

Safety in the laboratory general issues

Inga Siden-Kiamos, IMBB &
Technical Services FORTH

Legal framework for occupational health and safety

- Building codes
- Regulations on fire protection
- Health and Safety legislation N.1568/1985 and N. 3850/2010
- Local guidelines
- Safety at FORTH: Safety Engineer Mr Vagelis Charkoutsakis
- Safety committee with 7 members, representing all Institutes within FORTH
- Committee for Control of Safety (Charkoutsakis, Siden-Kiamos, Samartzis)

Committee for Control of Safety at FORTH

ΕΝΤΥΠΟ ΕΛΕΓΧΟΥ ΕΡΓΑΣΤΗΡΙΑΚΩΝ ΣΥΝΘΗΚΩΝ

ΙΝΣΤΙΤΟΥΤΟ: ΥΠΕΥΘΥΝΟΣ ΕΡΓΑΣΤΗΡΙΟΥ:

ΕΡΓΑΣΤΗΡΙΟ: ΑΡ.ΧΩΡΟΥ – ΘΕΣΗ:
ΗΜΕΡΟΜΗΝΙΑ:

Α/Α	ΠΑΡΑΜΕΤΡΟΙ ΕΛΕΓΧΟΥ	ΠΟΛΥ ΚΑΛΑ	ΚΑΛΑ	ΜΕΤΡΙΑ	ΜΗ ΑΠΟΔΕ ΚΤΟ
1	ΣΗΜΑΝΣΗ				
2	ΕΓΚΑΤΑΣΤΑΣΕΙΣ				
3	ΕΞΟΠΛΙΣΜΟΣ				
4	ΑΣΦΑΛΗΣ ΛΕΙΤΟΥΡΓΙΑ ΕΡΓΑΣΤΗΡΙΟΥ				
5	ΕΠΙΚΙΝΔΥΝΕΣ ΟΥΣΙΕΣ – ΜΕΤΑΦΟΡΑ ΔΙΑΧΕΙΡΙΣΗ – ΕΡΓΑΣΤΗΡΙΑΚΑ ΑΠΟΒΑΝΤΑ				
6	ΦΙΑΛΕΣ ΑΕΡΙΩΝ				
7	ΕΝΗΜΕΡΩΣΗ ΠΡΟΣΩΠΙΚΟΥ				

ΠΙΝΑΚΑΣ ΤΕΚΜΗΡΙΩΣΗΣ ΔΕΙΞΕΩΝ

Σημείο 1.
Σημείο 2.
Σημείο 3.
Σημείο 4.
Σημείο 5.
Σημείο 6.
Σημείο 7.

ΠΑΡΑΤΗΡΗΣΕΙΣ

Ο ΕΛΕΓΧΟΣ ΠΡΑΓΜΑΤΟΠΟΙΗΘΗΚΕ ΑΠΟ ΤΟΥΣ

1.
2.
3.

Inspections and evaluation of safety

- Signs
- Installations
- Equipment
- Safe laboratory work
- Dangerous substances/organisms –
transport- handling- waste
- Gas cylinders
- Information of personnel

Signs

Every room must have the appropriate signs. These should be clearly visible.

1. Use and special precautions of hazardous chemicals or organisms
2. Actions in case of an emergency
3. Phone numbers in case of an emergency
4. Hazard level(e.g. P1)

Signs for occupational safety and health

Signs related to

- Prohibition
- Warning
- Obligations
- How to find and recognize equipment for rescue, first aid and fire fighting
- Drawing attention to dangers such as hindrances, dangerous places or vessels containing or transporting dangerous goods

The form and color of signs for health and safety have special meanings

	Prohibited
	Obligation
	Warning
	Signs related to aid or rescue
	Signs related to fire

Pictograms independent of language

Signs for prohibitions

Round signs
Red frame
Black symbol
on white
background



No smoking



Naked flame
and smoking prohibited



No passage for
persons on foot



Prohibition to use water
for fire fighting



Non-drinkable water



Access for non-
authorised persons
prohibited



Passage of
trucks prohibited



Do not touch

Warning signs

Warns for possible or existing danger

Triangle with black symbol on yellow background with black frame



Signs for obligations

Circular signs.

The action that you are obliged to take is represented by a white symbol on a blue background



Signs for fire fighting material and equipment

These show the position of fire fighting material and equipment
Square or rectangular signs.

The material or equipment is represented by white symbols on red background

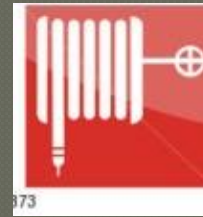


Fire Extinguisher

Ladder



Emergency phone



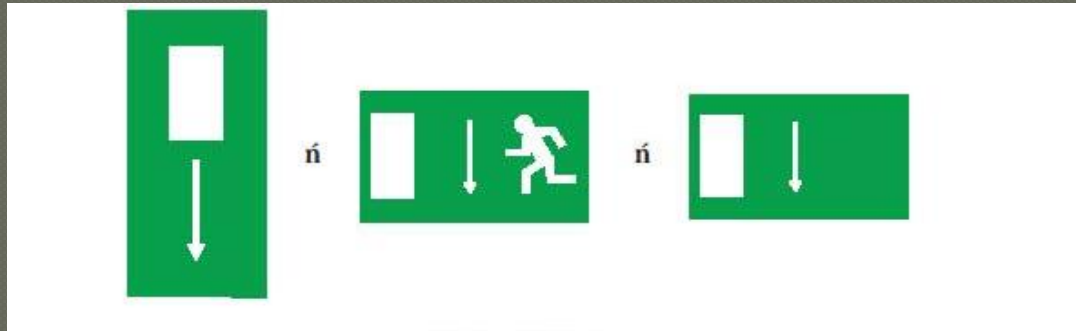
Hose reel



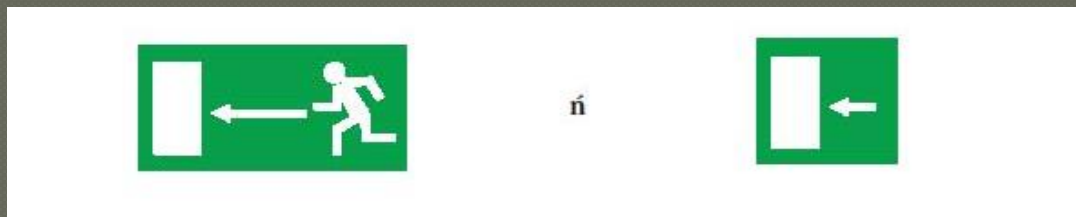
These signs indicate the direction of fire fighting equipment

Signs for evacuation and rescue

These signs designate evacuation routes, emergency exits and equipment for rescue and aid. These signs are rectangular or square, with a white symbol on green background



These signs show the position of the emergency exits



These signs show the route for reaching emergency exits

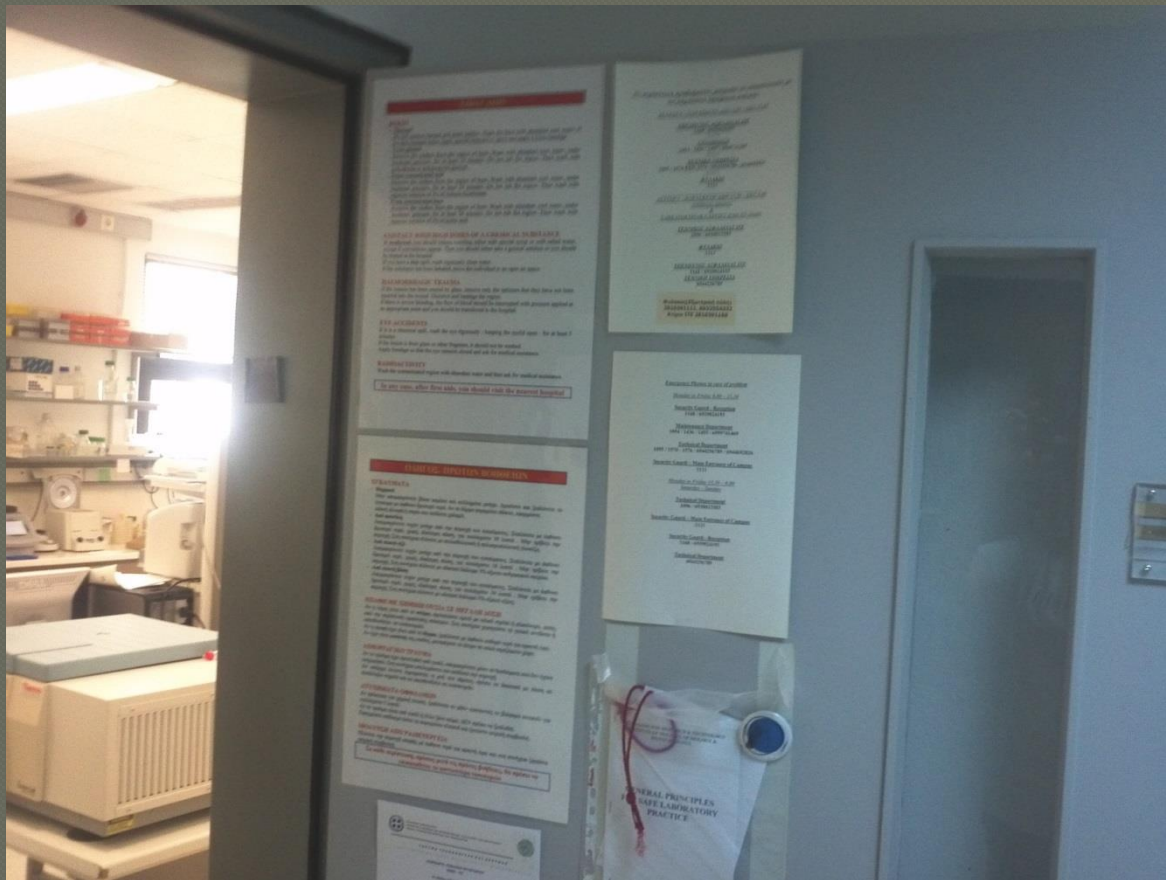
Emergency phone list

Every laboratory/room shall have an updated emergency phone list with the phone numbers of:

- Head of the lab/person in charge
- FORTH doctor
- FORTH Safety Engineer **ext 1095, 1570**
- FORTH Security Guard **ext 1111**
- First aid **166**
- Fire department **199**
- Police **100**
- Poisoning information **210 7793777**

in a place where it is easily accessible

Signs and information



A good example! All safety information collected in an easy accessible place

Technical services phones and websites

- Technical services: phone 1095
- Web <http://www.forth.gr/ty/>

*If something is damaged/missing/misfunctioning in the building
REPORT IT !*

The screenshot shows a Mozilla Firefox browser window displaying the website www.forth.gr/ty/contact-info.html. The page features a logo with a wrench and hammer, and the text "ΤΕΧΝΙΚΗ ΥΠΗΡΕΣΙΑ". A red box highlights the text "In an emergency at FORTH call extension 1111". The navigation menu includes "ΑΡΧΙΚΗ", "ΝΕΑ", "ΕΡΓΑ", "ΣΤΕΛΕΧΟΣΗ", and "ΕΠΙΚΟΙΝΩΝΙΑ". The main content area has a "Title" and "Content" section. A sidebar contains a "Υποστήριξη Ινστιτούτων" section with a link "Αναγγελία Βλαβών" circled in green. The footer includes a "New Request" form with fields for "Type", "Χώρος", "Description", "Ονοματεπώνυμο", and "Τηλέφωνο", along with "Save" and "Reset" buttons. The browser's address bar shows "139.91.86.5:12597/#/home/requests/new".

Installations

- Adequate light
- Adequate temperature
- Ventilation
- Good condition and performance of electrical equipment (fuses, power cords, multi-sockets etc)
- Good condition and performance of special safety equipment (when applicable, e.g. harmful gas indicators, indicators for UV light)

Installations

- Ventilation – air circulation



Air inlet in ceiling



Air outlet in walls

Installations

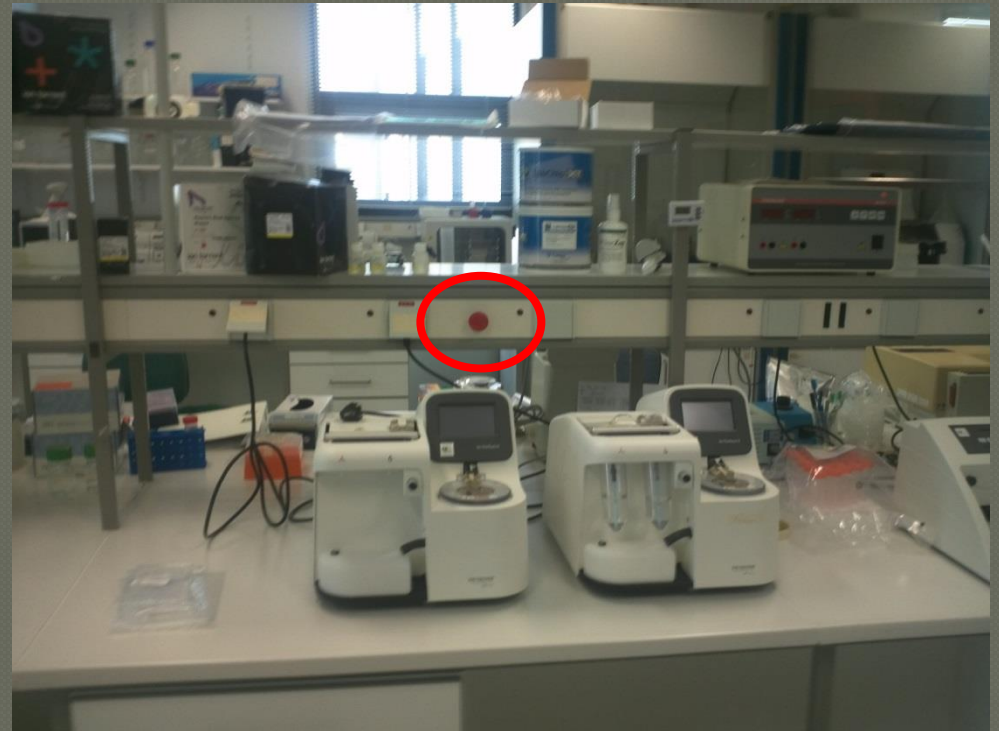


Ventilation should not be blocked!

Installations



Electrical panel – warning sign
Easy to access



Emergency button – breaks all current to the panel! Use in an emergency – do not obstruct or hide!

Installations



Do not overload electrical supply
Multiple plugs, extension cords
Technical Services

Installations



Do not keep heavy equipment or dangerous chemicals on high shelves.
Secure tall furniture (cupboards, shelves etc) – Technical Services

Safe laboratory work

- ◉ Access to dangerous places
- ◉ Free unobstructed evacuation routes
- ◉ No food or drink in the laboratory
- ◉ Correct use of equipment
- ◉ Follow safety instructions
- ◉ Cleanliness and order

Safe laboratory work

Escape routes



Escape routes – keep free



Emergency exits – don't block!



In an emergency (fire, earthquake) NEVER use the elevators

Equipment for safe laboratory work

- Fire equipment
- **Eye washing stations**
- Emergency showers
- Chemical hood
- Personal Protection
- Signs for harmful chemicals/organisms



Equipment for safe laboratory work

- Fire equipment
- Eye washing stations
- **Emergency shower**
- Chemical hood
- Personal Protection
- Signs for harmful chemicals /organisms/experiments



Equipment for safe laboratory work

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Do not obstruct/remove/hide

Equipment for safe laboratory work

○ Fire equipment Prevention



Sprinklers



Fire/smoke detectors



Fire indicators



Fire alarm signal



Fire alarm

Equipment for safe laboratory work

○ Fire equipment Prevention

Fire doors insulating different
areas of buildings
Automatic closure



Equipment for safe laboratory work

- Fire equipment
- Fire extinguishers



Do not obstruct/remove/hide

Fire fighting equipment for small fires

Classes of fires:

Class A: Fires with trash, wood, paper or other combustible materials as the fuel source.

Class B: Fires with flammable or combustible liquids as the fuel source.

Class C: Fires involving electrical equipment.

Class D: Fires with certain ignitable metals as a fuel source.



Types of fire extinguisher

Water Fire Extinguishers:

Used for Class A fires. Not suitable for Class B (Liquid) fires, or where electricity is involved.

Foam Fire Extinguishers:

Used for Classes A & B fires. Foam spray extinguishers are not recommended for fires involving electricity, but are safer than water if inadvertently sprayed onto live electrical apparatus.

Dry Powder Fire Extinguishers:

Often termed the 'multi-purpose' extinguisher, as it can be used on classes A, B & C fires. Best for running liquid fires (Class B). Will efficiently extinguish Class C gas fires, BUT BEWARE, IT CAN BE DANGEROUS TO EXTINGUISH A GAS FIRE WITHOUT FIRST ISOLATING THE GAS SUPPLY. Special powders are available for class D metal fires.

CO2 Fire Extinguishers:

Carbon Dioxide is ideal for fires involving electrical apparatus, and will also extinguish class B liquid fires, but has NO POST FIRE SECURITY and the fire could re-ignite.

Note: portable fire extinguishers only work for about 10-30 seconds

Equipment for safe laboratory work

- ◉ Fire equipment
- ## Fire cabinet and hose



Do not obstruct/remove/hide

If something happens....

Earthquakes

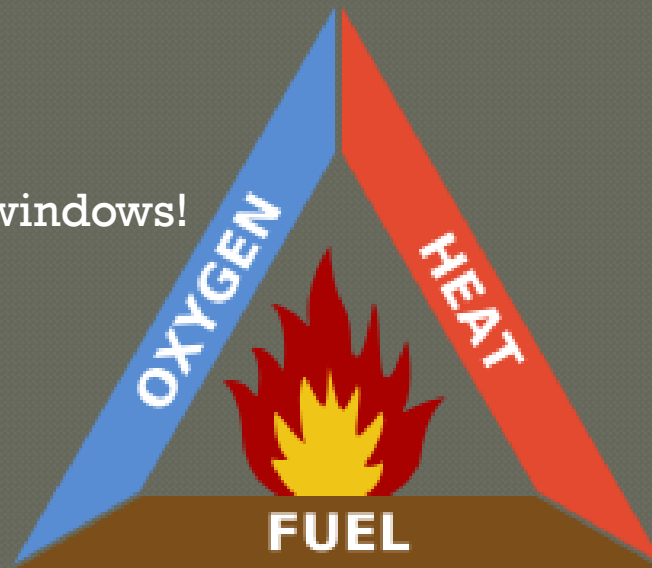
- Don't panic
- **Drop, cover and hold on.** Move as little as possible.
- Stay away from windows to avoid being injured by shattered glass.
- Stay indoors until the shaking stops and you are sure it is safe to exit.
- When it is, **use stairs** rather than the elevator in case there are aftershocks, power outages or other damage.
- Be aware that fire alarms and sprinkler systems frequently go off in buildings during an earthquake, even if there is no fire.



<http://www.redcross.org/prepare/disaster/earthquake>

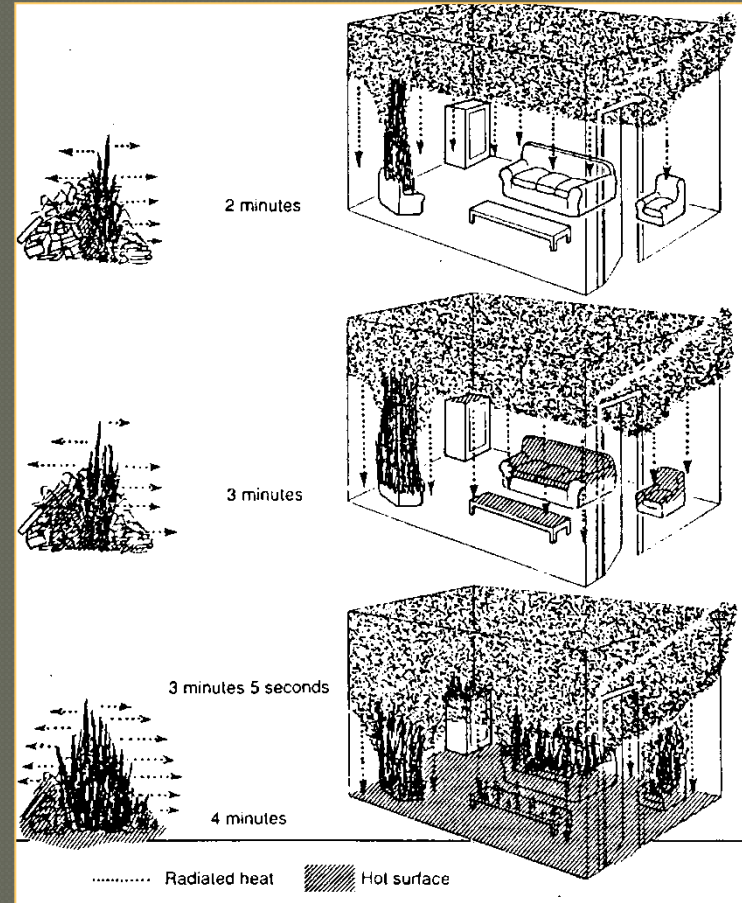
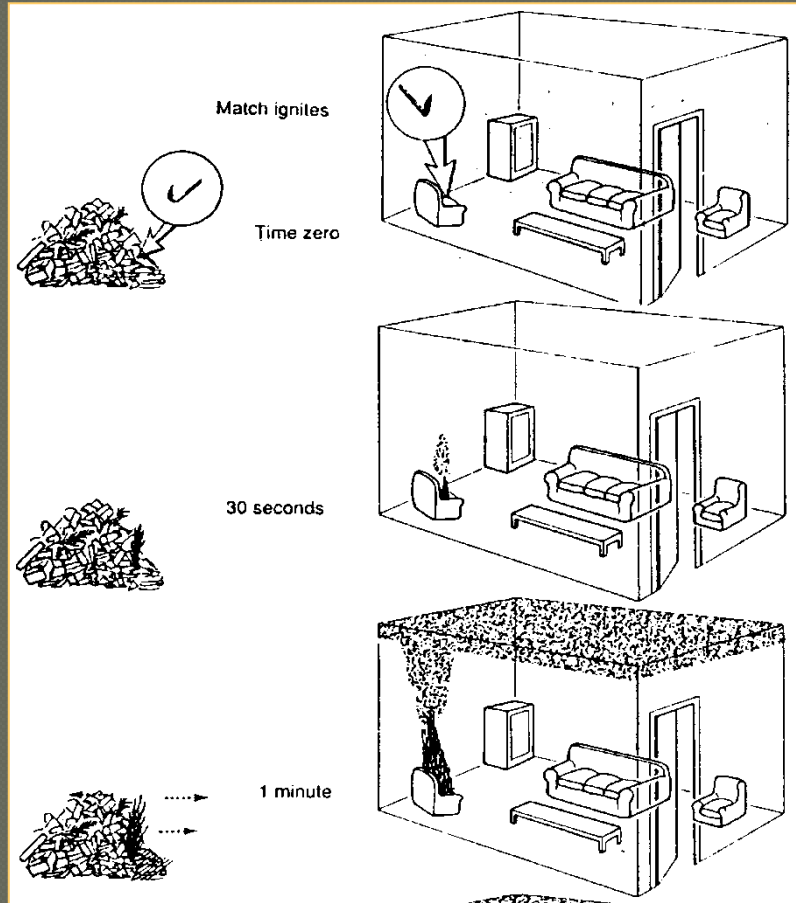
Fires

Do not open doors/windows!

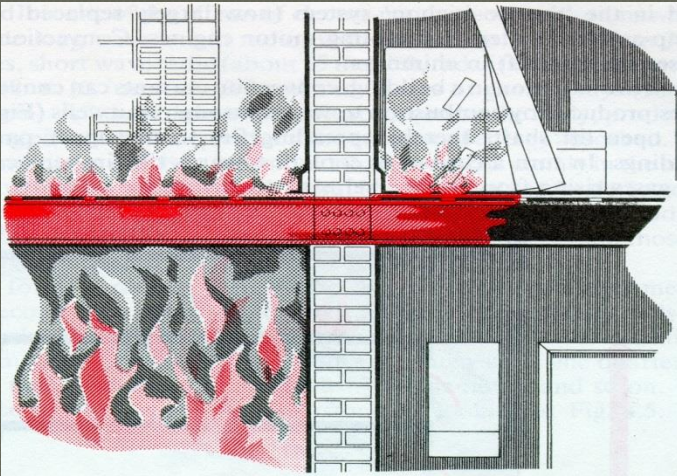


Fire fighting targets one or several of these three causes

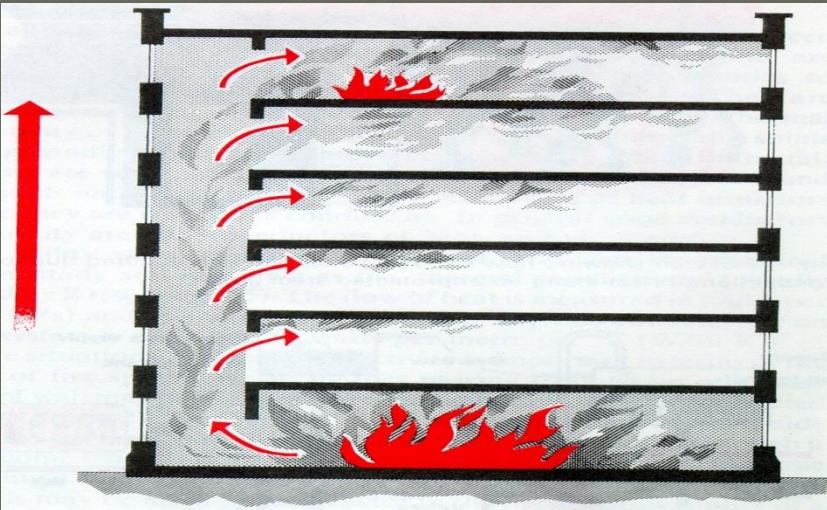
Development of fire



Spreading of fire



Through floors



Via stairways – ventilation shafts

In case of fire

- Take ALL fire alarms seriously and leave the building immediately. Do not stop.
- If you can't get out, signal for help.
- Close doors behind you.
- Stay low when there is smoke, where the air is cleaner and cooler.
- Always use closest exit or stairway; never use elevators.
- If the alarm is on your way out, pull it!
- Once outside, do not go back in!
- If your clothes are on fire, stop, drop, and roll.

In case of fire

ΠΥΡΟΣΒΕΣΗ



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LPr 27-10-05

ABB

Wrong

Correct

In case of fire

Learn how to use
a fire extinguisher

ΠΥΡΟΣΒΕΣΗ



Ψεκάζουμε ταυτόχρονα με περισσότερους πυροσβεστήρες.



Η φωτιά μπορεί να ξαναφουντώσει. Χρησιμοποιούμε νερό στα αποκαΐδια.

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LPp 27-10-05

Wrong

Correct

ABB



Accidents in the laboratory and first aid

Burns due to heat, chemicals or electricity

- Heat – due to flames, fire or explosions
- Chemicals – strong acids, bases and other corrosive chemicals
- Electricity – due to contact of skin to electrical current in electrical cables

Accidents in the laboratory and first aid

First aid after burns due to heat

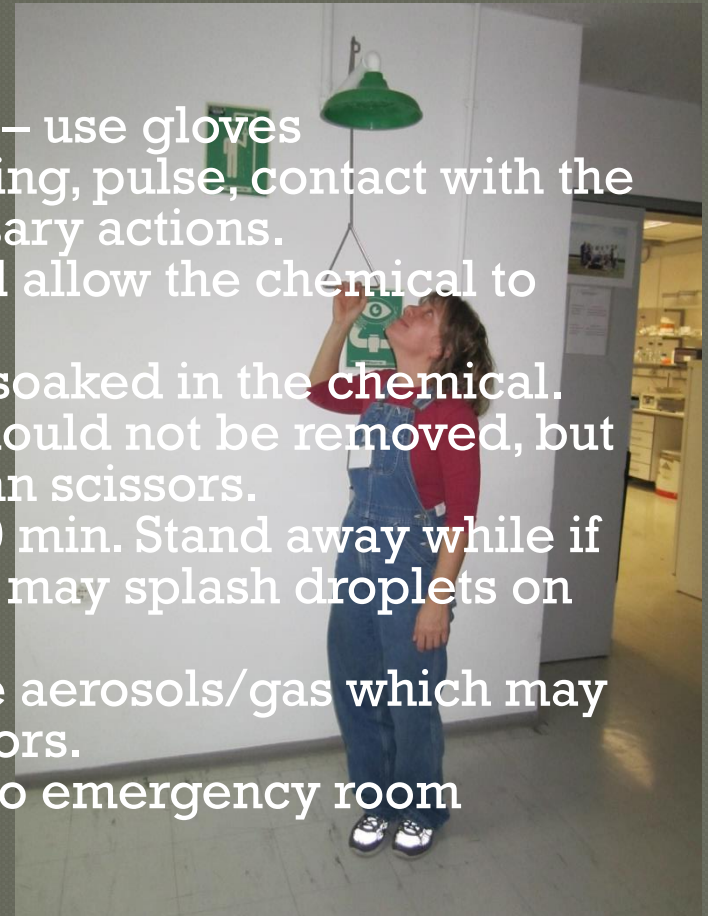
- Put out the fire on clothing using a blanket or thick clothing
- Lay the person down and protect the burned area from contact with ground
- Control the status of the victim – breathing, pulse, contact with the environment. If needed perform necessary actions.
- Wash the burned area with cool water for at least 20 min
- Remove the clothing AROUND the burned area, but not clothing which is sticking to the skin
- Do NOT use oil, crème etc
- Cover the wound with a clean bandage
- In serious cases call an ambulance/go to emergency room



Accidents in the laboratory and first aid

First aid after burns due to chemicals

- Make sure the area is safe
- Never touch the victim with bare hands – use gloves
- Control the status of the victim – breathing, pulse, contact with the environment. If needed perform necessary actions.
- Never rub the burnt area because it will allow the chemical to enter the skin to deeper levels
- Carefully remove the clothing which is soaked in the chemical. Clothing which is sticking to the skin should not be removed, but the surrounding area cut away with clean scissors.
- Wash with plenty of water for at least 20 min. Stand away while if you are pouring water as the chemicals may splash droplets on you. **USE THE EMERGENCY SHOWER!**
- Be careful as the chemical may produce aerosols/gas which may be odourless. Transfer the victim outdoors.
- In serious cases call an ambulance/go to emergency room



Accidents in the laboratory and first aid

First aid after burns due to electricity

- **Turn off the electricity before touching the victim.** If we cannot turn off the electricity the victim or the electrical cords/cables should be moved using a wooden item (chair, broom, etc.). Make sure you are standing on a dry floor or put books between as insulators.
- Do not move the victim.
- If possible perform first aid, at site, unless there is fire or smoke.
- Call for aid (166 from landline or 112 from mobile phone). It is safer to wait for an ambulance to transport the victim to hospital, as the ambulance has the expertise all the necessary equipment.

Accidents in the laboratory and first aid

Bleeding, eye accidents, poisoning

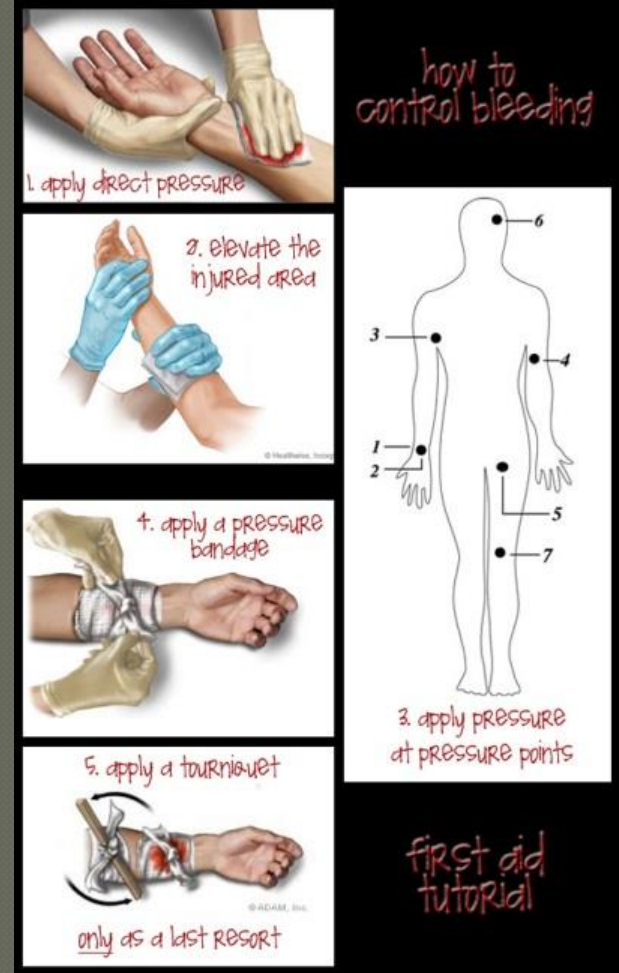
- Bleeding is the result of wounding with a sharp object, e.g. tool, glass etc
- Eye accidents happen when chemicals enter the eye
- Poisoning can be due to the swallowing of a dangerous substance

Accidents in the laboratory and first aid

First aid – Bleeding

- In case of a small accident allow the blood to flow for a few seconds
- In a wound due to broken glass only the pieces on the surface should be removed – internal pieces should not be removed
- Use an antiseptic solution and then bandage

- In case of intense hemorrhage stop the blood flow by pressure
- Use a bandage or piece of cloth to stop the blood flow, without obstructing the blood circulation completely.
- If an artery has been damaged stop the blood flow before the wound
- **CALL FOR MEDICAL HELP IMMEDIATELY**



Accidents in the laboratory and first aid

First aid – Eye accidents

- If a chemical substance has entered the eye use water to flush the eyes for at least 5 min, hold the eyelids open. **USE THE EMERGENCY EYE WASH STATIONS.**
- If a piece of glass has entered the eye **DO NOT** wash! Bandage the eye and seek medical help.



Accidents in the laboratory and first aid

Poisoning

- DO NOT attempt vomit – may cause damage to the lungs
- Seek medical help
- Inhalation of poisonous gas – transfer the victim to a well ventilated area and help him/her to take deep breaths
- If the victim is unconscious: Control the status of the victim – breathing, pulse. contact with the environment. If needed perform necessary actions.
- Keep note of the name of the poisonous substance
- Check the msds sheet for necessary actions

Poisoning information around the clock 210 7793777

Accidents in the laboratory and first aid

One person in each group should be in charge of action in case of an accident and have responsibility to

- Perform first aid
- Call ambulance
- Check safety equipment such as first aid kit
- Provide extra safety equipment in case of work with especially harmful substances-organisms/dangerous equipment

Prevention

- ⦿ Inspections
- ⦿ Control measures
- ⦿ Information

Control measures

Every year a certified company measures the presence of dangerous chemicals in laboratories chosen randomly

Chemicals measured:

- Carbon dioxide
- Sulfur dioxide
- Carbon monoxide
- Toluol
- Ethanol
- Ammonia
- Formaldehyde
- Hydrochloric acid
- Trichloroethylene

Control measures

Chemicals measured in randomly chosen office space by certified company

- ◉ Sulfur dioxide
- ◉ Carbon monoxide
- ◉ Toluol
- ◉ Formaldehyde

These are considered typical dangerous chemicals in office space

Control measures

Example of results

	OEL 8 hrs exposure	Carbon dioxide	Ethanol	Ammonia
Occupational Exposure Limit values (OELs)		5 ppm	1000 ppm	50 ppm
Lab 1	C270	None detected		
Lab 2	A206	None detected	None detected	None detected
Lab 3	A104	None detected	None detected	None detected

Information

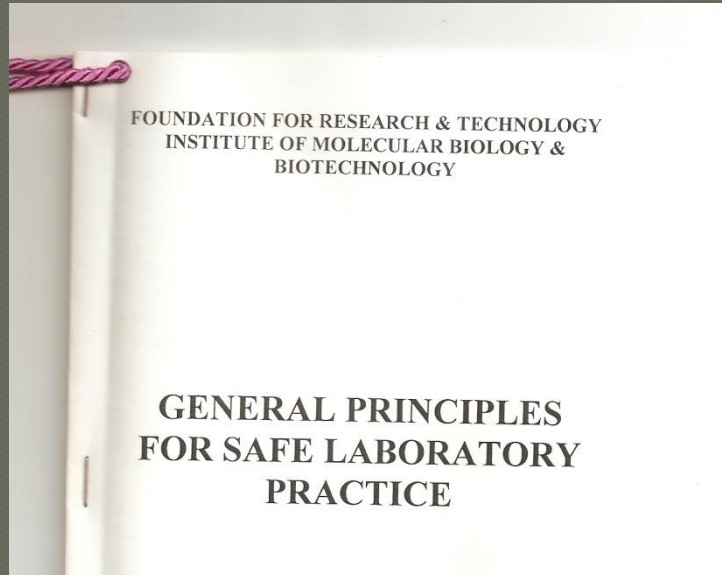
All persons working in the lab should be provided with information on safety issues

- How to work with material/organisms/equipment carrying a risk to safety and health
- Basic procedures for disposal of dangerous/harmful substances or organisms
- Safety precautions for working with radiation (UV, X-rays, lasers)
- How to react in case of an emergency
- How to react in case of fire
- How to provide basic first aid

Responsibility of lab head to provide this information

Information

IMBB booklet



- More information on safety issues is available on IMBB intranet

Questions????

CO₂ Fire extinguisher

Book 3 Part 2

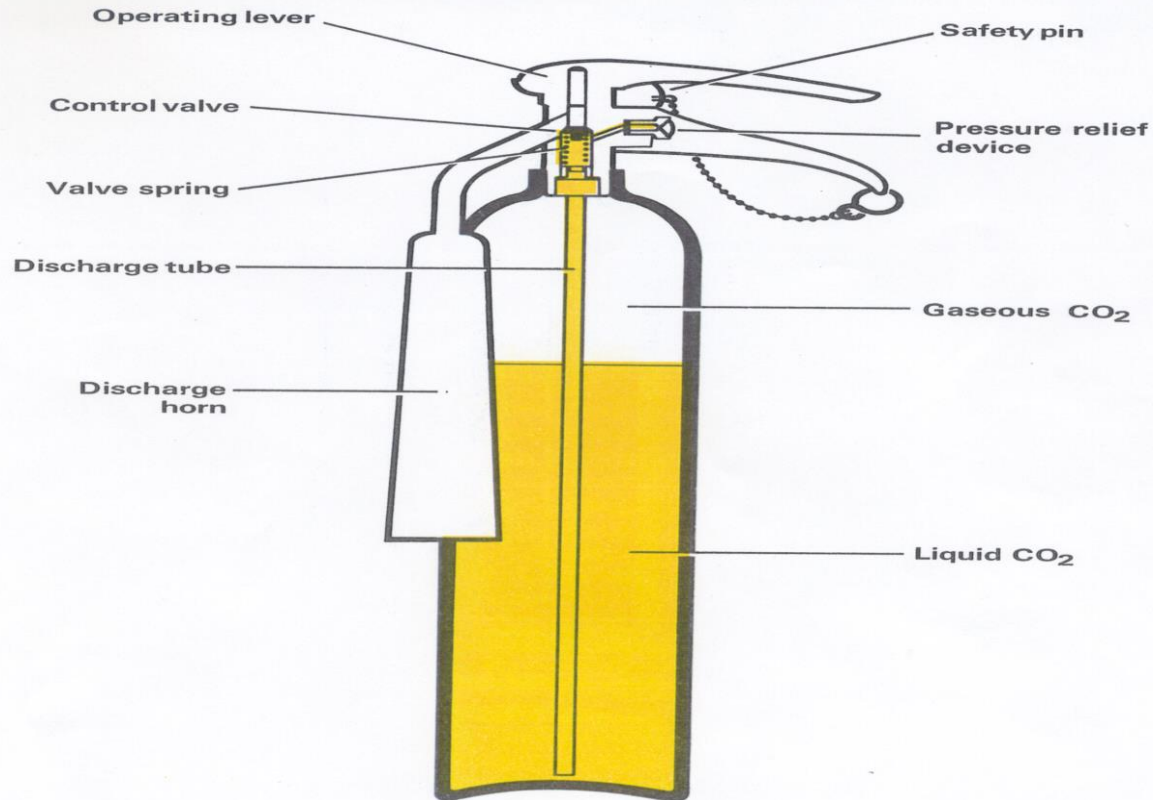


Fig. 7.2 Carbon dioxide extinguisher (small size).

Learn how to use – FORTH demonstration each year