Operation Procedure SINQ Sample Preparation WetLab Room EG 002 / Building WNLA

Location
WNLA / EG 002 (SINQ)

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Remark

Access to the laboratory room only after instruction by the eligible local contact (instrument responsible or by the room responsible person).

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1. PSI directives and guidelines

1. Safety, Health Protection and Environmental Protection at PSI ("SGU directive"): AW-01-07-02 (available only on the PSI Intranet).
2. Work safety and Health Protection at PSI: AW-96-19-176 (available only on the PSI Intranet).
3. Safety analysis procedure for experiment: AW-96-09-03 (available only on the PSI Intranet).
4. Chemistry Safety (Handling chemicals / Activities involving chemicals at PSI): PB-9670-291 (available only on the PSI Intranet).
5. Nanomaterial Safety: AW-96-09-04 (available only on the PSI Intranet).
6. Gas and Cryo Safety: FO-9670-212, PB-9670-324, and AW-96-16-05 (available only on the PSI Intranet).
7. Biosafety: AW-96-14-02 (available only on the PSI Intranet).
8. Radiation protection at PSI: AW-96-18-01 (available only on the PSI Intranet).
9. Protection against non-ionising radiation (NIR) at PSI: AW-96-99-10 (available only on the PSI Intranet).
10. Risk assessment for experiments involving hazards: FO-9670-341 (available only on the PSI Intranet).
11. Personal Protective Equipment: PB-9670-37 (available only on the PSI Intranet).
12. Electrical Safety: AW-93-05-02 (available only on the PSI Intranet).
13. Fire & Emergency: AW-96-21-578 (available only on the PSI Intranet).
14. PSI "Hausordnung": AW-11-21-615 (available only on the PSI Intranet).

See safety relevant information on the PSI webpages: https://www.psi.ch/useroffice/safety-at-psi, https://www.psi.ch/en/sinq/safety-at-sinq, and if possible https://intranet.psi.ch/Safety/WebHome (available only on the PSI Intranet).

See Import Guidelines and Shipping Instructions on the PSI webpage: https://www.psi.ch/useroffice/importshipping.

See dangerous goods' (samples, chemicals, etc.) transport procedures on the PSI webpage: https://www.psi.ch/asi/gefahrguttransporte.

2. Scope of application

15. The WetLab WNLA / EG 002 is a part of the LMX User Platform and is allocated for users of beamlines at PSI large scale facilities.
16. The room and basic equipment there serve to prepare samples to be investigated at PSI beamlines.

3. Responsibilities and competences

17. The laboratory responsible person is in charge of:

- Safety infrastructure (e.g. eyewash and shower, PPE, fume hood, chemicals' absorbers, biosafety setup, etc.).
- Correct labelling with safety signs and the access control.
- Organization of maintenance, service, and repairs of existing equipment and ordering of (if necessary) new tools and devices.
- Supervision of proper functioning of the glove-box and its purification system.
- Supervision of proper labelling, handling and storage of chemicals ordered by PSI staff and/or delivered by users (after proper registration in the PSI DUO System and/or PSI Chemical Database).
- Coordination of chemical waste disposal. Chemical waste disposal can be done once per month (1st Wednesday of the month).
- Work coordination of the co-responsible and the assistant persons.

18. The laboratory co-responsible person is in charge of:
    - Control of proper indication and labelling of user workplaces, removing unlabelled samples and chemicals to a temporary storage.
    - "Millipore" device maintenance.
    - Basic, general consumables (e.g. gloves, Al-foil, paper, pipets, sample containers etc.).
    - Basic chemicals (e.g. ethanol, acetone etc.).
    - Chemical glass dish washer – cleaning glass, sorting clean glass into the drawers.
19. The laboratory assistant is in charge of:
    - Ordering and changing of He-bottles at the glove-box and 10%H_2/He gas mixture for the glove-box regeneration system.
    - Regular service for all pumps in the laboratory.
20. The instrument responsible (local contacts) are in charge of:
    - Instructing users to follow the "**Operation Procedure SINQ Sample Preparation WetLab EG 002 WNLA**".
    - Instructing users how to use the glove-box (short instruction manual is placed on the glove-box).
    - Instructing users how to use sharps (e.g. needles, broken scalpels, broken glass etc.) disposal container.
    - Instructing users how to use the fume hood, centrifuge, and press.
    - Informing the laboratory responsible person if some consumables have to be ordered or some devices have to be repaired.
21. Maintenance of laboratory infrastructure (ventilation, electricity, water etc.) is provided by the service groups from the LOG department of PSI.
22. It is expected that users bring all specific equipment, tools, materials and consumables. If users have a special request, they have to contact the instrument responsible (local contact) in advance.

23. The external users' advisors (supervisors, line managers, PI) are responsible for safe working procedures and instruction of all team members involved in the experiment.
24. PSI Safety supporting persons are:
    a. Safety Officer: Winfried Rendler 2677
    b. Radiation protection expert: Lisa Pedrazzi 4603
    c. Chemical safety: Patrick Kissel 5633
    d. Biosafety: Philipp Berger 4728
    e. Fire protection and gases: Martin Bednarzik 2520
    f. PSI work safety delegate in case of pregnancy and breastfeeding: Winfried Rendler 2677

4. Hazards

Major hazards in room WNLA / EG 002 are:

25. *Stubbing* by bad order, obstructed traffic routes, cables, etc.
26. *Fall* by improper use of steps, ladders, etc.
27. *Cuts and squeezing*: during mechanical sample preparation (scalpels, knifes, scissors, screw drivers, press, etc.).
28. *Cold burns* by liquid nitrogen.
29. *Burns* by hot plates, drying cabinet, soldering iron.
30. *Fire- and explosion risk*: inflammable organic solvents, fire load in presence of ignition sources.
31. *Etching burns* by acids, bases (alkaline fluids) and etching gases.
32. *Acute toxic and dangerous substances (e.g. elements and their compounds unclassified by MSDS)* – of hazard category / group 1 – (e.g. hydrofluoric acid (HF), Beryllium (Be), Arsenic (As), Osmium (Os), Mercury (Hg), Thallium (Tl) etc.) **require contact experts** in advance. Risk assessment "*handling hazardous substances in the lab*" (FO-9670-341 - available only on the PSI Intranet) has to be performed.
33. *Irritation* of respiratory tract by evaporation of solvents and aerosols.
34. *Environment protection*: release of contaminated liquids and gases into aquatic ecosystem and air.
35. *Suffocation* by replacement of oxygen in a room by dry ice, liquid / gaseous nitrogen, argon, helium.
36. *Biohazard: preparation of biological samples.* Only research work with biological material on biosafety level 1 (BL-1) is allowed. This includes simple labwork like diluting suspensions or solutions, extractions from plant materials as well as cutting off fractions of a bio crystal etc. Biological waste has to be collected separately in suitable yellows bags. Other activities with biomaterials **require contact experts** in advance.
37. *Ionizing Radiation*: by instruments and materials; **requires contact experts** in advance.
38. *High pressure* (mechanical press).

5. Actions / Laboratory rules

General procedures

39. The WetLab WNLA / EG 002 is located in a Controlled Area.
    - Users must wear personal dosimeter properly.
    - Smoking, eating, drinking, chewing and use of lipstick is strictly forbidden.
    - Food storage in the laboratory freezer and fridge is forbidden.
    - Use of tap water for food and beverage preparation is strictly forbidden.
    - Dishwashing and drying of kitchenware / tableware in the laboratory is prohibited.
    - Before removing tools, samples or other items from the controlled area, the user must call a staff member from the Operational Radiation Protection Section for the mandatory radiation control measurement. That action can be performed only during working hours of the Radiation Protection officers.
    - Users must make use of the monitors to check for potential contamination before leaving a controlled area.
40. Any unauthorized persons are not allowed to be in the lab.
41. Any loose hair must be tied back. Dangling jewellery, ties etc. must be removed.

42. Users have to know the following information/rules before starting the corresponding work:
    a. Hazards, transport, storage, handling, usage, control, return and disposal of materials which users use (solids, liquids, aerosols, cryogens, gases, etc.).
    b. Location of fire extinguishing equipment, emergency shower, eyewash, first aid kit, chemical absorbers, and biosafety setup.
    c. Location and use of industrial steps. Use of office steps is strictly forbidden.
43. It is mandatory to wear the following personal protective equipment (PPE): lab coat and safety glasses (contact lenses are forbidden), if health is affected suitable gloves and dust (gas) mask. When respiratory devices are necessary, there is

intrinsically a potential leakage of hazardous material into the surrounding atmosphere. In such a situation it is important to take additional safety measures like planning of room occupancy, information of co-workers, signalling potential dangers and be aware that surfaces outside a fume hood may be contaminated (by powders, aerosols etc.). Therefore, experiments that require dust (gas) mask **have to be discussed** with the laboratory responsible and **PSI safety experts** in advance.

44. Contaminated gloves must be removed when touching a pen, watch, phone, door, computers, books etc.
45. It is mandatory to wear closed-toed, flat-soled shoes.
46. Wear long pants, skirts, or dresses etc.
47. Every glove-box's user has to sign the separate list next to the glove box lock.
48. The user's workspace has to be marked by easily removable scotch tape (e.g. paper tape). All users' materials have to be stored in the provided storage boxes labelled with the completed form (user's name, local contact's name, instrument, phone number, sample description, time range of the experiment - start and end date, and if indicated, with GHS-pictograms). Goods from unlabelled or with outdated label workspace will be removed immediately and disposed without further notice by the room responsible persons.
49. Work with open flames, hot plates and hazardous materials; especially with volatile materials (toxic solids, aerosols (generated by ultrasound and centrifugations), biohazards, nanoparticles, organic solvents, strong acids and alkaline solutions) have to be carried out in the fume hood. The fume hood's sash must be closed as much as possible to work properly. Work in the fume hood must be settled back minimum 15 cm from the plane of the sash. The fume hood's sash must be closed completely when fume hood is not used. Use of open flames and hot plates in the lab increase explosion risk. All flammable materials have to be removed from the working area, during the work with open flames! Heat generating equipment must be placed in the rear of the fume hood.
50. All lab work carried out with chemicals has to follow the rules of good chemical practice.
51. All lab work carried out with biology samples has to follow the rules of good microbiological practice. This includes disinfection, sterilization and waste disposal of all tools and items as well as the workplace after having finished the experiments.
52. Each user is urged to leave the laboratory clean and well ordered.

Specific hazards and related actions

53. *Suffocation hazard*: When working with helium, nitrogen, argon and liquid nitrogen.

Actions: Oxygen sensors and intervention plan.

54. All chemicals intended to enter the laboratory room have to be declared in the DUO system (external and internal users) and/or PSI Chemical Database (internal users).
55. Users must inform the room responsible person when bringing hazardous materials into the laboratory room (MSDS has to be attached).
56. Chemicals have to be stored in appropriate ventilated chemical cabinets. Containers filled with liquid chemicals/solvents must be placed in a spill tray. The rules of storage chemicals together have to be followed.
57. Use *EX-protected* refrigerators for storing flammable materials, which require cold storage.
58. For *needle disposal* use properly the special needle collecting box. Biohazardous materials (tissues, cells, infectious materials, GMOs) have to be collected separately and disposed of according to the specified procedure (inactivation by autoclave) - **require contact experts** in advance.
59. Label all chemicals containers sufficiently (QR-code if available, user's name, local contact's name, instrument, phone number, date, unambiguous name of substance (verifiable abbreviation) and solvent, concentrations) and, if indicated, with GHS-pictograms. Insufficiently labelled containers will be removed immediately and disposed without further notice by the room responsible persons.
60. All users' samples, materials and consumables brought by the users have to be removed after the end of the experiment. If some samples stay in the glove box, they have to be clearly labelled and registered in the glove box log-book (Name, Institution, chemical formula, duration of storage).
61. All chemicals have to be disposed according to PSI rules when they are no longer required.

6. Access control

62. Access of all individuals is controlled by the "Interflex" system. The personal data are kept confidential according to the legal provisions. Access can be denied by the room responsible person in case of immediate danger and according to point 11 of this operation procedure.

7. Working Alone

63. Generally, working alone with flammable substances and chemicals is not allowed (PB-9670-348 - available only on the PSI Intranet). If such work will be done the advisor must be informed. The person working alone and his/her manager have to be aware of the dangers associated with working alone. The advisors have to agree by signing the "Note on the dangers of working alone" form (FO-9670-346 - available only on the PSI Intranet). Advisor has to take actions to ensure safe working according to PSI regulations and department / laboratory / group specific rules.

8. Actions in case of emergency, First aid

64. In case of fire or emergency (e.g. intoxication) follow the steps outlined in the operation procedures.
65. Users are instructed on this procedure by the instrument responsible person (local contact) or by the room responsible person or by a designated representative. Training specific for this room could be organized if necessary with recorded participations.
66. All specific actions in the case of emergency for the entire building WNLA have to be followed.
67. If specific hazards have been identified, take actions according to the propositions defined in PSI operation procedures.

Always:

68. Keep in mind: Self-protection first! Keep calm!
69. **Alert** PSI emergency response unit by dialling: **3333**
70. **Warn** people in the area and activate the fire alarm if necessary.
71. If your own safety is not at risk, **rescue**
72. If your own safety is not at risk, **take actions** according the accident and specific instructions predefined in the operation procedures e.g. MSDS (acute toxic compounds (toxins, HF, gases, Be) inflammable and suffocating gases, etc.).
73. Radioactive and chemical contamination: Remove contaminated clothes; clean the skin (gently!) with water. Decontamination will be determined by the action forces.

9. Trainings

74. All users have to be sufficiently informed on occurring hazards in room WNLA / EG 002, the appropriate actions in routine operation and in cases of emergency. The room responsible person is accountable for this.
75. All responsible persons involved have to acquire the appropriate knowledge, which enables them to fulfil their function by participating in appropriate education and instruction courses. The advisors are accountable for initiating and control.
76. In case of additional hazards (acute toxic substances, laser, non-ionizing radiation) the room responsible person will inform his/her supervisor and initiates a hazard assessment and adapts this procedure accordingly.

10. Disposal of materials and maintenance works

Disposal:

77. The PSI guidelines for recycling and disposal have to be followed.
78. Users are obliged to use minimal amounts of chemicals in order to reduce waste.
79. Inactive and active waste must be strictly separated.
80. Domestic, biological and chemical waste must be strictly separated.
81. All trash beams must be always closed properly.

82. Disposal of chemicals has to be done properly using the available containers for acid, organic solvent and water solution wastes. All other chemicals/samples, contaminated wipes, tissues, gloves, pipette tips etc. can be disposed of in the "solid waste" beams in appropriate closed containers with a label indicating the contents and if indicated, with GHS-pictograms. Plastic (e.g. cryo-vials) and glass (e.g. Schott Duran-like) containers for waste are available. All waste containers and trays are placed at the ventilated collection place. Dangerous goods (e.g. elements, oxides and their compounds unclassified by MSDS) – of hazardous, including carcinogenic, mutagenic, and reprotoxic substances have to be packed in air tight, double wall containers sealed with the Parafilm.
83. Storage place for waste has to be always closed properly.
84. Chemicals: Disposal of chemicals out of the laboratory will be organized by the room responsible person. Intermediate storage, especially of organic solvents, and transport to disposal at chemical waste at collecting station West has to be performed according to the PSI regulations.
85. SINQ Sample Preparation WetLab WNLA / EG 002 doesn't have the capacity to store extraordinary amounts of (solvent) waste, therefore the amount produced has to be reasonable. If sample preparation requires a large volume of solvent, the user has to discuss this in advance with the PSI local contact (beamline scientist) and the laboratory responsible.
86. As there is no autoclave in the SINQ area for biological materials, all biological waste (including used wipes, tissues, gloves, pipette tips etc.) has to be disposed of and sealed in special waste bags which must be checked by the radiation protection unit at PSI before those bags leave experimental areas in WNHA as well as WNLA and are to be transferred to BIO department for extermination. The above actions **require contact experts** in advance.

Reporting deficits:

87. Defective devices and deficits of room infrastructure haves to be reported to the room responsible person who will initiate appropriate actions.

11. Sanctions

88. Disregard of these directions will result, even without remanding, in immediate cancellation of access to room WNLA / EG 002. This process will be initiated by the room responsible person and reported to the organisation unit responsible, the laboratory head and the safety officer of PSI.

12. Appendix

89. Herewith I confirm that I have read and fully understood this “operation procedure.” I agree to be bound by PSI facilities' safety regulations applicable during my stay related to my activities at PSI.

Name:

_____

Date:

Signature: