NMR laboratory safety
Institute of Chemistry, Hebrew University

Tutorial presentation according to the safety at work ordinance 2001

Disclaimer: This presentation is intended for use by users of the Institute of Chemistry Department NMR laboratory of the Hebrew University for safety instruction in that laboratory only. No responsibility can be accepted if used for other purposes.

By Roy Hoffman, Hebrew University 2015/04/19
General

- Do not eat or drink in the laboratory

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• Do not eat or drink in the laboratory
• Do not smoke in the building (not recommended at all)
• Do not work alone
• Place sharp and contaminated waste in the appropriate bin under the sink

Sharps bin. Place the waste in the bin – not as photographed

Regular bin

By Roy Hoffman, Hebrew University 2015/04/19
General

• Do not eat or drink in the laboratory
• Do not smoke in the building (not recommended at all)
• Do not work alone
• Place sharp and contaminated waste in the appropriate bin under the sink
• Wear safety glasses
• Report all chemical spills or dangerous occurrences to the staff (Roy and Yair)

By Roy Hoffman, Hebrew University 2015/04/19
Magnets

- There are very strong magnets in the laboratory that present special dangers

400 MHz

500 MHz

By Roy Hoffman, Hebrew University 2015/04/19
“Close to the Magnet” – especially dangerous

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Do not enter

- If you have a pacemaker
- Certain types (ferromagnetic) implants or shrapnel
- Neurostimulators
- If in doubt – stay out
  – Until you consult with the staff (Roy & Yair)

By Roy Hoffman, Hebrew University 2015/04/19
Do not bring metallic objects close to the magnets or preferably not into the laboratory

- They are liable to fly towards the magnet and injure anyone in the way
- Someone has already been killed by a gas bottle flying into a magnet

Gas bottle in an MRI

By Roy Hoffman, Hebrew University 2015/04/19
Do not bring metallic objects close to the magnets

Mobile phone
Work tools
Magnetic card
Gas cylinder

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Do not bring magnetic media, mobile phones, analog watches or guns near the magnet.

By Roy Hoffman, Hebrew University 2015/04/19
If the magnet quenches

- Quenches are rare but you need to know what to do
- You may hear a hiss from the magnet
- You may see a heavy cloud covering the ceiling and the low oxygen alarm may go off
- The symptoms of lack of oxygen include dizziness, drowsiness, nausea, vomiting, excessive salivation, reduced alertness, unconsciousness and death
- **Leave the room** (by the regular exit or by the window)
- Report it to the laboratory staff
- Do not return to the laboratory until you get permission from the staff
- **Danger of suffocation**

Escaping through the window

By Roy Hoffman, Hebrew University 2015/04/19
This is how a quench looks

By Roy Hoffman, Hebrew University 2015/04/19

Photo: Kyryl Kobzar
In case of emergency

• Follow instructions from security and emergency response team (they may or may not be in uniform).

Security  Emergency response team  First aider from the emergency response team

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First aid

• In case of unconsciousness, chest pain, serious injury or illness – call an ambulance immediately
  – Call 85000 (security)
  – (In parallel 101 from a mobile phone to give further details)
• First aid kit in the room – report use to the staff
• Call university medic
  – Roy 0523849276
  – Security 85000 (they will send the emergency team)
Eyewash and emergency shower

• In case of chemical contamination

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Chemical spills

- In the case of a chemical spill act according to the instructions at http://safety.huji.ac.il/content.php?id=207

By Roy Hoffman, Hebrew University 2015/04/19
Emergency electricity shutdown

In case of electrocution or fire

- Press the laboratory power shutdown button.
- Use the regular light switch to turn off the lights.
- Shutting off the electricity does not switch off the magnets.
- The power shutdown for the whole floor does not shut down the spectrometers.
In the case of fire or alarm

• IF IN DOUBT GET OUT!
• Fire! – sound the alarm
• Leave the building
  (low oxygen alarm – just from the lab)
  – by the regular exit
  – by the windows that open inwards
  – do not open the windows except in emergency
In case of fire - extinguisher

IF IN DOUBT GET OUT!
If the fire is small, use
• The extinguisher in the lab
• Do not bring another extinguisher into the lab

By Roy Hoffman, Hebrew University 2015/04/19
In case of fire – fire hose reel

IF IN DOUBT GET OUT!

• Before using the fire hose reel
  – Shut down all the electricity (emergency buttons in laboratory then corridor, see above)
  – Get help (it needs 2 people)
• Do not use on burning liquids* or alkali metals
• At all times stay alert and keep an escape route open
• Open the main tap
• Unreel the hose

*Experienced firefighters have techniques for extinguishing flammable liquids with a fire hose but if you have not learnt and practiced these methods you will make matters worse.

By Roy Hoffman, Hebrew University 2015/04/19
In case of fire – fire hose (contd.)

IF IN DOUBT GET OUT!

• Your assistant should hold the hose and support you from behind
• Use spray mode and keep out of smoke
• After the emergency is over, close the main tap and discharge the hose

By Roy Hoffman, Hebrew University 2015/04/19
Safety equipment

• Wear safety glasses
• Use appropriate gloves when you are exposed to chemicals
• Remove all your chemicals when you finish work, return laboratory chemicals to the cupboard and lock it
• Remove gloves and wash your hands with soap when you finish work

Chemical cupboard in the lab that contains small quantities of poisonous, oxidizing, blistering, inflammable and explosive chemicals. MSDS sheets are stored here.

By Roy Hoffman, Hebrew University 2015/04/19
Cryogens

• In addition to safety glasses, wear a face mask and cryogenic gloves
• If the nitrogen valve sticks open, close it with the monkey wrench

By Roy Hoffman, Hebrew University 2015/04/19
Cryogens

- In addition to safety glasses, wear a face mask and cryogenic gloves – danger of frostbite or injury from an exploding Dewar
Cryogens

- In addition to safety glasses, wear a face mask and cryogenic gloves – danger of frostbite or injury from an exploding Dewar
- If you need to vent pressure, wear ear protection
- This equipment is in the cupboard. Return it after use.
- If there is a large cryogen spill the low oxygen alarm may sound
- The symptoms of lack of oxygen include dizziness, drowsiness, nausea, vomiting, excessive salivation, reduced alertness, unconsciousness and death
- Even if there is no alarm and you suspect lack of oxygen
- Leave the room – danger of suffocation

By Roy Hoffman, Hebrew University 2015/04/19
Security & National Emergency

For more details see [www.oref.org.il/International/14-en/PAKAR.aspx](http://www.oref.org.il/International/14-en/PAKAR.aspx)

- **Earthquake**
  - Run out of the building to an open area
  - If you are trapped bang on the pipework or wall with a stone, shout, phone or SMS to colleagues
    - Don’t give up hope if no one answers
    - Keep calm and wait patiently
    - When you hear someone and especially if you hear rescue workers then everything suddenly falls silent bang on the pipework or wall with a stone and shout for help

- **Local terrorist attack**
  - Stay put then follow instructions from security staff

By Roy Hoffman, Hebrew University 2015/04/19
Security & National Emergency

For more details see www.oref.org.il/894-en/Pakar.aspx

- National emergency (war)
  - Leave a radio on the silent channel or another Israeli channel
  - When there is a siren close any open bottles of chemicals and go to the shelter under the NMR lab
  - You should reach the shelter within 1½ minutes

Civil defense exercise 2009/06/02

By Roy Hoffman, Hebrew University 2015/04/19
Safety obligations of laboratory users

• Abide by all the above safety regulations
• Watch this presentation every half year and sign that you have seen it
• Do a fire extinguishing exercise every half year and sign that you did it
• You are responsible for damage caused by any guests that you bring to the laboratory
• The laboratory manager reserves the option to rescind the right to enter the laboratory to those who do not comply with the safety obligations

By Roy Hoffman, Hebrew University 2015/04/19