is calling, where the fire has occurred, and what is burning.

## How to announce fire alarm

A fire alarm is announced or called

- automatically, by the FIRE SIGNAL electric sensor
- by using the ELECTRICAL FIRE SIGNAL pushbutton
- by calling "F I R E"



## Evacuation and fire-fighting assistance

Evacuated people shall gather in the designated open space and wait for further instructions. By the time the firefighters arrive, each person is obliged to provide adequate personal assistance (*unless he or she expose himself to a serious danger*) and to take the necessary measures to prevent the spread of fire.

# Handling chemical substances and mixtures at the Masaryk University

## 1. Introduction

Handling chemical substances in the Czech Republic and the EU is regulated by a number of laws. Their purpose is to protect people's health and the environment. The following instructions are based on Regulation (EC) No. 1272/2008 of the European Parliament and of the Council focusing on classification, labelling and packaging of substances and mixtures (CLP) and its amendments (European Parliament and Council Regulation No. 487/2013), Act No. 350/2011 Coll., on chemical substances and mixtures and Act No. 267/2015 Coll., which amends Act No. 258/2000 Coll. on the protection of public health.

## 2. Chemicals and chemical mixtures labelling

From the point of view of the Regulation of the European Parliament No. 1272/2008 on the classification, labelling and packaging of chemical substances the actual physical hazards of chemical substances or mixtures with regards to health and the environment may be characterised in more general terms by using the **so-called hazard classes**. There are 28 hazard classes in the EU which may be further divided according to physical hazards, hazards to human health or risks to the environment. Each hazard class is divided into one or more **hazard categories** that further define the nature and severity of the hazard. Based on CLP regulations each hazard category is assigned with the following elements:

- one or more **standard statements** on the severity of the hazard (H phrase) which describes the nature of the hazard of the given substance or mixture, including the hazard/risk degree. H-phrases replace the former R-statements.
- one or more **hazard warning symbols**, which provide graphic information about the type of the hazard by means of a symbols and other elements. Hazard warning symbols represent certain hazard classes and categories whereas one symbol may refer to multiple hazard categories.
- **Signal word** indicates the seriousness of the level of the warning against potential danger; there are two levels: the word "danger" refers to more serious hazards; and the word "warning" refers to a less serious hazard category.
- **Safe handling instructions** (P-phrases, precautionary statements) which have a defined form and communicate information on hazard prevention, about responses to injury or accident, and about safe storage and disposal of the given substance or mixture. These are similar to the earlier S-sentences.

The characteristics of all hazard classes, the list of hazard categories and associated danger symbols and signal words are given in annex No. 1. Annex No. 2 provides the list of H-phrases. Annex No. 3 provides the list of P-phrases.

Information on the classification of a specific chemical or mixture by using hazard categories together with a complete list of H- and P- phrases, warning symbols and signal words may be found in the safety data sheet of the given substance or mixture.

The obligation to classify, label and package chemicals under the CLP Regulation applies to manufacturers and importers, suppliers and the so-called downstream users who use the substance or mixture in their industrial or professional activities. Certain chemicals and mixtures which are carcinogenic, mutagenic, harmful to reproduction or sensitise the respiratory tract must be uniformly classified across the entire EU. The list of these substances and their classification may be found in the annex attached to the CLP Regulation.

The CLP Regulation does not apply to the following types of substances and mixtures: radioactive substances and mixtures, substances and mixtures subject to Customs supervision and which are temporarily stored for the purpose of export or which are in transit, non-isolated intermediate products, substances and mixtures intended for scientific research and development which are not sold on markets, waste, exemptions defined by Member States for the purpose of defence, human and veterinary medicines, medical devices, beauty products, food items, animal feeds and food supplements.

These chemicals and mixtures are generally commercially available in suitable and properly marked packages. These packages are designed to meet the requirements on safe transport and storage. The packaging of the chemical or mixture is equipped with a label which contains the following information:

- Name, address and telephone number of the supplier,
- amount of substance or mixture in the package,
- product identifiers,
- any required hazard warning symbols,
- any required signal word,
- any standard hazard phrases,
- any precautionary phrases,
- any additional information necessary

Generally, a chemical packaging containing less than 3 litres should carry a label at least 52 × 74 mm in size. The warning symbol must cover at least 1/15 of the label area, but at least 1 cm<sup>2</sup>. If the packaging does not exceed 125 ml, the H- and P-phrases (the list of these categories is available in CLP Regulation) may be omitted for selected classes of dangerous substances and mixtures.

If a new packing is created by MU workers or students (if the old packaging breaks or the chemical spills over when changing the packaging into a smaller unit, or when preparing solution, mixtures, etc.), it is necessary to create own label. The elements on the label must match the substance or mixture classification in line with the CLP Regulation. More information on the classification and concentration limits required for the classification of mixtures may be found in the CLP Regulation. MU uses relevant software to create new labels, which is available in all involved workplaces, or it may be requested from the persons authorised to supervise the handling of chemical substances at the given faculty / workplace (see item 10 of these guidelines)

### **3. Instructions on safe handling of chemicals and mixtures**

Based on the Act No. 267/2015 Coll., which amends Act No. 258/2000 Coll. on the protection of public health:

- Legal and physical persons are required to protect human health and the environment while handling chemical substances and to observe danger symbols and H and P phrases.
- No legal entity or natural person may sell, give or otherwise provide to other legal or natural persons substances or mixtures classified as acutely toxic under category 1 or 2, unless such persons are authorised to handle these substances or mixtures (see the eligibility requirements below).
- Legal entities and natural persons may not offer, donate, sell or otherwise deliver, dispose of or somehow provide a natural person under the age of 18 or a person whose legal capacity is limited by the court, with chemicals and mixtures classified as acutely toxic under category 3 or target organ systemic toxicants after single or repeated exposure category 1, corrosive labelled with standard phrase H314.
- Legal entities and business individuals may handle highly toxic chemicals or mixtures (acute toxicants under category 1 or 2) if overseen by professionally qualified natural person. Individual activities may also be performed by an employee who has been trained by the professionally qualified person. This training shall be conducted at least once a year for 2 years. A written record of the training must be archived for 3 years.
- Legal entities and natural persons doing business must prepare written guidelines for the relevant workplaces specifying how to handle hazardous chemicals and mixtures classified under relevant hazard categories:
  - Acute toxicity, category 1 and 2
  - Target organ systemic toxicity after single or repeated exposure to category 1
  - Carcinogenicity category 1 and 2
  - Germ cells mutagenicity category 1 and 2
  - Reproductive toxicity category 1 and 2
  - Corrosive

These rules must be discussed with the relevant public health authority responsible for the given location (JMK – Regional Hygiene Administration).

- Chemical substances and mixtures classified of acute toxicity, category 1 or 2 must be stored in lockable rooms secured against theft and entry of unauthorised persons. Mutual harmful effects or misplacement of stored substances must be eliminated as well as leakage into the environment including danger to individuals.
- The consumption of substances and mixtures classified as hazardous under acute category 1 or 2 must be recorded. These records must be kept separately for each substance and must include data on the quantity received and released, inventory status including the name of the person to whom the chemical or mixture was given. Records shall be kept for at least 5 years after the stock has been completely exhausted.

Natural persons professionally qualified to deal with highly toxic substances and mixtures pursuant to Act No. 267/2015 Coll., are:

1. University graduates who:
  - have completed a university degree through an accredited master study programme in general medicine, dentistry / stomatology, pharmacy or through accredited master degree programmes in the field of veterinary medicine and hygiene or public health protection, or
  - have obtained a university degree in the field of chemistry,
  - have obtained a university degree focusing on teaching and specialising in chemistry,
  - have obtained a university degree and have a certificate of completion for a lifelong education in the field of toxicology,
  - have obtained a university degree through an accredited master programme focusing on phytopatology or on plant protection or possibly focusing on lifelong learning in this field.
2. natural persons who have successfully passed a professional proficiency test and possess a certificate of professional competence authorising them to handle chemical substances and chemical mixtures classified as highly toxic.

The rules focusing on hazardous chemicals and mixtures handling and which have been discussed with the JMK Regional Hygiene Administration may be found at the following website: <http://www.rect.muni.cz/nso/>. These rules shall be available in printed form at all workplaces. Each MU workplace may also have its own specific rules that supplement and adapt these general university rules to the conditions of the particular workplace.

A specific feature of many of MU workplaces is that not only commercially available chemical substances and mixtures are handled here, but that they are also prepared in small quantities and new substances whose properties are not known yet are studied and investigated here. When handling these substances and mixtures the necessary precautionary and general principles must be observed. The basic requirement is to minimise the exposure of natural persons to these substances, to prevent substance release into the environment and to anticipate their hazardous physiochemical properties.

#### **General work rules observed in a chemical laboratory:**

- While working it is necessary to follow principles of good laboratory practice.
- Only qualified people have access to the laboratory. Guest only when accompanied by a qualified person. Others are forbidden to enter the laboratory.
- Pregnant women are not allowed in the laboratory. Further, women who gave birth may only enter the laboratory 9 months after delivery. Each woman is immediately required to report pregnancy to the head of the workplace.
- Only work related to the character and purpose of the laboratory may be performed in the laboratory.
- It is forbidden to eat, drink and store food in the laboratory. It is also forbidden to use laboratory tools and ware for food storage. The laboratory provides a designated room

for food handling. Each worker must thoroughly wash their hands before eating, drinking and smoking - work breaks and after work.

- Every lab worker must use appropriate work equipment, which he or she is obliged to wear throughout his / her work and based on the nature of the given work (protective goggles, shield, gloves, etc.). Protective equipment must always be worn when handling substances that can cause burns or frostbites and also when using corrosive substances and substances under high pressure or when handling appliances that use vacuum.
- Laboratories where steel gas bottles are stored must be equipped with a sign specifying the type of the used gas.
- Only properly trained persons may connect appliances to power supply. It is prohibited to modify or change any electric appliances. Only properly qualified personnel may repair electrical devices or systems. Defects in distribution networks (water, gas, electric power), must be reported to the laboratory manager or to the workplace manager immediately. In UKB to PCO.
- It is forbidden to handle chemicals with unprotected hands (laboratory spoons are used to collect solids); corrosive, toxic and infectious agents shall be picked by a measuring cylinder or by safety pipettes.
- After the chemical is picked up, it is necessary to properly seal the bottle immediately to avoid leakage of airborne pollutants and to avoid misplacement or confusion of chemicals.
- Any handling of substances producing fumes, irritants, smells and toxic gases may only be carried out under activated fume hood.
- Substance incineration or annealing may only be carried out under fume hood. The same applies to production of hydrogen sulphide which is highly poisonous.
- Corrosives may not be stored at a height greater than the height of the worker's shoulders who is handling the corrosives (no more than 165 cm).
- When handling substances in open containers (e.g. test tubes) it is necessary to keep the neck of the tube/container away from your face while making sure that the container does not point towards other workers.
- When a harmful substance is spilled it must be disposed of immediately.
- Spilled nitric acid may not be removed using sawdust, rags and other organic materials. Before the removal nitric acid must be neutralised and if this is not possible it must be diluted as much as possible. Dishes contaminated with organic matter cannot be cleaned with nitric acid (danger of violent reactions, production of nitrogen oxides and danger of self-ignition).
- Spilled acids, especially concentrated acids, must be first carefully diluted with water, slightly neutralised with carbonate (e.g. sodium bicarbonate, chalk, etc.), or by spraying with diluted alkali solutions, followed by careful flushing with water or by allowing the liquid to be absorbed by sawdust, rags, etc. When cleaning make sure not to contaminate too large area.
- Spilled perchloric acid must be strongly diluted with water and non-flammable material must be used to wipe it out. Never use cotton or cellulose material. The material which was used to wipe out the perchloric acid must be thoroughly washed under running

water.

- Perchloric acid shall be stored in a bottle with sanded neck and separately from other chemicals, especially organic chemicals. Perchloric acid bottles should not be placed on wooden racks, but on glass, porcelain, ceramic or other fireproof and non-absorbent pads allowing easy removal of possible spills.
- When a flammable liquid is spilled immediately turn off open sources of heat, disconnect electrical appliances from the power grid, and dispose of the spill in a qualified manner. The liquid should be absorbed by a porous material and the material shall be transported to a safe place. Non-polar solvents spilled on PVC flooring cannot be cleaned by wiping the spill out (danger of static electricity). When large amount of solvent is spilled workers who do not participate in the cleaning must leave the laboratory.
- Chemical dishes that have been used to handle toxic or corrosive substances must be rinsed thoroughly before further use. All bottles which contained toxic substances must be cleaned of any remaining contents before their disposal.
- When distilling flammables, it is necessary to move any bottles with flammable substances and other chemicals to a safe distance and shut down all sources of open flame. Flammables cannot be heated using an open fire /burner. Water / oil baths, heating mantles or heat sinks are used to heat flammables. The temperature must be kept below the flash point. If water enters the oil bath turn off the heating process immediately and replace the bath.
- When diluting acids always pour the acid into water and never the other way around! Pour the acid slowly and carefully while constantly stirring the liquid, especially sulphuric acid. When dissolving solid hydroxide, the hydroxide must be poured in small portions into water while stirring. Never pour water onto the hydroxide.
- When handling glass (removing plugs, attaching hoses, etc.), it is necessary to protect yourself from injury. Hose cannot be fitted on tubes or thermometers when dry and by applying direct pressure. Instead turn the hose right to left while sliding it on a wetted glass surface.
- Before using vacuum or pressure make sure that only undamaged dishes and parts are installed in the in the given apparatus.
- Be aware of the danger of the formation of explosive peroxides in substances that are easily oxidised by air under light (ethers, unsaturated hydrocarbons). Especially before distillation of substances from older packages it is recommended to perform a test confirming the presence of peroxides. Peroxides may be detected with a solution of potassium iodide or starch paper impregnated with potassium iodide. A positive reaction is manifested by the formation of elemental iodine (solution turns pink) or the paper turns blue. Peroxides may be removed by shaking the liquid in a water solution with ferrous salt. Empty bottles of ethers from which their contents have evaporated over a long storage period may pose danger as well.
- Packaging which do not clearly specify what type of chemical they contain must be disposed of in a qualified manner and immediately.

#### **4. Fire handling procedure:**

- Escape routes from the laboratory and handling areas must be permanently free any obstacles - make sure to maintain work desks, fume hoods, the floor and the entire laboratory clean and in order.
- If a fire occurs stay calm and try to extinguish minor accidents by extinguishing the flame, using a fire mask or dust cover or use suitable fire extinguisher More detailed information how to extinguish a certain type of fire based on the used chemicals and type of work may be found in safety data sheets.
- If a fire occurs, first remove pressurised steel bottles containing gas.

#### **5. Safety data sheet**

Material safety data sheet (MSDS) for chemical substances and mixtures is a basic information document providing summarised data about the manufacturer or importer and about hazardous properties of the chemical or the mixture, as well as data necessary for the protection of human health and the environment. Indicates possible risks and specifies personal protective equipment required for safe use.

The content of safety data sheets and requirements for their preparation are specified in detail in REACH (Regulation of the Commission No. 1907/2006) and in the amendment to this Regulation (Regulation of the Commission No. 453/2010).

The safety data sheet allows users of chemicals and mixtures to take the necessary measures needed to protect human health and the environment and to ensure safety at work.

It is recommended that you demand it when ordering the substance for the first time or download it from the manufacturer's / seller website. It is advisable to store data safety sheets at the workplace so that all workers have access to them, and to implement a suitable system allowing everyone to quickly find the given data sheet.

#### **6. List of highly hazardous substances**

Each workplace shall prepare a list of substances and mixtures that are classified as corrosive or Target organ systemic toxicants after single or repeated exposure belonging to category 1, carcinogenic category 1 or 2, mutagenic category 1 or 2, reproductive toxicants category 1 or 2, germ cell mutagens category 1A or 1B, reproductive toxicants category 1A or 1B and acutely toxic category 1 or 2 which are stored or use at the given workplace. The list shall be stored in an electronic database and must be continuously updated. The update period cannot be longer than one year. A person responsible for supervising the handling of chemicals at the given faculty / workplace shall be responsible for the accuracy and timeliness of the records (see the list at the end of these rules).

#### **7. General rules on waste management and processing**

Waste may only be stored in containers that are properly labelled - as required by the given legislature. Labelling must match the nature of the waste stored in the container. Only water-miscible chemicals may be poured into the sink and only in quantities which do not pose any risk to rivers or to the water sewage system such as water-soluble solvents up to 0.5l (diluted at least 10 times), acids and hydroxides (diluted 30 times, pH should remain within 6.5 - 8.5). Corrosives, acids and hydroxides may only be poured into sink while the water faucet runs.

Water-immiscible solvents which are toxic, flammable and explosive, concentrated acids and hydroxides and compounds releasing toxic or irritant fumes on contact with water, and heavy metal solutions cannot be poured into the sink. Do not place fire-hazardous substances in waste containers.

Each workplace shall dispose of chemical waste at regular intervals or through a supplier. Each workplace shall arrange for waste disposal through a company that deals with the disposal of chemical waste. Reimbursement for the disposal of waste shall be paid by the given workplace.

## **8. Training for faculty students and staff focusing on hazardous chemicals and mixtures handling**

Physical persons who are not professionally qualified to handle highly toxic substances and mixtures pursuant to Act No. 267/2015 Coll., but who in the course of their employment, or while being trained for the employment at MU, handle hazardous chemical substances or mixtures which are allocated to the hazard categories:

- Acute toxicity category 1 or 2
- Target organ systemic toxicity after single or repeated exposure category 1
- Carcinogenicity category 1 or 2,
- Germ cell mutagenicity category 1 or 2,
- Reproductive toxicity category 1 or 2,
- Germ cell mutagenicity category 1A or 1B
- Reproductive toxicity category 1A or 1B,
- corrosive,

must be demonstrably and properly introduced to and aware of the hazardous properties of the given chemical substances or mixtures including requirements on health and environmental protection against harmful effects of such chemicals and must be aware of first-aid application principles.

The training for faculty students and staff focusing on hazardous chemicals and mixtures handling may be divided into several stages:

- general training focusing on the handling of chemical substances and mixtures used by students and employees,
- special training for students working in a specific practical exercise,
- training for students and employees dealing with highly hazardous chemicals or mixtures.

General training for students of the relevant fields is organised by each faculty individually and applies to all bachelor, master and postgraduate students who may come into contact with dangerous chemical substances or mixtures during their studies or while working for a research programme. The faculties have included in their curriculum a compulsory study programme without providing any credits which uses and handles chemicals or chemical mixtures called Chemicals and chemical substance handling. The credit from this study programme will serve as proof of its completion. For first year students the general training is provided as a minimum

two-hour lecture. This lecture may be included as an introductory lecture of another lesson, or it can be done separately. The attendance is recorded. However, senior students do not have to attend this lecture and may obtain the necessary information at <http://rect.muni.cz/nso>.

All students must prove their general knowledge of the instructions defining handling of hazardous chemicals and mixtures every year by passing a test that may be completed through the MU information system. The result of the test is periodically recorded, and the students will receive their credit if they attend the lecture focusing on handling of chemicals at least once during their study.

Special training under individual practical exercises should always be conducted if the nature of the exercise requires it. The head of the workplace in cooperation with the training supervisor shall decide on the content of the training,

Foreign students shall be trained how to handle chemical substances at the given workplace by their supervisor. The training is recorded – see <http://rect.muni.cz/nso/>.

Workplaces (institutes, separate workplaces) shall organise for employees a general type of training once every two years. The given workplace is responsible for ensuring, recording and for inviting the given lecturer. Training records and follow-up training reports must be kept for 3 years.

Should employees of the Masaryk University handle the above-mentioned substances and mixtures they must be professionally qualified in line with Act No. 267/2015 Coll., or they must be trained by a competent person. The workplace manager or supervisor shall maintain record for any worker who handles any of the above dangerous substances or mixtures mentioned above in order to be able to provide a personal record demonstrating that the given employee has been trained to handle these substances. The personal training records must be kept for at least 3 years after the last training. Repeated training shall be conducted at least once during 2-year period. Details how to fill out such personal record are available at <http://rect.muni.cz/nso>. Occasional visitors, if they are briefly staying or working in the premises where dangerous chemical substances, solutions or products are used, shall be informed by their escort.

## **9. First-aid assistance**

General information on first-aid is available in Annex No. 4. Should the work involving hazardous chemicals require such information but no relevant information on the first-aid is found in the above documents, the given worker is obliged to obtain this information and included it in the Rules for handling highly dangerous substances (see item 4 of these Rules).

## **10. MU persons authorised to handle chemical substances**

These persons serve as an advisory body focusing on the handling of chemical substances at MU and at individual faculties. Their responsibilities include supervision of the compliance with legal standards relating to the handling of chemical substances, general training and testing of students and staff involved in the specified subject, inspection activities, administration management and contact with superior inspection bodies (e.g. KHS).

Managers of individual workplaces are responsible for making sure that the valid legislation, internal regulations and instructions of MU are observed.

**MU authorised person**

Mgr. Jaromír Literák, Ph.D.

Department of Chemistry and Research Centre of Toxic Substances in the Environment

Faculty of Science

Kotlářská 2

611 37 Brno

phone: 549 495 580

e-mail: literak@chemi.muni.cz

University campus Bohunice, Kamenice 5, pavilion A10, room 108

**Representatives for individual Faculties:**

*Faculty of Science*

Mgr. Jaromír Literák, Ph.D.

Department of Chemistry and Research Centre of Toxic Substances in the Environment

Faculty of Science

Kotlářská 2

611 37 Brno

phone: 549 495 580

e-mail: literak@chemi.muni.cz

University campus Bohunice, Kamenice 5, pavilion A10, room 108

*MU Faculty of Medicine*

Doc. RNDr. Jiří Dostál, CSc.

Department of Biochemistry

Kamenice 5

625 00 Brno, Czech Republic

phone: 549 493 564

e-mail: jrdostal@med.muni.cz

location: University campus Bohunice, Kamenice 5, pavilion A16, room 114

*MU Faculty of Education and Pedagogy*

Mgr. Jiří Šibor, Ph.D.

Department of Physics, Chemistry and Vocational Education

Poříčí 7

603 00 Brno

phone: 549 497 725

e-mail: sibor@ped.muni.cz

location: building Y, room 03011

*MU Faculty of Informatics*

**doc. RNDr. Irena Krontorád Koutná, Ph.D.**

Centre for Biomedical Image Analysis

Botanická 68a

602 00 Brno

phone: 549 49 3969

e-mail: [qkoutna@fi.muni.cz](mailto:qkoutna@fi.muni.cz)

location: University campus Bohunice, Kamenice 5 - building A3, room 111

#### *CEITEC MU*

Ing. Barbora Loučková

Central European Institute of Technology

Kamenice 753/5

625 00 Brno

phone: 549 49 8037

e-mail: [234665@mail.muni.cz](mailto:234665@mail.muni.cz)

location: University campus Bohunice, Kamenice 5 - building A35, room 128

### **11. Important contact information**

#### **Authorised person for the Faculty of Science and MU**

Jaromír Literák

e-mail: [literak@chemi.muni.cz](mailto:literak@chemi.muni.cz)

phone: 549495580

#### **Central Protection Panel at the Brno-Bohunice University Campus**

extension 2929 (phone: 549492929) for emergency situations

extension 4450 (phone: 549494450) for non-emergency situations

#### **RMU Protection and Safety Centre**

[www.rect.muni.cz/nso](http://www.rect.muni.cz/nso)

#### **Toxicological Information Center**

phone: 224919293 or 224915402

## Annex No. 1: Overview of hazard classes, hazard categories and warning symbols

### Classes associated with physical hazards:

#### Explosives include:

1. explosive substances and mixtures;
2. explosive products excluding devices containing explosive substances and mixtures in such quantities or of such nature that their accidental ignition will not cause any external damages by particle, fire, heat, smoke or noise outside of the given apparatus;
3. substances, mixtures and articles other than those specified under item 1 and 2 which are manufactured to obtain a practical, explosive or pyrotechnic effect.

In addition, explosives are further divided into one of the ix subcategories, depending on the type of hazard they represent.

Hazard class	Hazard class and category code	Graphic symbol code	Signal word
<b>Explosive</b>	Unst. Expl.	GHS01	Danger
	Expl. 1.1	GHS01	Danger
	Expl. 1.2	GHS01	Danger
	Expl. 1.3	GHS01	Danger
	Expl. 1.4	GHS01	Warning
	Expl. 1.5	☐	Danger
	Expl. 1.6	☐	☐

**Flammable gases** (including chemically unstable gases), gases or gaseous mixtures which have flammable range with air at 20°C and under a standard pressure of 101,325 kPa. This hazard class is divided into two categories where substances are placed based on test or calculation results. Flammable gas, which is also chemically unstable, is also placed in one of the two categories defined for chemically unstable gases.

<b>Flammable gas</b>	Flam. Gas 1	GHS02	Danger
	Flam. Gas 2	–	Warning

**Aerosols**, i.e. aerosol dispensers are containers which cannot be refilled, are made of metal, glass or plastic and contain compressed, liquefied or dissolved gas under pressure, or they may contain liquid, paste or powder and are fitted with a release mechanism which allows the

contents of the container to be dispensed as solid or liquid particles or as a gas suspension, in the form of a foam, paste or powder, or in a liquid or gaseous state. For the purpose of classification aerosols are considered flammable if they contain a component that is classified as flammable:

- liquids with a flash point  $\leq 93$  °C, including flammable liquids,
- flammable gases
- flammable solids.

Aerosols are placed into one of the two categories of this class based on its components, based on chemical combustion heat and, where appropriate, based on foam flammability test (applicable to foam aerosols) and based on ignition distance test - in an enclosed space (atomisers).

<b>Flammable aerosol</b>	Flam. Aerosol 1	GHS02	Danger
	Flam. Aerosol 2	GHS02	Warning

**Oxidising gases** are any gases or gaseous mixtures which in general may cause or promote combustion of other substances by providing oxygen more efficiently than air. This class contains only one category.

<b>Oxidising gas</b>	Ox. Gas 1	GHS03	Danger
----------------------	-----------	-------	--------

**Gases under pressure** are gases stored in a vessel under a pressure of at least 200 kPa (pressure gauge) or liquefied gases or liquefied refrigerated gases. The class is divided into four groups: compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases.

<b>Gases under pressure</b>	Press. Gas (compressed gas)	GHS04	Warning
	Press. Gas (liquefied gas)	GHS04	Warning
	Press. Gas (refrigerated liquefied gas)	GHS04	Warning
	Press. Gas (dissolved gas)	GHS04	Warning

**Flammable liquids** are liquids with a flash point of no more than 60 °C. This class is divided into three categories.

<b>Flammable liquid</b>	Flam. Liq. 1	GHS02	Danger
	Flam. Liq. 2	GHS02	Danger
	Flam. Liq. 3	GHS02	Warning

**Flammable solids** are solids that are readily combustible or may cause fire or may contribute to the through friction. Easily ignitable solids are substances or mixtures in the form of powder, granules or paste and are considered dangerous if they can easily ignite during a short contact with the source of ignition, such as a burning match, and if they allow rapid flame to spread. This class is divided into two categories.

<b>Flammable solid</b>	Flam. Sol. 1	GHS02	Danger
	Flam. Sol. 2	GHS02	Warning

**Self-reactive substances and mixtures** are thermally unstable liquids, solids or mixtures susceptible to strong exothermic decomposition even without the presence of oxygen (air). This definition excludes substances and mixtures classified under this document as explosives, organic peroxides or oxidising substances and mixtures. Substances falling into this hazard class are further divided into seven categories (A to G).

<b>Self-reactive substance or mixture</b>	Self-react. A	GHS01	Danger
	Self-react. B	GHS01 GHS02	Danger
	Self-react. CD	GHS02	Danger
	Self-react. EF	GHS02	Warning
	Self-react. G	–	–

**Pyrophoric liquids** are liquid substances or mixtures which self-ignite even in small amounts upon contact with the air within five minutes. This class contains only one category.

<b>Self-ignitable liquid</b>	Pyr. Liq. 1	GHS02	Danger
------------------------------	-------------	-------	--------

**Pyrophoric solids** are solid substances or mixtures which self-ignite even in small amounts upon contact with the air within five minutes. This class contains only one category.

<b>Self-ignitable solid</b>	Pyr. Sol. 1	GHS02	Danger
-----------------------------	-------------	-------	--------

**Self-heating substances or mixtures** are liquids, solids or mixtures other than pyrophoric liquid or solids that are capable of self-heating thanks to reacting with air and without any energy supply; these substances or mixtures differ from pyrophoric liquids or solids because they only catch on fire if in large quantities (kilograms) and after a long period of time (hours or days). Self-heating of substances or mixtures leading to spontaneous ignition is caused by the reaction of the substance or mixture with oxygen (air) and thanks to the generated heat which not being discharged into the surrounding environment quickly enough. Self-ignition occurs when the rate of the heat creation is higher than the heat loss and the self-ignition temperature is reached. This class is divided into two categories.

<b>Self-heating substance or mixture</b>	Self-heat. 1	GHS02	Danger
	Self-heat. 2	GHS02	Warning

**Substances or mixtures emitting flammable gases when in contact with water** are solids or liquid substances or mixtures that tend to become self-ignitable or tend to release flammable gases in dangerous quantities when in contact with water. Based on tests, substances in this class are divided into three categories

<b>A substance or mixture that emits flammable gases when in contact with water</b>	Water-react. 1	GHS02	Danger
	Water-react. 2	GHS02	Danger
	Water-react. 3	GHS02	Warning

**Oxidising liquids** are substances or mixtures which are not necessarily combustible in general but by providing oxygen may cause or promote combustion of other substances. This class is divided into three categories.

<b>Oxidising liquid</b>	Ox. Liq. 1	GHS03	Danger
	Ox. Liq. 2	GHS03	Danger
	Ox. Liq. 3	GHS03	Warning

**Oxidising solids** are substances or mixtures which are not necessarily combustible in general but by providing oxygen may cause or promote combustion of other substances. This class includes three categories.

<b>Oxidising solid</b>	Ox. Sol. 1	GHS03	Danger
	Ox. Sol. 2	GHS03	Danger
	Ox. Sol. 3	GHS03	Warning

**Organic peroxides** are liquid or solid organic substances which contain a bivalent group -O-O- and which can be considered hydrogen peroxide derivatives where one or both hydrogen atoms are replaced by organic radicals. The term organic peroxides includes mixtures of organic peroxides (products) which contain at least one organic peroxide. Organic peroxides are thermally unstable substances or mixtures which may be exothermically decomposed through self-acceleration. In addition, they may have one or more of the following properties:

- i) they may decompose through an explosion;
- ii) they burn quickly;
- iii) they are sensitive to an impact or friction;
- iv) they react dangerously with other substances.

This class is divided into seven categories (A to G)

<b>Organic peroxide</b>	Org. Perox. A	GHS01	Danger
	Org. Perox. B	GHS01 GHS02	Danger
	Org. Perox. CD	GHS02	Danger
	Org. Perox. EF	GHS02	Warning
	Org. Perox. G	–	–

**Substances or mixtures corrosive to metals** are substances or mixtures that may damage or even destroy metals through chemical reaction. The criterion is the rate of the corrosion either on a steel or aluminium surface exceeding 6.25 mm per year and under a test temperature of 55 °C when tested on both materials. This class contains only one category.

<b>Substance or mixture corrosive to metals</b>	Met. Corr. 1	GHS05	Warning
---	--------------	-------	---------

### Classes associated with health hazards

**Acute toxicity of a substance** refers to adverse effects that occur after oral or dermal administration of a single dose of the given substance or mixture, or after multiple doses administered within 24 hours or after inhalation exposure of 4 hours. Acute toxicity hazard class is divided into acute oral toxicity, acute dermal toxicity and acute inhalation toxicity. This class is divided into four categories.

<b>Acute toxicity</b>	Acute Tox. 1	GHS06	Danger
	Acute Tox. 2	GHS06	Danger
	Acute Tox. 3	GHS06	Danger
	Acute Tox. 4	GHS07	Warning

**Skin corrosive / irritating substances** are substances that cause irreversible damage to the skin, namely a visible skin necrosis through the epidermis and to the dermis following the application of the test substance for up to 4 hours. Corrosive reactions are typified by ulcers, bleeding, bloody scabs, and, by the end of observation at 14 days, by discolouration due to blanching of the skin, complete areas of alopecia, and scars. Histopathology shall be considered to evaluate questionable lesions.

Skin Irritation means the production of reversible damage to the skin following the application of a test substance for up to 4 hours

This class is divided into two categories: corrosive substances (category 1) and irritants (category 2). Categories of corrosive substances are further divided into three subcategories (A to C).

<b>Skin corrosive /</b>	Skin Corr. 1A	GHS05	Danger
-------------------------	---------------	-------	--------

<b>Skin irritation</b>	Skin Corr. 1B	GHS05	Danger
	Skin Corr. 1C	GHS05	Danger
	Skin Irrit. 2	GHS07	Warning

**Serious eye damage / eye irritation.** Serious eye damage refers to a damage to the eye tissue or to a visual decay after application of the test substance to the anterior surface of the eye, which is not fully reversible within 21 of the application. Eye irritation means the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application. The class is divided into two categories: substances causing serious eye damage (category 1) and substances causing serious eye irritation (category 2).

<b>Serious eye damage / eye irritation</b>	Eye Dam 1	GHS05	Danger
	Eye Irrit. 2	GHS07	Warning

**Respiratory or skin sensitisation.** Respiratory sensitising substances are substances which give rise to airway hypersensitivity after inhalation. A skin sensitizer is a substance which, upon contact with the skin, causes an allergic response. Substances which sensitise the airways are placed into one category (category 1), which is further divided into two subcategories (1A and 1B). Substances which sensitise the skin are placed into one category (category 2), which is further divided into two subcategories (A and B).

<b>Respiratory / skin sensitisation</b>	Resp. Senns. 1	GHS08	Danger
	Skin Sens. 1	GHS07	Warning

**Germ cell mutagenicity.** A mutation refers to a permanent change in the amount or structure of genetic material in the cell. The term mutation refers both to hereditary genetic changes that may be phenotypic, and to DNA changes, if known (including specific base pair changes and chromosomal translocation). The terms mutagenic and mutagen are used for substances that cause an increased occurrence of mutations in the population of cells or organisms. The class is divided into two categories, category 1 is further divided into two subcategories (1A and 1B).

<b>Germ cell mutagenicity</b>	Muta. 1A	GHS08	Danger
	Muta. 1B	GHS08	Danger
	Muta. 2	GHS08	Warning

**Carcinogenicity.** Carcinogen refers to a substance or a mixture of substances that cause cancer or increase the incidence of cancer. Substances which have induced benign and malignant tumours in well performed experimental studies on animals are considered also to be presumed or suspected human carcinogens unless there is strong evidence that the mechanism of tumour formation is not relevant for humans. Substances and mixtures of this class are placed into one of the two categories. Category 1 is further divided into two subcategories (1A and 1B).

<b>Carcinogenicity</b>	Carc. 1A	GHS08	Danger
	Carc. 1B	GHS08	Danger
	Carc. 2	GHS08	Warning

**Reproductive toxicity** includes adverse effects on sexual function and fertility in adult males and females as well as developmental toxicity in offspring. However, the class mutagenicity in germ cells is used to classify substances and mixtures with proven genetic inheritance impacts to offspring.

Under this classification system the reproductive toxicity is divided into two main groups: adverse effects on sexual function and fertility, and adverse effects on the development of offspring.

Certain toxic impacts on the reproduction cannot be unambiguously assigned either to sexual function and fertility or to the offspring developmental toxicity. Nevertheless, substances or mixtures with these effects or substances containing such chemicals are classified as toxic for reproduction. This class is divided into three categories. Category 1 is then divided into subcategory 1A (known toxicity) and 1B (a substance which is suspected to produce these types of effects). Category 2 includes substances with predicted negative reproductive and developmental effects. The third category is a supplementary category and includes substances with effects on or via lactation.

<b>Toxicity for reproduction</b>	Repr. 1A	GHS08	Danger
	Repr. 1B	GHS08	Danger
	Repr. 2	GHS08	Warning
	Lact.	–	–

**Specific target organ toxicity – single exposure.** Specific target organ toxicity (after single exposure) refers to a specific, non-lethal target organ toxicity resulting from a single exposure to the substance or mixture. All serious health effects that may impair the function, both reversible and irreversible, immediate or delayed, are included. The classification process identifies the substance or mixture which may be toxic for specific target organs, which as such may create potential adverse health effects for persons exposed to that substance or mixture. This class is divided into three categories.

<b>Specific target organ toxicity – single exposure</b>	STOT SE 1	GHS08	Danger
	STOT SE 2	GHS08	Warning
	STOT SE 3	GHS07	Warning

**Specific target organ toxicity – repeated exposure.** Specific target organ toxicity (repeated exposure) refers to a specific toxicity to target organs resulting from repeated exposure to the substance or mixture. All serious health effects that may impair the function, both reversible and irreversible, immediate or delayed, are included. This class is divided into two categories.

<b>Specific target organ toxicity – repeated exposure</b>	STOT RE 1	GHS08	Danger
	STOT RE 2	GHS08	Warning

**Aspiration hazard.** A class of substances or mixtures which may be toxic to humans upon aspiration. Aspiration refers to the entry of a liquid or solid substance or mixture into the trachea and into the lower respiratory tract either directly through the oral or nasal cavity or indirectly from vomiting. Aspiration toxicity includes serious acute effects, such as chemical pneumonia, various degrees of lung damage, or death after aspiration. This class contains only one category.

<b>Inhalation hazard</b>	Asp. Tox. 1	GHS08	Danger
--------------------------	-------------	-------	--------

## Hazard classes associated with environmental hazards

**Hazardous to the aquatic environment.** Acute aquatic toxicity means the intrinsic property of a substance to be injurious to an organism in a short-term exposure to that substance. Chronic aquatic toxicity is the ability of the substance to cause adverse effects on aquatic organisms during exposure that are determined in relation to the life-cycle of the organism. The classification of substances within this class consists of one category for acute toxicity and four categories of chronic toxicity.

<b>Hazardous to the aquatic environment</b>	Aquatic Acute 1	GHS09	Warning
	Aquatic Chronic 1	GHS09	Warning
	Aquatic Chronic 2	GHS09	–
	Aquatic Chronic 3	–	–
	Aquatic Chronic 4	–	–

## Additional EU hazard class

**Hazardous to the ozone layer.** A substance hazardous to the ozone layer refers to a substance which, on the basis of the available knowledge about the substance and based on the predicted or observed life and behaviour of the substance in the environment, may pose a threat to the structure and functioning of the stratospheric ozone layer.

<b>Hazardous to the ozone layer</b>	Ozone	–	Danger
-------------------------------------	-------	---	--------

## **Annex No. 2: Hazard statements (H-statements)**

- H200** – Unstable explosives.
- H201** – Explosive; mass explosion hazard.
- H202** – Explosive, severe projection hazard.
- H203** – Explosive; fire, blast or projection hazard.
- H204** – Fire or projection hazard.
- H205** – May mass explode in fire.
- H220** – Extremely flammable gas.
- H221** – Flammable gas.
- H222** – Extremely flammable aerosol.
- H223** – Flammable aerosol.
- H224** – Extremely flammable liquid and vapour.
- H225** – Highly flammable liquid and vapour.
- H226** – Flammable liquid and vapour.
- H228** – Flammable solid.
- H240** – Heating may cause an explosion.
- H241** – Heating may cause a fire or explosion.
- H242** – Heating may cause a fire.
- H250** – Catches fire spontaneously if exposed to air.
- H251** – Self-heating; may catch fire.
- H252** – Self-heating in large quantities; may catch fire.
- H260** – In contact with water releases flammable gases which may ignite spontaneously.
- H261** – In contact with water releases flammable gases.
- H270** – May cause or intensify fire; oxidiser.
- H271** – May cause fire or explosion; strong oxidiser.
- H272** – May intensify fire; oxidiser.
- H280** – Contains gas under pressure; may explode if heated.
- H281** – Contains refrigerated gas; may cause cryogenic burns or injury.
- H290** – May be corrosive to metals.
- H300** – Fatal if swallowed.
- H301** – Toxic if swallowed.
- H302** – Harmful if swallowed.
- H304** – May be fatal if swallowed and enters airways.
- H310** – Fatal in contact with skin.
- H311** – Toxic in contact with skin.
- H312** – Harmful in contact with skin.
- H314** – Causes severe skin burns and eye damage.
- H315** – Causes skin irritation.
- H317** – May cause an allergic skin reaction.
- H318** – Causes serious eye damage.
- H319** – Causes serious eye irritation.
- H330** – Fatal if inhaled.
- H331** – Toxic if inhaled.

**H332** – Harmful if inhaled.  
**H334** – May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
**H335** – May cause respiratory irritation.  
**H336** – May cause drowsiness or dizziness.  
**H340** – May cause genetic defects *exposure cause the hazard*>.  
**H341** – Suspected of causing genetic defects.  
**H350** – May cause cancer.  
**H351** – Suspected of causing cancer.  
**H360** – May damage fertility or the unborn child.  
**H361** – Suspected of damaging fertility or the unborn child.  
**H362** – May cause harm to breast-fed children.  
**H370** – Causes damage to organs.  
**H371** – May cause damage to organs.  
**H372** – Causes damage to organs through prolonged or repeated exposure *exposure cause the hazard*>.  
**H373** – May cause damage to organs through prolonged or repeated exposure *exposure cause the hazard*>.  
**H400** – Very toxic to aquatic life.  
**H410** – Very toxic to aquatic life with long lasting effects.  
**H411** – Toxic to aquatic life with long lasting effects.  
**H412** – Harmful to aquatic life with long lasting effects.  
**H413** – May cause long lasting harmful effects to aquatic life.

**EUH 001** – Explosive when dry.  
**EUH 006** – Explosive with or without contact with air.  
**EUH 014** – Reacts violently with water.  
**EUH 018** – In use, may form flammable/explosive vapour-air mixture.  
**EUH 019** – May form explosive peroxides.  
**EUH 044** – Risk of explosion if heated under confinement.  
**EUH 029** – Contact with water liberates toxic gas.  
**EUH 031** – Contact with acids liberates toxic gas.  
**EUH 032** – Contact with acids liberates very toxic gas.  
**EUH 066** – Repeated exposure may cause skin dryness or cracking.  
**EUH 070** – Toxic by eye contact.  
**EUH 071** – Corrosive to the respiratory tract.  
**EUH 059** – Hazardous to the ozone layer.  
**EUH 201** – Contains lead. Should not be used on surfaces liable to be chewed or sucked by children.  
**EUH 201A** – Warning! Contains lead.  
**EUH 202** – Cyanoacrylate. Danger. Bonds skin and eyes in seconds. Keep out of the reach of children.  
**EUH 203** – Contains chromium (VI). May produce an allergic reaction.  
**EUH 204** – Contains isocyanates. May produce an allergic reaction.

**EUH 205** – Contains epoxy constituents. May produce an allergic reaction.

**EUH 206** – Warning! Do not use together with other products. May release dangerous gases (chlorine)

**EUH 207** – Warning! Contains cadmium. Dangerous fumes are formed during use. See information supplied by the manufacturer. Comply with the safety instructions.

**EUH 208** – Contains (name of sensitising substance). May produce an allergic reaction.

**EUH 209** – Can become highly flammable in use.

**EUH 209A** – Can become flammable in use.

**EUH 210** – Safety data sheet available on request.

**EUH 401** – To avoid risks to human health and the environment, comply with the instructions for use.

### **Annex No. 3: Precautionary statements (P-statements)**

- P101** – If medical advice is needed, have product container or label at hand.
- P102** – Keep out of reach of children.
- P103** – Read label before use.
- P201** – Obtain special instructions before use.
- P202** – Do not handle until all safety precautions have been read and understood.
- P210** – Keep away from heat/sparks/open flames/hot surfaces. — No smoking.
- P211** – Do not spray on an open flame or other ignition source.
- P220** – Keep/Store away from clothing/.../combustible materials.
- P221** – Take any precaution to avoid mixing with combustibles...
- P222** – Do not allow contact with air.
- P223** – Keep away from any possible contact with water, because of violent reaction and possible flash fire.
- P230** – Keep wetted with...
- P231** – Handle under inert gas.
- P232** – Protect from moisture.
- P233** – Keep container tightly closed.
- P234** – Keep only in original container.
- P235** – Keep cool.
- P240** – Ground/bond container and receiving equipment.
- P241** – Use explosion-proof electrical/ventilating/lighting/.../equipment.
- P242** – Use only non-sparking tools.
- P243** – Take precautionary measures against static discharge.
- P244** – Keep reduction valves free from grease and oil.
- P250** – Do not subject to grinding/shock/.../friction.
- P251** – Pressurized container: Do not pierce or burn, even after use.
- P260** – Do not breathe dust/fume/gas/mist/vapours/spray.
- P261** – Avoid breathing dust/fume/gas/mist/vapours/spray.
- P262** – Do not get in eyes, on skin, or on clothing.
- P263** – Avoid contact during pregnancy/while nursing.
- P264** – Wash ... thoroughly after handling.
- P270** – Do not eat, drink or smoke when using this product.
- P271** – Use only outdoors or in a well-ventilated area.
- P272** – Contaminated work clothing should not be allowed out of the workplace.
- P273** – Avoid release to the environment.
- P280** – Wear protective gloves/protective clothing/eye protection/face protection.
- P281** – Use personal protective equipment as required.
- P282** – Wear cold insulating gloves/face shield/eye protection.
- P283** – Wear fire/flame resistant/retardant clothing.
- P284** – Wear respiratory protection.
- P285** – In case of inadequate ventilation wear respiratory protection.
- P231 + P232** – Handle under inert gas. Protect from moisture.
- P235 + P410** – Keep cool. Protect from sunlight.

**P301** – IF SWALLOWED:  
**P302** – IF ON SKIN:  
**P303** – IF ON SKIN (or hair):  
**P304** – IF INHALED:  
**P305** – IF IN EYES:  
**P306** – IF ON CLOTHING:  
**P307** – IF exposed:  
**P308** – IF exposed or concerned:  
**P309** – IF exposed or if you feel unwell:  
**P310** – Immediately call a POISON CENTER or doctor/physician.  
**P311** – Call a POISON CENTER or doctor/physician.  
**P312** – Call a POISON CENTER or doctor/physician if you feel unwell.  
**P313** – Get medical advice/attention.  
**P314** – Get medical advice/attention if you feel unwell.  
**P315** – Get immediate medical advice/attention.  
**P320** – Specific treatment is urgent (see ... on this label).  
**P321** – Specific treatment (see ... on this label).  
**P322** – Specific measures (see ... on this label).  
**P330** – Rinse mouth.  
**P331** – Do NOT induce vomiting.  
**P332** – If skin irritation occurs:  
**P333** – If skin irritation or rash occurs:  
**P334** – Immerse in cool water/wrap in wet bandages.  
**P335** – Brush off loose particles from skin.  
**P336** – Thaw frosted parts with lukewarm water. Do not rub affected area.  
**P337** – If eye irritation persists:  
**P338** – Remove contact lenses, if present and easy to do. Continue rinsing.  
**P340** – Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
**P341** – If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.  
**P342** – If experiencing respiratory symptoms:  
**P350** – Gently wash with plenty of soap and water.  
**P351** – Rinse cautiously with water for several minutes.  
**P352** – Wash with plenty of soap and water.  
**P353** – Rinse skin with water/shower.  
**P360** – Rinse immediately contaminated clothing and skin with plenty of water before removing clothes.  
**P361** – Remove/Take off immediately all contaminated clothing.  
**P362** – Take off contaminated clothing and wash before reuse.  
**P363** – Wash contaminated clothing before reuse.  
**P370** – In case of fire:  
**P371** – In case of major fire and large quantities:  
**P372** – Explosion risk in case of fire.

**P373** – DO NOT fight fire when fire reaches explosives.

**P374** – Fight fire with normal precautions from a reasonable distance.

**P375** – Fight fire remotely due to the risk of explosion.

**P376** – Stop leak if safe to do so.

**P377** – Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

**P378** – Use ... for extinction.

**P380** – Evacuate area.

**P381** – Eliminate all ignition sources if safe to do so.

**P390** – Absorb spillage to prevent material damage.

**P391** – Collect spillage.

**P301 + P310** – IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

**P301 + P312** – IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

**P301 + P330 + P331** – IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

**P302 + P334** – IF ON SKIN: Immerse in cool water/wrap in wet bandages.

**P302 + P350** – IF ON SKIN: Gently wash with plenty of soap and water.

**P302 + P352** – IF ON SKIN: Wash with plenty of soap and water.

**P303 + P361 + P353** – IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

**P304 + P340** – IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

**P304 + P341** – IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

**P305 + P351 + P338** – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**P306 + P360** – IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes.

**P307 + P311** – IF exposed: Call a POISON CENTER or doctor/physician.

**P308 + P313** – IF exposed or concerned: Get medical advice/attention.

**P309 + P311** – IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.

**P332 + P313** – If skin irritation occurs: Get medical advice/attention.

**P333 + P313** – If skin irritation or rash occurs: Get medical advice/attention.

**P335 + P334** – Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.

**P337 + P313** – If eye irritation persists: Get medical advice/attention.

**P342 + P311** – If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

**P370 + P376** – In case of fire: Stop leak if safe to do so.

**P370 + P378** – In case of fire: Use ... for extinction.

**P370 + P380** – In case of fire: Evacuate area.

**P370 + P380 + P375** – In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.

**P371 + P380 + P375** – In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

**P401** – Store ...

**P402** – Store in a dry place.

**P403** – Store in a well-ventilated place.

**P404** – Store in a closed container.

**P405** – Store locked up.

**P406** – Store in corrosive resistant/... container with a resistant inner liner.

**P407** – Maintain air gap between stacks/pallets.

**P410** – Protect from sunlight.

**P411** – Store at temperatures not exceeding ... oC/...oF.

**P412** – Do not expose to temperatures exceeding 50 oC/122oF.

**P413** – Store bulk masses greater than ... kg/... lbs at temperatures not exceeding ... oC/...oF.

**P420** – Store away from other materials.

**P422** – Store contents under ...

**P402 + P404** – Store in a dry place. Store in a closed container.

**P403 + P233** – Store in a well-ventilated place. Keep container tightly closed.

**P403 + P235** – Store in a well-ventilated place. Keep cool.

**P410 + P403** – Protect from sunlight. Store in a well-ventilated place.

**P410 + P412** – Protect from sunlight. Do not expose to temperatures exceeding 50 oC/122oF.

**P411 + P235** – Store at temperatures not exceeding ... oC/...oF. Keep cool.

**P501** – Dispose of contents/container to ...

## Annex No. 3: General instructions for giving first aid

### Principles for providing first aid to those exposed to chemical substances

doc. MUDr. Daniela Pelclová, CSc., MUDr. Alexandr Fuchs, CSc., MUDr. Miroslava Hornychová, CSc., MUDr. Zdeňka Trávníčková, CSc., Jiřina Fridrichovská, prom. chem.

#### 1. General principles of first aid

In providing first aid the first thing that must be protected is the safety of both the receiver and provider! By all means avoid chaotic behaviour. The injured should be kept mentally and physically calm. In providing first aid, the affected person should be kept warm.

##### 1.1. Quick orientation:

The situation must always be evaluated with a view to your own safety and that of the injured. Enter a contaminated area only if you have the proper protection ([self-contained breathing unit], mask with proper filter, backup from other personnel, etc.)

*ATTENTION! In the case of poorly-ventilated areas it must always be expected that the area could be contaminated!*

- In handling contaminated clothing or other objects, responsible persons must always wear the proper protective clothing including gloves.
- First aid should not be given in the place where the accident happened because of the danger of contamination of the provider

##### 1.2. In situations where life is threatened, first undertake the resuscitation of the injured and obtain medical assistance.

**In these situations where life is in danger, first carry out resuscitation, then seek medical assistance:**

**stopped breathing** - immediately provide artificial respiration

**stopped heart** - immediately provide indirect heart massage

**unconsciousness** - lay victim down in stabilized position on side

##### 1.3. Equipment:

For effective first aid, the necessary equipment and materials must be available at the site:

- adequate water (if there is no source of water, an emergency supply of about 10 litres per person),
- blankets or other textile material to protect the victim against chill and to modify the position of the victim; keep extra reserve clothing including shoes on hand
- first aid kit (contents according to the type of dangerous substances found at the workplace). The kit's contents must be replaced before the expiration date of the medicines and other materials it contains

1.4 In case of uncertainty on how to proceed, use the telephone contact for the Toxicology Information Centre, Na Bojišti 1, 120 00 Praha 2: tel. 224 919 293, 224 915 402; give information on the substances or the composition of the preparation from the original packaging or from the safety data sheet of the substance or preparation.

1.5. If medical examination is necessary, bring along the original packaging with label, or the safety data sheet of the given substance or preparation!

## **2. First aid in the event of contact with corrosives and other substances causing edema of the lungs**

**In these situations where life is in danger, first carry out resuscitation, then seek medical assistance:**

- stopped breathing** - immediately provide artificial respiration  
**stopped heart** - immediately provide indirect heart massage  
**unconsciousness** - lay victim down in stabilized position on side

### **2.1. Inhalation (applies to substances that cause edema of the lungs)**

- move the victim into the fresh air, quickly and with a view to your own safety; do not let the victim walk!
- according to the situation, rinse out mouth or nose with water
- change the person's clothes if they have come into contact with the substance
- keep the victim warm
- if the situation warrants, call an ambulance
- or obtain medical care; the patient must be monitored for at least another 24 hours.

### **2.2. Contact with eyes (applies to corrosives)**

- immediately rinse eyes with flowing water, open eyelid (even by force); if the victim has contact lenses, take them out immediately. **Do not neutralize under any circumstances!**
- rinse for 10-30 minutes from the inner corner of the eye outward, so as not to contaminate the other eye.
- If the situation warrants, call emergency services.
- or seek medical attention as soon as possible, preferably from a specialist.
- anyone affected must seek medical care, even if the case is minor

### **2.3. Contact with skin (applies to corrosives)**

- immediately remove the affected clothing; before or during washing remove all rings, watches, and bracelets, if present in the area where the skin is affected
- rinse the affected area with a flow of tepid water if possible for a period of 10-30 minutes; do not use a brush, soap, or neutralizer.

Note: when affected by substances for cauterizing properties, **do not use neutralizing solutions.** Inactivating solutions can only be used with some

substances (for example, oil for lithium, sodium, potassium; potash for white phosphorous; polyethylenglycol for phenols and cresols; calcium gluconate for hydrofluoric acids and oxalics) or decontaminating powder (with yperite).

- Cover burned parts of the skin with sterile bandage, do not apply cream or other treatment to the skin
- Cover the patient to keep him warm
- If the situation warrants, call emergency services
- Or seek medical attention

#### 2.4. Ingestion

- DO NOT INDUCE VOMITING – danger of further damage to the digestive tract!!! Danger of perforation of esophagus and stomach!
- IMMEDIATELY RINSE OUT MOUTH WITH WATER AND DRINK 2-5 dl of cool water to ease the thermal effects of the corrosive substance.
- *Because of the almost instantaneous effect on the mucous membrane, it is better to give the victim water from the tap and not waste time trying to find cool liquids – with each minute the condition is prolonged, the mucous membrane is irreparably damaged! Soda or mineral waters are not suitable, as they may give off gaseous carbon dioxide. Larger amounts of water should not be drunk, as this may induce vomiting and possible breathing of corrosive substance into lungs).*
- The victim should not force the drink, especially if he has pain in the mouth or throat. In that case only rinse the victim's mouth out with water.
- DO NOT USE CHARCOAL! (*the blackening makes medical examination of the digestive tract difficult and with acids and lyes does not have a positive effect).*
- Do not give the person any food
- Do not put anything in the victim's mouth if he is unconscious or has cramps
- If the situation warrants, call emergency services
- Or seek medical attention as soon as possible

#### 3. First aid after ingestion of substances that may be harmful to lungs (petrol, diesel fuel, kerosene, turpentine, solvent compounds with gasoline, etc.)

These are substances and preparations containing aliphatic, alicyklic, and aromatic hydrocarbons, which have low viscosity and low surface tension, and are usually marked with phrase R 65: *Harmful to health; ingestion may cause damage to lungs.*

**In these situations where life is in danger, first carry out resuscitation, then seek medical assistance:**

- stopped breathing** - immediately provide artificial respiration  
**stopped heart** - immediately provide indirect heart massage  
**unconsciousness** - lay victim down in stabilized position on side

### 3.1. Inhalation

- end the exposure immediately, move the person into the fresh air (remove contaminated clothing)
- arrange to keep the person warm
- arrange for medical examination; it will be necessary to maintain observation for at least 24 hours

### 3.2. Contact with the skin

- remove contaminated clothing
- rinse the affected area with large amounts of water, tepid if possible
- if the skin has not been damaged, soap, soap solution, or shampoo may be used
- seek medical care

### 3.3. Contact with eyes

- immediately rinse the eye with flowing water, open the eyelid (by force if necessary); if the person has contact lenses, remove them immediately
- keep rinsing for at least 10 minutes
- seek medical help, preferably from a specialist.

### 3.4. Ingestion

- DO NOT INDUCE VOMITING!
- *If the victim vomits, take care he does not inhale vomited material (danger of lung damage if even the smallest amount of these liquids are inhaled)*
- obtain medical treatment, as the patient must often be monitored for at least 24 hours; bring along original container with label, or the safety data sheet of the given substance.

## 4. First aid in case of contact with substances classified as toxic and highly toxic

**In these situations where life is in danger, first carry out resuscitation, then seek medical assistance:**

**stopped breathing** - immediately provide artificial respiration

**stopped heart** - immediately provide indirect heart massage

**unconsciousness** - lay victim down in stabilized position on side

### 4.1. Inhalation

- end the exposure immediately, and move the person into the fresh air (be careful of contaminated clothing)
- after exposure to hydrocyanic acids, have the victim inhale 1 or 2 ampoules of Nitramyl (amylum nitrosum)

- Arrange to keep the person warm
- If the situation warrants, call emergency services
- and always get a medical examination

#### 4.2. Contact with the skin

- remove contaminated clothing
- rinse the affected area with large amounts of water, tepid if possible
- if the skin is not damaged, soap, soap solution, or shampoo may be used
- if the situation warrants, call emergency services
- and always obtain a medical examination

#### 4.3. Contact with the eyes

- immediately rinse the eye under flowing water; keep the eyelid open (by force if necessary); if the victim is wearing contact lenses, take them out immediately.
- rinse for at least 10 minutes
- call emergency services

#### 4.4. Ingestion

- **AFTER INGESTING ANY HIGHLY TOXIC, SOME TOXIC, AND SPECIFIC DANGEROUS SUBSTANCES, of which consumption of amounts less than a gram or one gulp (30 ml) is life threatening) INDUCE VOMITING** (*especially with cyanides, some anorganic metal salts, paraquat, diquat, methyl alcohol, some organic solvents – benzene, tetrachloramethane, chloroform, carbon disulfide, and other substances*).

**To induce vomiting:** Induce vomiting only if subject is conscious, and within 1 hour after ingestion. Drink 1 – 2 dl of tepid water with a teaspoon of liquid soap and powdered or crushed active charcoal, about 5 tablets equivalent. *A larger amount of water is not desirable, because if vomiting does not occur, the extra water will help to dissolve and metabolize harmful substances soluble in water, and washes the toxic substance even deeper into the digestive tract.*

- If you are not sure whether to induce vomiting, contact the Toxicology Information Centre and give them the data on the substances or preparations from the original package or from the safety data sheet of the substance or preparation.
- **AFTER INGESTING TOXIC OR HIGHLY TOXIC SUBSTANCES EAT WITHIN 5 MINUTES 10-20 CRUSHED TABLETS OF ACTIVE CHARCOAL MIXED IN WATER – regardless of whether vomiting has been successfully induced or not**
- if cyanide has been ingested, inhale 1-2 ampoules of Nitramyl (amylum nitrosum)
- call emergency services

## 5. First aid in case of contact with substances classified as harmful to health

### 5.1. Inhalation

- immediately end the exposure, move the person into the fresh air
- see that the person is kept warm
- obtain medical attention, especially if there is a persistent cough, shortness of breath, or other symptoms

### 5.2. Contact with skin

- remove contaminated clothing
- wash the affected area with large amounts of water, tepid if possible
- if the skin has not been damaged, soap, soap solution, or shampoo may be used
- get medical attention, especially if skin irritation persists

### 5.3. Contact with eyes

- immediately rinse eye with flowing water, keep eye open (by force if necessary); if the person has contact lenses, remove them immediately.
- rinse eye for at least 10 minutes
- get medical attention, from a specialist if possible

### 5.4. Ingestion

- DO NOT INDUCE VOMITING – *the inducing vomiting itself may cause complications (inhalation of substance into lungs and respiratory system or mechanical damage to mucous membranes in the esophagus may cause more hazard than the ingested substance itself)*
- if possible, eat about 5 crushed tablets of medicinal charcoal
- seek medical attention

## 6. First aid in case of contact with substances classified as irritants

### 6.1. Inhalation

- end exposure immediately, move affected person into the fresh air
- take measures to keep affected person warm
- seek medical attention if irritation, shortness of breath, or other symptoms persist

### 6.2. Contact with skin

- remove contaminated clothing
- wash affected area with large amounts of water, tepid if possible
- if skin is not injured, soap, soap solution, or shampoo may be used

- seek medical attention if skin irritation persists

*Note: If the substance adheres to the skin and cannot be removed with water and washing agent or edible oil (quick-drying glue, for example), do not remove it by force, but have it done by a specialist.*

### **6.3. Contact with eye**

- immediately rinse eye with flowing water, keep eye open (by force if necessary); if the person has contact lenses, remove them immediately.
- rinse eye for at least 10 minutes
- get medical attention, from a specialist if possible

*Note: if the substance adheres to the eyelid and cannot be removed with water, do not remove it by force; instead seek qualified medical attention.*

### **6.4. Ingestion**

- DO NOT INDUCE VOMITING – *the inducing vomiting itself may cause complications (inhalation of substance into lungs and respiratory system, for example, detergents or other substances producing foam; or mechanical damage to mucous membranes in the esophagus)*
- if possible, eat 1 – 2 crushed tablets of active charcoal
- for persons without symptoms, contact by telephone the Toxicology Information Centre on whether medical examination is necessary; give the information about the substance or preparation from the original label or from the safety data sheet of the substance or preparation
- persons experiencing health problems should seek medical attention.