Forschungsgruppe Physics of Nanostructured Materials (PNM)

Faculty of Physics, University of Vienna

Safety Instructions working with chemicals + chemical lab room 3217

Work with chemicals has to be carried out using the chemical hood (chemistry laboratory # 3217, 2nd floor). Please note that the faculty also provides additional chemical hoods in laboratories at the 3rd and 4th floor. The chemical hood of PNM is designed for a general use according to the EN 14175 standard. This standard is suitable for many experiments involving hazardous chemicals but not for working with very aggressive chemicals and experiments that evolve large heat. The hood is not suitable at all for special tasks like working with radioactive substances. The suitability of the hood for a particular experiment has to be checked in each case. The hood is of limited suitability for working with perchloric acid. In the case of experiments involving this aggressive acid, consultation whether the hood can be used is mandatory. Working with hydrofluoric acid and peroxymonosulfuric acid is forbidden in the laboratories of PNM.

The correct function of the hood is indicated by a green light symbol. If the exhaust of air fails or the front cover is unlocked and shifted beyond the red marker an audible warning signal occurs. In the hood, only those chemicals are allowed to be stored that are necessary for the immediate progress of the experiment. The front cover of the hood has to be closed as far as possible. While an experiment is ongoing, it is allowed to open the front cover only in case of unavoidable handling (such as adding or removing chemicals, specimens, …). The sliding windows of the front cover should be opened only when the front cover is completely shut (i.e. in its lower position) since otherwise the required exhaust of air (laminate airflow) for a safe use of the hood is not achieved.

In the case of working with chemicals with rather limited risk potential (i.e. small amounts of solvents) a special mobile hood equipped with a filter is available. This hood might be used in any laboratory. The suitability of the hood for a given type and amount of chemical has to be checked in each case (either by consulting the manufacturer or considering the list of chemicals provided by the manufacturer that is attached to the hood).

Working with the fixed or the mobile hood all persons involved in a particular experiment have to acquaint themselves with the professional handling of these devices. Similarly, the safe handling of chemicals requires an analysis of all potential risks and the implementation of suitable safety measures prior to starting the experiment. This includes the knowledge of the relevant safety data sheets and the corresponding H (hazard)- and P (precautionary)-phrases (statements) (see e.g. http://www.msds-europe.com/id-486-h_p_statements_ghs_clp.html and https://de.wikipedia.org/wiki/H-_und_P-S%C3%A4tze). Safety data sheets will be usually shipped with the chemicals or can be readily found by searching for a particular chemical in the internet. H-phrases include information for the risk with handling, storage, …, of a chemical or hazardous substance. P-phrases include suitable

safety measures. These phrases are typically written at the label attached to the packing of the chemical as well as in the safety data sheets.

Safety data sheets of the stored chemicals are available in file folders kept in the chemistry laboratory. In addition, a list with H- and P- statements is available in the chemistry lab. It is mandatory that for each new hazardous substance or chemical a corresponding paper copy of the safety data sheet is printed by the person responsible for the corresponding experiment and made accessible for anyone by adding to the safety data sheets in the folders. Corresponding safety measures including personal protective equipment has to be provided prior to start working and have to be applied during the whole experiment.

Carrying out experiments involving hazardous substances requires the permanent presence of at least two persons (e.g. experiments involving etching, toxic, or easily flammable chemicals). Carrying out dangerous experiments alone is forbidden. Prior to starting the experiments the location and proper use of the fire extinguishers, emergency shower, emergency eye wash, etc. have to be known. In addition, the names and accessibility of first-aider and the “Brandschutzwarte” have to be known. A corresponding list is available in the chemistry laboratory. The emergency call of the poisons information centre is 406 43 43. This number is mounted readily visible in the chemistry laboratory.

Working with chemicals and hazardous substances requires wearing a lab coat made from cotton, protective glasses preferably in combination with a face shield, as well as gloves. The proper and safe handling with chemicals might require additional protective measures like wearing an apron. While handling chemicals, wearing closed shoes and long trousers is mandatory (no open shoes and short trousers). The choice of the protective equipment has to consider all the chemicals involved in the experiment and their potential risks. In particular, gloves of appropriate material and thickness have to be selected. Touching doorknobs, books, etc. with gloves that have used in contact with hazardous substances is forbidden. Cloth that has been contaminated by chemicals has to be disposed appropriately. Disposable “one-way” gloves (suitable for a rather limited section of chemicals only) are allowed only in case of hazards arising by sprinkling of these chemicals (“Spritzkontakt”) but not if there is the possibility of a full contact with the chemicals. Caused by their limited chemical durability wearing a pair of disposable gloves should be as short as possible. In particular, after contact with a hazardous chemical these gloves should be immediately disposed. Contrary to disposable chemical gloves, protective chemical gloves designed for full contact are providing a longer time till a chemical penetrates the protective material. However, also this time of penetration might be rather limited (taking this into consideration, the gloves have to be changed after the maximum penetration time). The time of penetration varies with the material of the glove and generally increases with increasing thickness of the glove. Gloves that were in contact with hazardous substances have to be disposed (preventing reuse of contaminated gloves by other users) and substituted by a new, unused glove.

A set of fully protective chemical gloves made from Butyl and Viton are available in the chemistry laboratory. In addition, there are disposable gloves made from Nitril. Aprons made from Butyl und PVC are also available. The suitability of protective measures (in terms of material and thickness) has to be checked prior starting the experiment. Some chemicals or

combination of chemicals might require the use of gloves and aprons made of special materials/thicknesses that have to purchased separately. General information on gloves as well as a list of chemicals and appropriate protective materials is available in the chemistry laboratory. A corresponding information system provided by the company KCL can be downloaded via the following link: http://www.kcl.de/kcl/DownRegiCM/Chemikalien-Manager.exe.

Persons working the chemistry laboratory working with specific experimental devices (such as the Struers electropolishing unit) have to acquaint themselves with the proper use prior to carrying out the experiments. Experimental units that are in use have to be monitored.

The proper setting up of mixtures of chemicals has to be clarified (e.g. considering the sequence of the components, possible exothermic reactions, release of hazardous vapours,…).

Hazardous experiments carried out in the chemical hood must not be unattended. Open chemicals might be left unattended if there is only a very weak risk potential. In this case, information on the type of chemical, a contact person and contact data (e.g. phone number), the starting time and date of the experiment should be made available e.g. by placing a short memo near the experimental setup. Of course, the door to chemical laboratory has to be locked (as always if there is no person working in the lab).

The proper disposal of chemicals has to be clarified prior to starting the experiments. Equipment for the collection and disposal of accidentally spilled chemicals has to be provided prior the experiment. A set of special substances suitable for absorption of spilled chemicals is available in the chemistry laboratory. The proper use of these absorptive substances has to be clarified prior to the experiment.

After their use, chemicals have to be safely stored or in suitable containers for storage or disposal. The containers have to be marked by appropriate labels (see the separate information Label_chemicals) clearly showing the type of chemical or chemical mixture (containing clear information on the components, percentage of components, date of production, person responsible for the chemical or mixture of chemicals). Hand-written labels are forbidden. The labels have to be attached to the container in such a way that any confusion with an eventually existing original label of the container is ruled out. All hazards of the chemical or mixture of chemicals have to be clearly indicated by according hazard symbols (pictograms). A self-adhesive set of pictograms is available in the chemistry laboratory. A printer for labels is available in the group PNM.

Chemicals can be disposed vie corresponding disposal centre of the Faculty for Chemistry (disposal is possible at fixed dates twice a week: Tuesday and Thursday, 14:00-15:00, phone 0664 60277 52010). For the transport of hazardous substances appropriate means have to be used (e.g. a bucket) that in the event of glass breakage can uptake all of the spilled chemical. The transport of hazardous chemicals has to be carried out by two persons with special care.

Chemicals have to be stored in safety storage cabinets containing sumps. Easily inflammable and inflammable substances have to be stored in the safety storage cabinet for flammable substances. Acids have to be stored in the underbench cabinet of the chemical hood. Storage

of a mixture of chemicals requires the knowledge and strict application of all terms of safe storage (e.g. maximum time permissible of storage, type of permissible storage cabinet). Toxic substances have to be stored in locked compartments. It is mandatory to clarify for chemicals containing toxic substances whether they have to be stored in the safety storage cabinet for flammable substances or in the underbench cabinet.

Working with chemicals should be carried out with utmost possible cleanness. Used equipment has to be cleaned immediately after the experiment. Any activities with the chemical hood have to be noted in the lab book of the chemistry laboratory. In addition, the use and disposal of chemicals has to be noted in the lab book. This especially holds for toxic substances. For this purpose lab books are available in the chemical lab. As a measure for the amount of chemicals used their mass should be determined. A balance is available in the lab (precision 0.1 g) and the mass of a chemical can be simply determined by measuring the weight of its container prior and after the extraction.

While working in the chemical laboratory room 3217, the door to the adjacent room 3218 has to be open all the time (a wedge that keeps the door open is available). This safety measure is necessary since the chemical lab is not directly leading to an escape way. Therefore, the escape route (through the room 3218) might be blocked in case a fire in this area is undetected. The safety storage cabinet for flammable substances or in the underbench cabinet have to be locked. They are only allowed to be opened for withdrawing or putting back chemicals. Similar the door of the chemistry laboratory has to be looked every time the laboratory is left.

Finally, please note that according to the General Laboratory and Workshop Regulations of the University of Vienna, working off the general working times (Monday till Friday from 8 am till 8 pm) always requires the presence of a second person to be in visual and hearing range or, at least, regular contact with a second person (e.g. via phone or SMS).

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