

Ruhr-Universität Bochum

Lehrstuhl für Analytische Chemie - AG: Elektroanalytik und Sensorik

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Operating Instructions for Laboratories AG Elektroanalytik & Sensorik; Ruhr-Universität Bochum

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1.) **General Comments**

1.1.) **General Laboratory Regulations**

- 1.1.1) Only authorized personnel are permitted to be present and to work in the laboratories.
- 1.1.2) The presence in laboratories of non-members of staff can be permitted only by the person responsible for the laboratory. The responsible persons for the different laboratories are the team leader (Prof. Dr. W. Schuhmann) and the members of the research group, who are officially employed by the Ruhr-Universität (Post-Docs, PhD-students, technical staff).
- 1.1.3) In the entire laboratory area and in the corridors immediately adjoining laboratories, drinking, eating, smoking and the application of cosmetics are not permitted. Designated rooms (seminar room NCDF 04/789) are provided for eating and drinking. Foodstuffs can be kept in room NCDF 04/789 and the refrigerator there designated for this purpose.
- 1.1.4) Before beginning any new projects, the supervisor is responsible for ascertaining hazards and establishing protective measures. The possible hazards and the protective measures have to be documented in the laboratory journal of the employee who is performing the experiment. The laboratory journals are property of the research group and will be kept for the time necessary according to law. The laboratory journal has to be written in that way that a scientist can reproduce the experiments. All notices in the journal have to be marked with the date. Cross references to documented security measures and properties of hazardous material are possible.
- 1.1.5) Persons entrusted with carrying out experiments are permitted to leave their workplace during an ongoing experiment only if continuous surveillance of the experiment is not required, or if a qualified person continues the surveillance. Qualified persons are members of the research group having a similar education than the one carrying out the experiments or members of the research group who are informed about the theory and the practical risks of the experiment.
- 1.1.6) The operating condition of surveillance devices for ongoing unobserved experiments must be tested before they are put into use. Experiments at elevated temperature (heating under reflux), augmented or reduced pressure, easily inflammable solvents are not allowed without proper surveillance.
- 1.1.7) In the event of malfunction or failure of the ventilation system, work with hazardous materials must cease immediately, and the laboratories in which hazardous materials are stored are to be vacated. If possible, flasks and storage containers of hazardous materials have to be closed in a safe way. Failure or malfunction of ventilation will be announced by the public address system. After the ventilation system is starting to function again the

laboratory may be only entered if it is assured that no contamination of persons is possible.

- 1.1.8) During projects in laboratories involving hazardous materials, an additional person, trained in the subject matter, must always be present. This measure is to be organised in between the members of the group. Qualified persons are members of the research group having a similar education than the one carrying out the experiments or members of the research group who are informed about the theory and the practical risks of the experiment. If the simultaneous presence of two qualified persons is not possible, the experiment must not be performed. In order to avoid time delays the group leader can assure the simultaneous presence of two qualified persons. If such projects are carried on outside working hours, they require the approval of the supervisor. The approval can be given in a general manner.
- 1.1.9) Emergency exits, escape routes, passages and stairs, as well as access to fire extinguishers, fire hoses and first-aid facilities, must not be blocked.
- 1.1.10) Obvious safety defects are to be eliminated when possible, or reported to the supervisor for elimination.
- 1.1.11) The members of the group have to wear safety equipment according to the evaluated danger. The necessary safety equipment can be derived from the compound-related operating instructions and the safety data sheets. For experiments with chemicals, especially experiments under reduced pressure a labcoat, safety glasses and closed shoes are indispensable. If gloves have to be worn, the adequate quality has to be derived from the compound-related operating instructions and the safety data sheets.
- 1.1.12) Labcoats and street clothes have to be stored separately. It is not allowed to enter the seminar room (NCDF 04/789) with contaminated labcoats, gloves etc.
- 1.1.13) Any writing for which no stay in the laboratory is necessary has to be done at the writing computers in NCDF 04/789 and NCDF 04/795.
- 1.1.14) The working place has to be kept in a clean condition.
- 1.2) **Use of Hazardous Materials**
- 1.2.1) Use of hazardous materials is only allowed after appropriate instruction in hazards, safety measures and waste disposal by the responsible person. Such instruction must be repeated at least once a year and is to be recorded in writing.
- 1.1.2) Storage of chemicals in laboratories is to be kept to the minimum necessary amounts. The maximum stored amounts outside the safety cabinet at the workplace may not exceed the amounts actually needed for work in progress

(maximum daily requirement). Hazardous fluids may not be shelved above head height.

1.2.3) Flammable fluids may be stored at the workplace only in the following amounts:

- amounts for immediate use in containers of 1 L
- amounts for daily use.

Amounts exceeding the above are to be stored in the designated storage rooms and secure cabinets. The safety cabinets are located in NCDF 04/755 (for liquids) and NCDF 04/756 (for solid compounds).

1.2.4) Toxic and highly toxic substances are to be secured in the inner cabinets which can be locked. The keys for these inner cabinets is stored by the group leader. The amounts used for experiments have to be listed in a booklet. Only those amounts immediately required to proceed with a project may be kept at the workplace.

1.2.5) Operating instructions for the use of carcinogenic hazardous materials must be followed.

1.2.6) Chemicals may only be stored in the designated storage rooms or cabinets. The safety cabinets are located in NCDF 04/755 (for liquids) and NCDF 04/756 (for solid compounds).

1.2.7) Work is not permitted in hoods in which chemicals are stored.

1.2.8) No chemicals may be placed on the floors.

1.2.9) Combustible fluids which must be stored at low temperatures may only be stored in refrigerated compartments whose interiors are free of sources of ignition. These compartments are appropriately labelled.

1.2.10) Containers with hazardous materials may only be stored in cupboards and shelves at heights permitting safe removal.

1.2.11) Hazardous substances may only be transferred to designated, suitable containers. No containers may be used in which foodstuffs are ordinarily stored (e.g., beverage containers).

1.2.13) The containers are to be labelled with

- the name of the hazardous material
- the hazmat symbol
- risk and safety phrases
- name of producer or deliverer

In the case of containers for immediate use, the name of the hazardous material and the hazmat symbol are sufficient. Upon transferral to other containers, these containers are to be appropriately labelled.

- 1.2.13) All projects during which hazardous materials can be inhaled must be carried out in a ventilation hood.
- 1.2.14) The sliding covers of the ventilation hoods are to be kept closed. They may only be raised when necessary to continue work.
- 1.2.16) Care must be taken to avoid overfilling the ventilation hoods with equipment and materials.
- 1.2.17) Transportation of chemicals is only permitted in designated and appropriate transport containers and carts. Persons not involved in the transportation of chemicals may not ride in lifts in which chemicals are being transported. For highly hazardous materials the additional transportation regulations in the special operating instructions are to be followed as necessary.

1.3) **Use of Pressurized Gases**

- 1.3.1) Pressurized gas cylinders (full and empty) may only be transported
 - with protective cap in place
 - on a cylinder transportation cart with the security chain in place.Transportation is to be carried out by two persons. Other persons are not permitted in lifts used for such transportation.
- 1.3.2) Pressurized gas cylinders must be secured against tipping over by appropriate means (e.g., chains or canister containers).
- 1.3.3) At their place of use only those pressurized gas cylinders required for work in progress may be present.
- 1.3.4) After use and after emptying the valves of pressurized gas cylinders must be closed.
- 1.3.5) Pressurized gas cylinders are to be used with the appropriate pressure-reducing valves.
- 1.3.6) Pressurized gas cylinders with toxic, highly toxic, corrosive and cancerogenic gases must be continuously ventilated (e.g., in a ventilation hood) whenever they are mounted for experiments in the laboratory. During their use the appropriate protective breathing masks are to be kept in readiness.

1.4) **Use of Equipment**

- 1.4.1) Obviously defective equipment may not be used and their status has to be announced to the group leader or another responsible group member.
- 1.4.2) Movable electrical equipment may only be used if it is provided with a valid inspection badge. Group members are required to check the inspection badge before using the equipment.

- 1.4.3) Defective equipment may only be handed over for repairs if it has been externally cleaned.
- 1.4.4) Before pumps are inspected by the pump workshop, their oil must be drained. The oil is to be disposed of in 12-liter plastic-metal combination containers as highly contaminated used oil.
- 1.4.5) Glass apparatuses in danger of bursting through high pressure or vacuum are to be secured by the protective screens, wire cages or sheets provided.

1.5) **Waste Disposal**

- 1.5.1) The amount of waste is to be kept to a minimum by using only small amounts of materials in reactions. Continuing use and reuse should be preferred to disposal.
- 1.5.2) For waste removal the waste removal regulations of the RUB apply.
- 1.5.3) Hazardous wastes must be collected in the designated, labelled containers.
- 1.5.4) Collection bins for hazardous wastes are found in the secure cabinet in NCDF 04/755
- 1.5.5) Collection bins must not be left open.
- 1.5.6) The waste supervisor (Michael Ehrlich) of the research group is responsible for having full containers taken to the interim repository for hazardous wastes.
- 1.5.7) Empty chemical containers disposed of as ordinary household waste must be cleaned and their labels and caps or lids removed. Broken glass, syringes and cannulas must be collected in separate, puncture-proof containers. Waste paper baskets are not permitted for this purpose.

1.6) **General Practices in the Operation of Laboratories**

- 1.6.1) For the safe insertion and removal of glass parts into and from plugs, hands are to be protected by nonpenetrable protective gloves or thick pads.
- 1.6.2) Apparatus must be set up so as to be clearly observable and operationally safe. Care must be taken to make set-ups free of mechanical stress. Where required, individual components are to be secured or supported by tripods.

1.7) **Procedures in Case of Accidents**

See also the public notice of the RUB: "Guidelines for Procedures in Case of Accidents, Acute Illness and Fires", as well as the leaflet of the state accident

insurance office (Landesunfallkasse): "Instructions for First Aid in Case of Accidents" (GUV 20.5).

- 1.7.1) When giving aid, one's own safety has priority.
- 1.7.2) The rescue services are to be called through the university's central emergency service. Report to the central emergency service: precise location of the emergency, type of injury, number of injured persons.

Request persons familiar with the area to give directions to the members of the rescue team. Wait for the arrival of the rescue team both at the north and south entrances of the building.
- 1.7.3) In case of accidents involving chemicals, use the accompanying form (safety data sheet) to give data about the chemicals or the operating instructions for specific materials, as well as the telephone number if further information is needed.
- 1.7.4) If toxic gases or vapours have been inhaled, or are suspected to have been inhaled, leave the room immediately. Affected, incapacitated persons are to be brought out of the danger zone.
- 1.7.5) In the case of accidents with strong acids or bases remove contaminated cloth immediately. Injured skin has to be rinsed with water intensively and eventually cleaned with soap. Avoid warm water and skin massage which are increasing the amount of skin absorption.
- 1.7.6) If chemicals come into contact with eyes, eyes are to be immediately rinsed with an *eye rinsing hose* for at least 15 minutes. The eye lid has to be kept open during rinsing. A medical doctor specialized on eyes should be visited.
- 1.7.7) Burning cloths should be extinguished with the emergency shower. Burning wounds have to be cooled with water until the pain stops.
- 1.7.8) In case of accidents with electric power the current should be interrupted. The power net of the working group is secured with FI-safety switches. Hence, accidents with electric power are unlikely. The FI safety switches have to be tested monthly.
- 1.7.9) If someone is hurt with open wounds first aid should be given using one-way gloves for the own security.
- 1.7.10) The group leader has to be informed about any accident immediately.
- 1.7.11) Whenever medical treatment is required, go to the doctor on call.
The closest doctor on call is Dr. Russe, Bochum, Buscheyplatz 15, Bochum;
Tel.: 701051
- 1.7.12) Person trained in first aid at the department:
Michael Ehrlich, NCDF 04/792, Tel.: 24701
Prof. Dr. Wolfgang Schuhmann, NCDF 04/788, Tel.: 26200
Works paramedic: contact through the central emergency station (Tel. 3333).

Nearest doctor: Dr. Besser, Unicenter, Tel. 971200.

1.8) **Procedures in Case of Fires**

1.8.1) Watch out for personal safety whenever giving aid.

1.8.2) Report fires immediately

- by using the fire alarms (smash glass window, press button firmly) and/or by calling the central emergency service (Tel. 3333) and reporting
- where the fire is
- what is on fire
- if people are in serious danger.

1.8.3) Warn other people and bring endangered persons to safety.

1.8.4) Use the designated escape routes. Do not use the lifts.

1.8.5) Turn off current and gas wherever possible (use emergency switch-off for laboratory current and gas).

1.8.6) Give directions to the fire brigade and the emergency services.
Note: Fire brigade will come to the north or south ends of the buildings.

1.8.7) When the building alarm sounds, vacate the building and as far as possible remove personal belongings. If possible, turn off apparatuses. Human safety comes first, protection of material property second.

2.) **Special Operating Instructions**

Operating Instructions relating to Materials

Whenever individual hazardous materials are used, the operating instructions for the specific materials or group of materials are to be followed.