

# Chemistry lab Guidelines and Regulations

## I. Introduction to the chemistry lab

The chemistry lab at UNIS is used by many different people staying for varying lengths of time, it is therefore necessary to state the regulations and guidelines of the lab. In this document you will find the routines and regulations concerning the Chemistry lab, instrument lab, handling of chemicals, and safety instructions.

The purpose of this document is to ensure that all persons follow the same rules and procedures in the UNIS laboratories. You are obliged to work as per the guidelines given below.

Please read the text carefully and make sure that you understand everything, before you begin your work. Take your time to get everything right and never hesitate to ask if you have any questions or suggestions regarding our routines and safety. We all want good laboratory results!

Any questions may be directed to the Lab leader, AT Staff engineer, or resident PhD candidate in Environmental Technology.

## II. General Information

### Access

You are to sign the Lab Safety Instruction form to give you access to the UNIS labs. The chemistry lab is located in room C208, and the instrument lab is room C206. This document is for you to keep and refer to throughout your lab work.

### Manuals

Manuals should always be in a binder in the same room as the equipment is located. Do not remove it. If you need certain information from the manual please make a copy. If you are unable to find the manuals please ask. There can often be found a copy in the Lab leaders' office.

### Material Safety Data Sheets

These are found in the chemistry lab, for all chemicals that are found in this lab. There is also a binder of MSDS for all standards found in the Instrument lab. It is very important that you read these before you begin working with any chemical. Make sure to read what protective equipment you should be using when handling the substance, and how to clean up any spills. You should know how to clean up a spill before it happens. Refer to the MSDS to make sure you are using the appropriate gloves for your substance.

### Refrigerators and Freezers

There is a small common fridge and freezer in the chemistry lab. These are for small items and short storage only. There is a fridge and freezer in the instrument lab that is used only for standards. The walk-in fridge and freezer off the multipurpose room in logistics is used for all other storage.

Remember to label your samples with your name, a UNIS contact if you are not permanently at UNIS, date to be stored until, and what the contents are. It is good practise to every now and then go through your things and throw away that which is not necessary to save for the future. Always go through the fridge and freezer when you are leaving UNIS so to not leave anything behind that you may need, or for others to clean up.

### **Phone numbers**

Chemistry Lab	room C208	7902 6438
Instrument Lab	room C206	7902 6436
Lab leader, Gerd Irene Sigernes	room C141	7902 3364

### **Storage room**

In the laboratory storage room C220, in the teaching lab C203, and in the cabinet in the hallway you will find some common equipment for everyone to use, such as gloves, glassware, tubing, small instruments, etc. Be sure to always return things clean and in working condition.

## **III. Laboratory Routines**

### **Protocol writing**

It is important for UNIS to gain knowledge from the work you do while at UNIS. It is therefore asked that a copy of your Standard Operating Procedure (protocol/method) be written and handed in to the Staff engineer, along with a risk analysis. These will need to be read through with the Lab leader or Staff engineer before you begin your work. Templates for these can be found on the server, ask the AT Staff Engineer or the Lab leader for a copy if it has not already been given to you.

### **General safety**

Eating and drinking is forbidden in all of the labs at UNIS, no food, drinks, water bottles or coffee cups should be brought in the labs. No outdoor clothing, shoes or backpacks can be brought into the chemistry lab; they can contaminate samples. It is important that indoor shoes be worn in the labs; you should not be working in sock feet or slippers in any of the UNIS laboratories. Personal protective equipment – gloves, glasses, and lab coats are all readily available in C208; it is important to use these to protect yourself as well as your work. We have different types of gloves for different uses. Make sure to read your MSDS and know which personal protective equipment you should be using.

It is also important that all ongoing projects (even if very temporary) are labeled; all glassware, samples, equipment that are being used need to be labeled with date, contents, and a name.

### **Chemicals**

All chemicals stored in the chemistry lab cabinet have Material Safety Data Sheets located in a binder on the C208 lab bench. These sheets provide information on handling of chemicals, decontamination and actions in case of accident. Make sure any MSDS for a substance you plan to work with is there and please read these sheets before you start to work. If you have any questions or concerns, ask!

Extra bottles, and all other chemicals at UNIS are found in chemical storage C218, if there is a name on the bottle then this belongs to a specific project –do not use it. Otherwise all chemicals found in chemical storage without a name are for common use.

### **Standards**

Standards are found in the fridge in C206. The MSDS binder for these substances is found on the bench in C208. When using the standards, weigh the bottle before and after and record the weight (as well as the amount taken) on the standard weigh sheet found in the binder on the lab bench. Make a note if emptied and always return the standards to their place in the fridge after using.

### **Lab Equipment**

Do not use any laboratory equipment without having been given instruction or training from an experienced user – always ask for help if you are unsure. This is for your own safety as well as for the maintenance of the instrument. Always leave the equipment in a condition that you would like to find it yourself. If equipment is broken or not well functioning, please notify the person responsible for the lab.

Analytical balance – It is important to keep the balance clean; always check to make sure any spills have been properly cleaned and that the hooks on the weigh plate are sitting in place. Remember to use the ventilation hood if working with a substance that easily creates particles which shouldn't be inhaled. There is a scale room off of the teaching lab that has more analytical balances for use, there are also heavier balances located in the teaching lab.

Muffle furnace – Do not put anything flammable inside the muffle furnace. Make sure no labels, tape, or paper is placed inside or between the door while it is hot. Wait for the furnace to cool down some before opening it – it is very hot! There are heat protection gloves and tongs for removing items kept next to the muffle furnace.

Ultrasonic bath – The ultrasonic bath is located in C206 under the fume hood. Try to not work in the same room when the ultrasonic bath is running. Use hearing protection when you are in the same room as the ultrasonic bath, and notify others working in the area. Always have the door to the lab closed while the ultrasonic bath is running, and place a note on the door. We use distilled water to fill our ultrasonic bath as this keeps it clean.

Turbovaps – We have three Turbovaps available for use. They are used for different matrices. The instrument located in C208 is used only for air; the instruments in C206 and C208 are used for soil and sediment samples, and biota samples. Please regard these regulations. Make sure to use 15 drops of 'clear bath' and distilled water when filling the water bath; this will keep it clear of growth.

Much of the glassware in C208 is used only in C208 and for trace analysis only. It is important that it not be used for other purposes or taken to other labs. Some glassware is limited (ex. Turbovap tubes, columns and condensers), make sure to ask whether someone else is using them before beginning. There is also certain glassware that is used only for air extraction, these are labelled as such.

## General cleaning

While the cleaning staff cleans the floors and empty the trash bins, everything else in the laboratory is our responsibility. The lab is shared by many, and it is important to keep things tidy and clean. Always make sure that you have cleaned up after yourself and put common equipment back where they belong.

Everyone is responsible for the cleaning of dishes. They are rinsed, then labels are removed and they are placed in the dish washer. When it is full, turn it on. The washing machine uses detergent for the wash cycle and a quick drying agent in the disinfection rinse. It then rinses with distilled water. Otherwise, dishes can be washed by hand and rinsed with distilled water. Dishes are then hung on the drying racks to dry.

Glassware is burned at 450°C for 6 hours in the muffle furnace - Cover the glassware openings with foil.

Plastic is not burned; after washing place plastic in MeOH and give it 15min in the ultrasonic bath.

Metal is not burned; after washing place metal in acetone, 15min in the ultrasonic bath, then place metal in hexane for 15min in the ultrasonic bath - make sure to wash both sides of the spoon, etc.

Columns and condensers are cleaned by extraction with solvents.

## IV. Waste Routines

Segregation of wastes is important. The two greatest divisions made with waste in our lab are the separation into halogenated and non-halogenated solvent waste; smaller amounts of other kinds of waste (described below) are segregated and placed in smaller containers

The waste containers for liquid waste are found in the Laboratory storage room C220 or in storage in logistics, ask the Staff engineer or the Lab leader if there are none in the storage room. They are white with a red cap and are approved for hazardous waste storage and transport – do not use glass bottles. Solid waste can be placed in any appropriate sized closed, and leak proof container, it will then be transported in a yellow box approved for hazardous waste transport. These waste containers should be clearly labeled with the contents and provided with hazard symbols and safety phrases. Please note that double labeling may be necessary if something may fit into more than one category because of a solution. For example: if poisons are collected in combination with another substance of interest.

Labels are found in chemical storage C218, and when filled out should contain:

- Specific generic names of the components in the container
- Hazardous pictogram(s) ticked off on the label
- Waste generators' department, and person to contact
- No abbreviations, structures, formulae, or trademark names
- No vague categories are acceptable, ex. solvent waste
- If waste is not identified it cannot be removed.



Be sure to list the components as you make additions to the container.

Empty solvent bottles are left open in the fume hood to allow for evaporation. They can then be used as temporary waste bottles (smaller amounts of waste can be poured into these bottles then emptied into the larger plastic waste containers which are found in the storage room. Glass bottles are not to be used for final waste container as they will not be accepted at the waste depot. Once a container is almost full (do not fill to the top), it can be moved into the fume hood in C218 - make sure the label is properly filled out. Ask, if you need help.

The following groupings of waste chemicals are based on chemical reactivity, and Norwegian disposal requirements. All of these groups should be labeled as such.

1. Halogenated

- All halogenated liquids and substances in solution (any organic chemical that contains: F, Cl, Br, or I)

2. Non-Halogenated

- All non- halogenated organic liquids and organic substances in solution with <20% water (any organic chemical that does not contain F, Cl, Br, or I).
- This includes alcohols with <20% water, acetone, ether, hexanes, benzene, toluene, acetonitrile, ethyl acetate, heptane, cyclohexane, fluorescein, isopropyl acetate, isopropyl alcohol, methanol.

3. Inorganic Acids

- All inorganic acids (eg. sulphuric, hydrochloric) and Inorganic/acid mixtures (eg. inorganic compounds dissolved in acid). These can be neutralized and then poured down the drain with lots of water.

4. Organic acids

- Organic acids (eg. formic acid, acetic acid) should be segregated from inorganic acids. Generally inorganic acids are oxidizing agents while some organic acids may be either reducing agents or combustible. These can be neutralized and then poured down the drain with lots of water

5. Contaminated solids

- Contaminated absorbents such as: silica gel, ammonium acetate, potassium hydroxide, sodium chloride, aluminium oxide, sodium hydroxide, and florasil, which have been used with organic solvents. Are kept separate in individual containers and labeled as 'Contaminated Solid Waste'. Identify organic or hazardous components on the label.
- Gloves, filters, and other solid materials that have been contaminated with hazardous materials can be placed in sealed bags and labeled with the contaminants.

6. Neutral Organic Solids

- All solid organic compounds which are neutral - no acids or bases, but are hazardous in themselves are kept separate. (eg. carbon black, Envi-Carb). They can be dissolved/mixed with a combustible solvent and then labeled as waste with both the solvent and the carbon black.

#### 7. Pesticides

- Any compounds used to destroy or inhibit plant or animal pests such as pesticides, fungicides, insecticides etc.
- Make sure to also label the solvent these compounds are in.

#### 8. PCBs

- Make sure to also label the solvent these compounds are in.

#### 9. PAHs

- Make sure to also label the solvent these compounds are in.
- You need to also include the EWC waste code for this substance found in the MSDS under Disposal Considerations

#### 10. Waste Oil

- All types of oil, including waste oil, oil emulsions and crude oil (all defined as inflammable liquids). Make sure to label as 'used oil' not hazardous waste.

### **Glass and sharp objects**

All kind of sharps, syringes, and scalpels are collected in labeled yellow plastic containers found in the labs. The entire container, when full, is then disposed in hazardous waste boxes. Clean broken glass is collected in the glass waste box, located next to the door in C208, and next to the sink in C206. If the glass cannot be washed before being placed in the receptacle, leave it to evaporate in a fume hood for several days. If glassware contained or was used with hazardous compounds that are not very volatile (ex. PAHs, PCBs) these need to first be cleaned with solvent (use a Cyclohexane:Acetone 1:1 mixture) in the ultrasonic bath for 15min covered. The solvent and hazardous compound waste can then be placed in a waste container and labelled properly. While the glass can then be left on foil in a fume hood to evaporate before being washed and placed in the glass waste container.

It is important that only clean glassware is placed in the broken glassware receptacle. This box is left open in our lab where people are working every day, there cannot be residual vapours coming off of the glassware placed in that box.

### **V. Laboratory Safety**

It is very important to know the safety procedures and how to work appropriately in a laboratory to protect yourself and others from dangerous situations. Please remind each other to be safe and "stop the work" if you are uncertain.

More information on Lab safety, and fire and accident protocols is found in the Safety Instructions for UNIS labs.