**Aerosol Laboratory Safety Regulations and Routines**

1 June 2015

**Purpose of the safety course**

To ensure that all who work independently in the lab have adequate knowledge to work safely with respect to health and environment and to avoid accidents.

**Who is allowed to work independently in the lab?**

You have to complete and pass a safety course in order to work independently in the lab. Working independently means that you take responsibility for using the equipment and material in the lab. You have to notify the lab supervisor, Anders Gumundsson of any activities outside of those dealt with in the safety course.

**Who should attend the safety course?**

Anyone who wants to work independently in the lab.

Students and visitors taking part in laboratory experiments under teacher supervision are not required to take the course. This means that students and visitors are not to be left unsupervised.

**Course topics**

* Working with aerosols
* Working with electricity
* Radioactive sources
* Compressed air
* Pressurized vessels/bottled gas
* Vacuum
* Handling chemicals
* Working alone
* Working in the experiment chamber
* Cleanup
* Computer security
* Fire
* Evacuation/emergencies

**Incidence Reporting**

???

**Risk Analysis**

If a new experiment will be carried out, a risk analysis must be made. It is judged that the risks that go beyond those described in this publication "Safety Regulations and Routines ", a written risk assessment submitted to the director for approval before work can begin. Examples of risk analyzes carried out are: bioaerosol, nanocarbon, the reactor. These are documented in the binder.

**Working with aerosols**

* Keep in mind the risk for contamination of air, surfaces, measurement instruments and experimental setups. (Others should be able to use the material and instruments without risk for dangerous exposure.)
* Use the local exhaust ventilation.
* Do not use old water when generating aerosols. There is a risk for the growth of bacteria that can spread. The water should be fresh and boiled before usage. This is particularly important in human exposures. Remember to clean nebulizers, tubes, valves, etc.

**Working with electricity**

* No work is allowed on 230-volt electrical outlets or stationary equipment such as ordinary 230-volt outlets and wall outlets. No own splices of cables with e.g. sugar cubes. Contact the supervisor of the aerosol lab if there are defects or deficiencies.
* Work safely. During maintenance/repairs, it is best that the instrument is not connected to 230 volt. Pull out the cable. If the instrument has to be connected to 230 volts, be sure to check carefully where in the instrument there is 230-volt tension. Return the protective casing after carrying out the work. Put up a warning sign if the device is left unsupervised when the protective casing is removed. The sign can be found in the chemistry lab.
* There is a main power switch in every fuse box for turning off the electrical current if necessary.
* Make use of an external earth fault breaker if 230 volts are used outside of the lab. This can be found in the electronics room.
* You must contact the supervisor of the aerosol lab if you plan to develop prototypes that require 230 volts.
* NEW. Non-approved 230-volt instruments (e.g. research instruments) must be approved by the supervisor of the aerosol lab before use.

**Radioactive sources**

* Handle the sources carefully. Make sure that you have knowledge and information about the radiation risk. Ni – only β-radiation, Kr85 (inert gas) – β- and γ-radiation.
* Preparations removed from the storage cabinet must be noted.
* The preparation can only be opened by the people designated and qualified to do so: Erik S., Göran F. and Bengt M.
* If you see that the preparation is damaged, contact the supervisor of the aerosol lab.
* Do not look into the openings.
* If you are uncertain, ask someone.
* NEW. Radioactive sources must not leave the lab without notification to Göran Frank.

**Compressed air**

* Compressed air poses a risk. Pressurized tubes must be sealed with a clamp; the bigger the tube, the more important it is.
* Always reduce the pressure to as low a level as possible with the pressure regulator.

**Pressurized vessels/bottled gas**

* Bottled gas is to be stored in designated locations in the lab. See the orientation map.
* Contact the supervisor of the aerosol lab if you need a new bottle of gas.
* All bottles of gas are to be numbered and registered in the binder that is located by the entrance.
* Bottled gas should always be safeguarded from falling.
* Use the designated pressure regulator for the pressurized containers and keep the pressure as low as possible. It can be dangerous to use the wrong one.
* Pressurized containers have to be inspected. Those that have not passed inspection have to be labeled.
* The pressurizing of large containers is dangerous, as is even low pressure on large surfaces. Use pressure regulators to keep the pressure at a minimum.
* Be sure that the safety value works or that the pressure can be reduced if the outlet flow is blocked.

**Vacuum**

* There is a vacuum pump in the ventilation room. It is adjusted from the wind tunnel room. You start it by pushing the yellow button. The pump turns off automatically at 19.00
 (7 p.m.) unless you have set the operating button in the manual mode.

**Handling chemicals**

* All purchases and importing of chemicals in the aerosol lab have to be approved by the supervisor. Be sure that you include the security instructions and place them in the binder next to the chemical storage cabinet.
* Flammable materials/liquids including alcohol and cleaning agent containers are always stored in cabinets intended for this purpose and are labeled “Flammable Substances”. These labels can be found in the chemical lab.
* Leftover liquids, such as butanol and solvents, are poured into the indicated bottle in the fume cupboard.
* Chemicals that are no longer to be used are to be turned in for destruction. Contact the supervisor.
* All bottles/cans are to be labeled with name, date and contents. They are to be stored in the designated location in the chemical lab when not being used. This includes solvents (ethanol and others).
* Keep the chemistry lab in order. Wash and wipe up after yourself.
* In case of spillage, use the absorbents in the chemistry lab which are then disposed of in the recycling center (located in the parking lot). Keep in mind the risk for spontaneous combustion with linseed oil, for example.
* A container for broken glass can be found in the chemistry lab.
* Eye protection can be found in the chemistry lab.

**Working alone**

* Outside of normal working hours (8-17 [8a.m.-5p.m.] weekdays) personal alarm should be used. This is also the case when you are working alone. Hazardous work is not to be carried out on your own. This include such activities a climbing ladders and working on the roof of the chamber.

**Working in the experiment chamber**

* The door is opened by a push button from both sides, in and out. If this does not work, an emergency function can be found on the inside of the door as well as outside.
* Handel the door molding with care. Make sure that nothing on the floor tears holes in the molding.
* All equipment inside the chamber that uses 230 volts has to be connected to one of the outlets inside the chamber. These are connected to a special earth fault breaker.
* Keep in mind not to take anything into the chamber that can be “dangerous”, such as glass bottles or liquid nitrogen.

# Fire

* A fire extinguisher is mounted by the door to the courtyard.
* In case of fire, make sure that others are also notified and leave the lab. Fire alarms are at the gates to the backyard.
* You are not allowed to remove gas tubes from the aerosol lab.

# Evacuation/emergencies

* There are three exits: the main entrance, one to the courtyard and the stairway up from the corridor. In the event of an alarm, re-grouping is in the front of the IKDC building.

**Clean up**

* Clean up after yourself at the end of the day!
* Do not take out other people’s experimental set ups. Record what you borrow.
* Instruments can be booked on the list in the aerosol lab.
* The chamber can be booked on the door of Anders G office.
* Do no block emergency exits.
* No unnecessary cords and tubing on the floor.

**Computer security**

* See the Department’s computer policy.

**Practical exercises**

* Personal alarm
* The emergency exit on the door of the experiment chamber.
* What should I do when there is an accident?

**Orientation in the lab**

* General presentation of the content of the different rooms.
* Use of local exhaust ventilation, compressed air, vacuum and bottled gas.
* Emergency exits
* First aid equipment, emergency eye rinse and body shower.
* Fire extinguisher
* Alarming the door to the courtyard.
* Waste and recycling, recycling center.
* Where things are located in the chemistry lab.

**I have participated in the course and pledge to comply with the Aerosol Laboratory Safety Regulations and Routines.**

Lund (date) …………………..

……………………………………………………

Signature

……………………………………………………

Printed name

**Approved by the supervisor of the Aerosol Laboratory**

Lund (date) ……………………….

……………………………………………………

Signature

……………………………………………………

Printed name