

Department of Occupational Health, Safety & Environment & Housing Faculty of Science & Technology University of Twente

# Occupational Health, Safety & Environment Science & Technology

Basic information for Science & Technology Students (version August 2022)

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# 1 What do I do in case of an emergency?!

# Stay calm!

Call the alarm number **2222** (when using cell phone: 053-4892222) and provide the following information:

- 1. nature of the emergency
- 2. number of injured and type of injury
- 3. name of the building and room number
- 4. Your own name



Call: 2222

*If possible wait for the emergency team to arrive so you can provide them with information; otherwise leave the building by the nearest (emergency) door.* 

#### 1.1 In case of fire

- \* Push the nearest manual fire alarm (in the corridors; break the glass)
- \* Close as many doors and windows as possible
- \* Turn off equipment
- Use the small fire extinguishers (in the corridors and the laboratories, see also paragraph 9.1)
- \* If possible wait for the emergency rescue team.
- \* Always think of your own safety!

Do not hesitate to telephone the alarm number 2222 (053-4892222). It is better to warn unnecessarily than to warn too late!!!

#### 1.2 In case of evacuation (will be announced)

- \* Turn off equipment and experimental set-ups or make them safe
- \* Close the window of the fume cupboard
- \* Close doors and windows
- \* Take personal property with you if possible
- \* Leave the building via the nearest (emergency) exit
- \* Go to the canteen in the Horst building.

# 2 Map of Carré 4<sup>th</sup> floor

(readable copies of this map are posted in the corridors)



## 3 General code of conduct

- In case of fire, accident and/or calamity: call Alarm number: 2222 (053-4892222) Give name of the building, room number, type of fire and size.
- 2. When the acoustic evacuation signal goes off: make the equipment you are using safe or turn it off and follow the instructions.
- 3. Always report accidents or dangerous situations to the instructor/teaching assistant/Occupational Health, Safety & Environment coordinator or at the Reception in Carré.
- 4. If there are any tasks to be done, the instructor/teaching assistant/Occupational Health, Safety & Environment co-ordinator will give instructions in relation to the risks involved and the safety measures to be taken.
- 5. Tasks may only be commenced with the permission/approval of the instructor/teaching assistant/Occupational Health, Safety & Environment co-ordinator.
- 6. You are not permitted to enter any room without the permission of the instructor/Occupational Health, Safety & Environment co-ordinator.
- 7. Use of personal protective equipment is compulsory when indicated on the warning signs.
- 8. Following instructions is compulsory; you must be able to recognise all the prohibition, warning and emergency signs (see sign at the Carré Main Entrance)
- 9. Escape routes, passageways, stairwells, entrances, exits, fire extinguishing equipment, safety equipment and fuse boxes must never be blocked or used for other purposes.
- 10. Smoking is not permitted in the building and the whole campus (except the living spaces)
- 11. Eating and drinking is not permitted in the laboratories.
- 12. Keep the areas clean and tidy and use the available waste containers.
- Instructions given by people with functions such as: Occupational Health, Safety & Environmental co-ordinator, appointed safety person, domestic staff member or Fire Service must always be followed.
- 14. Keep yourself informed of the generally applicable and additional specific legislation, and stick to it.
- 15. People who do not follow the regulations bring danger to others and could be expelled.

# 4 Why Occupational Health, Safety & Environment?

Occupational Health, Safety & Environment ("Arbo & Milieu") is intended to prevent injury and damage to persons and the environment caused by work. The Occupational Health and Safety Act ensures that the employer provides good employment conditions and that applies not only to employees, but also to the **students**. On the other hand the employees and the students must also play their part. That is to say you must keep your eyes and ears open and report dangerous/unsafe situations and of course you must follow the rules.

There is a special advisory body (AMH) at the Science & Technology Faculty who helps set up policy in this field. Various people in the Faculty contribute to this, including the Faculty Occupational Health, Safety & Environment coordinator.

Of course the door to the Faculty Occupational Health, Safety & Environment coordinator (room CR 3.211, tel 5958) is always open to you.

On behalf of the Science & Technology Faculty I would like to wish you a safe and healthy study period!

Bertus Dierink Coordinator Occupational Health, Safety & Environment

People responsible for "O, H, S & E" at Science& Technology Faculty and important telephone numbers

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Security service:		tel: 2134		
ALARM		tel: 2222		

# 5 Access to the buildings and the emergency team

Opening hours: Monday to Friday 08.00 to- 18.00

#### 5.1 Access after working hours

You will need a personal access card to get into most UT buildings outside opening times. You may register via the Sesam authorization portal to get your card activated. You must have a clear reason for doing this.

- If there is an emergency outside opening hours, it is important to know who is in the building and where. By logging in with your chip-card you will be automatically registered by the security service in the access system.
- If you bring guests into the building you must report to the Service desk beforehand to constitute a so-called "Management Agreement". This agreement states that you are responsible for the people you bring in and that they will follow the rules.
- If you have permission to work in the building's laboratory, you must NEVER work ALONE!!!

#### 5.2 Emergency team

There is a special emergency team in Carré that comes into action when accidents, fire, etc. occur. If you call **2222** (053-4892222) this team will always come, pending the arrival of the regional emergency team, in order:

- To secure casualties and provide first aid To limit the number of casualties and the damage To fight new fires To evacuate the building or parts of it
- To guide and support the regional emergency teams in rescue and firefighting activities
- \* To take measures to prevent the spread of damage and suchlike
- \* To take care of the casualties.

Never hesitate to telephone the alarm number **2222**. The emergency help team would rather come for nothing than arrive too late!!!

# 6 Safety

#### 6.1 General

Everyone present in the Science & Technology Faculty buildings must work carefully and safely and behave according to the applicable rules. This is important for your own safety and the safety of others. Naturally we will do our best to prevent injury and damage to people and the environment. Before you start work you must be aware of the following:

- The Occupational Health, Safety & Environment Regulations from the Science & Technology Faculty
- \* This information
- \* Any additional rules for the field in which you work
- \* Your surroundings, e.g. the nearest (emergency) exit, fire extinguishing equipment, first aid kit, telephone, etc.

Safety signals seen frequently in the Science & Technology Faculty are listed below; they can also be found on the sign in the canteen:









Safety glasses Compulsory (blue sign)

Emergency exit/escape route (green sign)

Smoking forbidden (white sign with red edge)

First Aid (green sign)

## 6.2 Laboratories

All sorts of emergency provisions are available in the laboratories, such as:

- \* Emergency showers and eye showers
- \* Fire extinguishing equipment
- \* First aid equipment
- \* Telephone.

Make sure you know where to find everything and how it should be used (see chapter 9.1). Hose reels and manual fire alarms can be found in the corridors.

The fume hoods and safety cupboards (for storing hazardous substances) are regularly checked. Gas taps are also present in the laboratories; the colour of the tap shows which gas it provides.

You must never use gas cylinders yourself; if you need them, contact your mentor/teaching assistant.

#### 6.3 Carrying out experiments

Before you start an experiment you must draw up an adequate work plan for the experiment to be carried out, which includes a Risk-Inventory & Evaluation (RI&E). In it you review the risks and whether less risky alternatives are possible. **Take sufficient time when drawing up an RI&E!!!** and take into account the following points:

- Follow the Occupational Health, Safety & Environment Regulations from the Science & Technology Faculty.
- Collect information about the properties of the hazardous substances to be used. Also consider the dangers of the by-products and/or end products.
- \* Do not use more than is necessary!!!
- \* Find out how an apparatus works before using it and read the manual.
- Assess the type and quantity of chemical waste produced (see chapter 6).
- \* Determine how you will remove the chemical waste.
- Determine which forms you will need (ask the instructor/teaching assistant).
- \* Discuss the experiment with your instructor/teaching assistant and follow his/her instructions.
- Always wear safety glasses and preferably a lab coat. Make sure you use the correct type of gloves!
- \* Do not waste water and energy.
- \* **Never** work **alone** in a laboratory!!!

## 7 Hazardous substances

During your studies you will be working with hazardous substances in practicums. It is important to know the types of substance you are using. Suppliers are obliged to indicate the risks of the substance on the label. At present two systems are in use: The GHS and the WMS system.

GHS stands for Globally Harmonized System of Classification and Labelling of Chemicals. EU-GHS is the European version. The GHS consists of a set of criteria for categorizing dangerous substances and mixtures. Eventually the GHS system will replace the WMS (Wet Milieugevaarlijke Stoffen). At the moment a transition is taking place from one system to the other. As a consequence when looking for safety information on chemicals both systems can be encountered. For the Science and Technology Lab courses the most important differences between WMS and GHS are:

- So-called H and P (Hazard and Precautionary) phrases in the GHS system and the R and S (Risk and Safety) phrases in the WMS systems. An explanation of the phrases can be found on posters in the laboratories, but also are easily found on the Internet.
- The GHS danger symbols have the shape of a white diamond with a red border. The pictograms are very similar to the old WMS danger symbols, with exception of the symbols for *containers under pressure* (gas bottle) and *long term health risks* (radiation torso) – referring to cancerous, mutagenic, reprotoxic or sensitizing effects. Also the cross (for harmful substances) has been replaced by an exclamation mark.
  - Always read the label and be alert!!!
  - Always use the smallest quantity possible!!!
  - Always put the packaging back in the store!!!

#### 7.1 GHS and WMS symbols used

(the grey background of the symbols in print is always orange in reality) GHS WMS Storage



#### 7.2 The NFPA-symbol

Another system of categorizing dangerous substances is according to the NFPA (National Fire Protection Association). The NFPA diamond on the label is divided in four boxes, as shown below:



The top three boxes indicate the risks on a scale of 0 (no risk) to 4 (very serious risk) in the following areas:

Top: **F**ire hazard

Left: Health hazard

Right: Reactivity (instability)

The bottom box indicates specific hazards:

Don't extinguish with water

OXY the substance is oxidizing

# H R

#### 7.3 Where can I find information about hazardous substances?

Various information including links to MSDS's you can find in the UT library and on the central UT/HR site. See: (<u>https://www.utwente.nl/en/service-</u> portal/health-safety/hazardous-substances/hazardous-substances

#### 7.4 Experiment forms

The Science & Technology Faculty uses forms that give the required information about specific experiments being done. These forms contain information about the dangers and other aspects of the set-up. The blank forms can be obtained from the instructor/lab technician.

The forms must be filled in correctly and signed

# 8 Waste disposal in the Science & Technology Faculty

The University of Twente seeks to do its bit with regard to sustainability, energy and corporate social responsibility. Last summer the first buildings started sorting waste more thoroughly in the so called waste islands. Now we continue sorting waste in the rest of the buildings.

#### 8.1 Waste islands

Waste must be separated and disposed of in waste collectors which are placed in central locations, e.g. near coffee-vending machines. The waste islands will allow waste to be separated into four streams:

- Paper
- GFT (Vegetables, Fruit and Garden waste)
- PMD (Plastics, Metals, Drinks bottles and cartons)
- Residual waste

#### 8.2 Chemical waste

It is important to dispose of chemical waste properly. Everyone who uses hazardous substances, you, the student, as well, can contribute considerable in this. You are responsible for providing correct information about the composition of the waste Together with your instructor/teaching assistant and laboratory technician you will ensure that the packaging and labelling is clear and legible.

Always ensure that the packaging is correct and the labels are fully completed, so that no unwanted reactions occur during transport and storage.

When in doubt ask your instructor/teaching assistant or the laboratory technician.

#### 8.3 Cleaning glass work

Make sure that contaminated water does not enter the sewer. Rinse your glassware 3 times with a small amount of water (or another suitable solvent). Rinsing three times with a small amount of water is much more effective and more environmentally-friendly than rinsing once with a larger quantity. These three fractions must be collected and removed.

Before you start experiments:

#### Make an inventory of the chemical waste:

- \* See if alternative experiments with less hazardous substances are possible (not often because test is specific).
- \* How much waste will you produce?
- \* What is the composition of the chemical waste?
- \* What are the risks with the substances?
- Which waste category does the waste belong in? (six categories, see below)

Put the results on paper and discuss them with your instructor/teaching assistant

#### Which waste bins do you need?

Empty waste bins may be obtained from the laboratory assistant.

Every waste bin must have a label (see below).

Make sure the bins remain closed as much as possible. Always put waste bins on a drip tray in the fume hood.

#### Make sure the correct labels are used

Ask your mentor/ practical assitant or the laboratory assistant for the correct labels.

Only labels signed by the mentor/ practical assistant are valid. The name of the user, lab and telephone number must also be stated.

#### Correct removal of full waste bins

Take full waste bins to the central storage depot (ask the instructor/teaching assistant where it is.) Put the date on the label.

Start an inventory

Use the correct waste bins

Labels on the waste bins

Removal of full waste bins

# Six categories of chemical waste

Category I: Acidic and neutral inorganic substances in solution

Acid anorganic substance solution I	es in
Subgroup: Composition and concent	tration:
Name: Department: Tel.:	Date:
For information: 053-489( University of Twente Chemical Waste Service PO Box 217, 7500 AE Ens	4081) chede

- Diluted solutions of inorganic acids < 10%</li>
- \* Cations of heavy metals in solution
- \* Copper etching bath
- \* Iron chloride solution
- \* Developer and fixer for b/w photography with  $pH \le 7$
- \* Bleach fixer for colour photography with  $pH \le 7$
- \* Other inorganic substances in solution with  $pH \le 7$ .

Alkaline Inorganic substances in solution
Subgroup: Composition and concentration:
Name: Department: Tel.: Date:
For information: 053-489(4081) University of Twente Chemical Waste Service PO Box 217, 7500 AE Enschede

#### Category II: Alkaline inorganic substances in solution

- \* Cyanide-containing solutions
- \* Ammonia solutions
- \* Caustic soda
- \* Alkaline copper bath
- \* Developer and fixer with pH > 7
- \* Other inorganic substances in solution with pH > 7.



Halogen-Free Organic substances III
Subgroup: Composition and concentration:
Name: Department: Tel.: Date:
For information: 053-489(4081) University of Twente Chemical Waste Service PO Box 217, 7500 AE Enschede

The grey bar is red on the label!!!

- \* Rinsing acetone
- \* Organic acids such as acetic acid and formic acid
- \* (Mixtures of) liquid organic substances
- \* (Mixtures of) organic solvents
- \* Organically contaminated water with more than 50% water
- \* Oil emulsions, drilling, cutting and roller oils and cooling liquid
- \* (Used) oil
- \* Contaminated active carbon and silica powder
- Paint waste, sealants, adhesives, resins and unhardened polymer waste
- \* Tins with left-over printing ink
- \* Contaminated polishing cloths
- \* Oil filters and solid oil-containing waste.

Category IV: Halogen-rich organic substances (more than 0.1%)

Halogen-Rich Organic substances IV			
Subgroup: Composition and concentration:			
Name: Department: Tel.: Date:			
For information: 053-489(4081) University of Twente Chemical Waste Service PO Box 217, 7500 AE Enschede			

The grey bar is red on the label!!!

- \* Rinsing acetone contaminated by halogens
- \* (Mixtures of) organic, halogen-retaining solvents, such as chloroform, dichloormethane, trichloroethylene and perchloroethylene
- \* (Mixtures of) halogen-rich organic substances
- \* Organically contaminated water with more than 50% water
- \* Oil from vacuum pumps.

Special Waste substances V	
Subgroup: Composition and concentrat	tion:
Name: Department: Tel.:	Date:
For information: 053-489(408 University of Twente Chemical Waste Service PO Box 217, 7500 AE Ensch	31) ede

Category V: Special waste substances

- Hazardous substances in original packaging with specification list/ packing list
- \* Batteries
- \* Strip lights, sodium and low-energy light bulbs
- \* Spray cans
- \* Film material
- \* Hospital waste
- \* Empty, chemically contaminated packaging
- \* Precipitations of heavy metals
- \* Silt waste, slurry and liquid
- \* Metallic mercury > 98%
- \* Fly ash
- \* Mercury thermometers and mercury waste, e.g. amalgam.

Waste with Exeptional Risks VI
Subgroup: Composition and concentration:
Name: Department: Tel.: Date:
For information: 053-489(4081) University of Twente Chemical Waste Service PO Box 217, 7500 AE Enschede

- Explosive substances (picric acid, TNT)
- \* Compressed gasses (lecture bottles)
- \* Highly inflammable substances
- Substances liable to spontaneous combustion (white phosphorus, organometallic compounds)
- \* Organic peroxides
- \* Carcinogenic and very toxic substances (asbestos, benzene, carbon tetrachloride, As, Sb and Be compounds, pesticides and herbicides)
- \* Extremely corrosive substances and concentrated acids ( $\geq$  10%)
- Substances which in contact with water develop inflammable gasses (potassium, calcium carbide, sodium)
- \* Extremely reactive substances requiring special treatment.

# 9 (Near) accidents

See page 2 for emergencies/ calamities.

#### 9.1 Extinguishing a fire

Fire is an unwanted combustion with flames which, without intervention, could increase or cause damage or danger. The factors needed for combustion are:

- inflammable substance
- combustion temperature
- certain quantity of oxygen

Furthermore the mixture and any catalysts also play a role.



Fire triangle

A fire can be extinguished by removing one side of the fire triangle.

The following extinguishing agents could be used for this:

- \* water from a hose reel
- \* CO<sub>2</sub> extinguisher
- \* foam spray extinguisher
- \* sand
- \* fire blankets



#### Extinguishing a fire by removing sides of the fire triangle

#### General points of attention during extinguishing

- \* never open doors that are warm !!!
- \* test the extinguisher before you approach the seat of the fire
- \* approach the fire with your back to the wind
- stay at a safe distance (3 metres)
- \* hold the nozzle of the extinguisher tight
- do not leave the scene immediately when the fire is extinguished but walk around and make sure it really is out
- \* watch the location of the fire at all times, even if you walk away, because of the chance of it relighting (watch out: danger of tripping).



Extinguishing principle: cooling (lowering temperature) <u>Advantage</u>: continuous supply <u>Disadvantage</u>: water damage possible not suitable for metal and electrical fires

trigger

(class D and E).



reel

valve

supply pipe

rotating hose guide

hose

lockable

spout

#### control valve hose with Foam spray extinguisher (94% water and 6% nozzle surfactant) Use: everything except metal (A, B, C, E < 230 V) Extinguishing principle: filling level blanketing, removing oxygen (side effect cooling) Advantage: riser usually suitable Disadvantage: a little more expensive rump

#### <u>Sand</u>

Use:especially suitable for liquid fires (Class B)Extinguishing principle:blanketing, removing oxygenAdvantage:cheapDisadvantage:not always available.

#### Fire blanket

<u>Use:</u> small fires and people <u>Extinguishing principle</u>:blanketing, removal of oxygen <u>Advantage</u>: cheap and re-use possible <u>Disadvantage</u>: no cooling effect; the fire blanket must be cooled to limit the occurrence of burns when extinguishing fires on people.

#### How do you use an extinguishing agent ?

- with a hose reel, first open the valve completely and remove the safety pin from the extinguishers; pressurise a powder extinguisher before hitting the impact knob
- hold the nozzle by the handle /trigger control valve
- test that it works by giving it a squeeze
- approach to about 3 metres from the fire
- aim at the seat of the fire (hottest part); use a spray for this when using water
- extinguish the fire; use a restrained water jet

Extinguishing people:

- get the victim to lie on the ground
- place the blanket over the person and start at the head and finish at the feet
- do not press down on the blanket unnecessarily and keep it cool with water.

	Water	CO <sub>2</sub>	foam	sand	fire blanket
A: solids - flames - glow	++		+ +		
<b>B</b> : liquids		+	++	++	
C: gasses			+		
<b>D</b> : metals					
E: electricity		++	+ (≤230V)		
Small fires/ peo- ple					++

#### Summary of the use of extinguishing agents

#### 9.2 You must report (near) accidents and hazardous situations!!!

You must report a (near) accident, incident or dangerous situation to your instructor/ teaching assistant, or to the Faculty Occupational Health, Safety & Environment co-ordinator at the Science & Technology Faculty (e-mail: a.h.dierink@utwente.nl or tel. 5958). If we are made aware of accidents and dangerous situations, we can try to find out the **cause** so that it may be avoided as much as possible in future. Pointing the finger of blame is definitely **not** the intention. Dangerous situations could cause accidents; that is why it is important to report them.

### 10 How do I prevent RSI?

In recent times RSI (Repetitive Strain Injury) has become a familiar term. RSI is caused by repetitive movements, such as working with a computer. Symptoms in various parts of the body, such as shoulders, neck, arms, wrists, etc. are part of RSI. Headaches and tired eyes are not part of RSI. As you will be using computers during your studies, make sure that, while working behind a computer:

- \* your work station is well-arranged
- \* you regularly switch between computer work and other work
- \* you do not work on the computer for longer than 6 hours per day and
- \* that you take a 5 minute break every hour.

Arranging a PC work station is shown in the drawings below. Further info can be found on <u>https://www.utwente.nl/en/service-portal/health-safety/workplace-cli-mate/rsicans-information-for-students</u>



Optimal arrangement of a PC work station

Software to help prevent RSI : <u>http://www.workrave.org/</u> **More info about Occupational Health, Safety and Environment and the Science & Technology Faculty can be found on**: <u>https://www.utwente.nl/nl/tnw/intranet/diensten/amh/occupational-health-safety-en/</u>