

Laboratory safety rules

1. During the laboratory works student must wear appropriate protective clothing: white lab coat which should be all on. Long hair must be pinned. If necessary, it is recommended to use other protective equipment: rubber gloves, goggles, face shield or mask.
2. **Always wear rubber gloves when working with biological material** (blood, serum, plasma, urine)!
3. **It is forbidden to eat, drink or smoke in the laboratory.** Always wash your hands with soap before leaving the laboratory.
4. Keep calm and maintain clean working place during work. Work with maximum attention and thought.
5. Each beaker, test tube, bottle on the workbench must be clearly and comprehensibly described (table of contents).
6. Do not manipulate with solid chemicals by bare hand, do not spill into the hand, etc. Use clean laboratory spoons or spatula. In case of chemical contamination immediately rinse your hands and wash with soap and water.
7. Small plugs are held in the hand during work and are not placed on the workbench. Larger bottles corks must be laid in such a way that the bottle contents do not contaminate the work surface. Bottles and other containers should be closed immediately after taking of the required amount of chemical.
8. The liquid reagents should be poured from the bottles on the side facing away from the signature avoiding a damage of the label on the bottle. The mistaking due to unreadable inscription may occur with dangerous consequences.
9. Pipetting of toxic, corrosive, irritant and potentially infectious (biological) fluids must be done with special safety pipettes or using a pipette adaptor. Never directly by mouth!
10. During manipulation with substances in test tubes and other containers, the mouth of the container must always be directed from oneself and other workers.
11. When heated fluids on an open fire the tube has to be heated gently and slowly from level to the bottom. Mix the liquid by moving the tube during heating so that the contents are evenly heated avoiding sudden boiling and splashing of boiling liquid out.
12. Odors of any chemical substances are not detected by direct smell; vapors with a wave of the palm instead. **Chemicals must never be tasted!**
13. Concentrated acids, especially sulfuric acid, **are diluted by pouring the acid into water.** The acid is added in a thin stream, in a small portions manner while stirring the solution continuously with the glass stick. **The reverse procedure**, i.e. the addition of water to the acid, **is not permitted**
14. When dissolving solid sodium or potassium hydroxide, the hydroxide is poured in small amounts into water while stirring the whole content continuously. Always wait for the previous portion to be dissolved. If the solution is heated inadequately during the procedure, the vessel is cooled with water in a larger vessel.
15. Spilled concentrated acids are first diluted carefully with water and then neutralized with low concentration soda or alkaline hydroxide solution. Spilled hydroxide

solutions are diluted with water only. The contaminated surfaces are then washed with water. These operations must be carried out in protective gloves. Small drops of acids, bases and other dangerous substances are absorbed into the filter paper and the stained area is then washed with reasonable amount of water.

16. Chemical solutions are poured into the sink only when diluted with excess of tap water simultaneously.
17. Inhalation of even minimal quantities of chemicals should be avoided. Some substances, e.g. hydrogen cyanide, hydrogen sulfide, chlorine, phosgene, etc. can cause death after a single aspiration. Others, e.g. mercury, benzene, carbon tetrachloride and 2-naphthylamine can potentially cause severe health issues after a longer time period. Due to a potential infection it is necessary to ensure strict purity when working with biological material.
18. **With irritant, odorous and toxic substances** such as chlorine, phosgene, chloroform, carbon tetrachloride, carbon disulfide, etc., and with highly flammable substances, e.g. with petroleum ether, diethyl ether, petrol, carbon disulphide, benzene, acetone etc. must be manipulate and work in properly exhausted and powered up hoods. When working with combustible substances, care must be taken to avoid unintended ignition of vapors from open fire, ie especially from nearby burners, but also electrical appliances. It is not possible to work simultaneously with a flammable solvent and heat anything else with a gas burner in one hood. A chromatographic baths may also represent a dangerous source of vapors. Spraying chromatograms by reagents is dangerous process, which produces fine aerosol of an agent. So thus the detection can only be done in a well-fume hood or a dustbox. Annealing, combustion and mineralization of the substances are also carried out **in a fume cupboard**.
19. In the case of spills of large quantity of flammable, all burners and electric devices must be switched off immediately and the room must be ventilated intensively and no electric devices, including light must not be turned on. The maximum permissible amount of flammable substances in the laboratory is determined by regulations. Remind that all organic substances containing less than 70% halogen are flammable.
20. When attaching tubing to glass tubes and inserting glass tubes, taps and thermometers into the plugs should be handled with care and without violence, preferably in protective gloves or hand protected with a clean cloth. The glass is held at the opening into which it is inserted. Insertion of glass objects into the holes in the rubber is facilitated by coating them with glycerol.
21. Chemical glass and glass components of chemical apparatus should be inspected carefully prior to work. Even a slight crack can have very serious consequences. Damaged glass must be discarded immediately by putting it into repair or store in a separate glass waste container. Damaged glass must not come to the washroom with the other glass. Shards of glass and small fragments on the tables should be carefully removed.
22. For heating, eg during distillation of liquids with a boiling point below 100 ° C, they are used electrically heated water baths, electric heating nests and infrared heaters. In the case of usage of oil baths for heating water must not enter the oil.

23. Stealthy boiling, eg during distillation, can be prevented by hot stones or glass balls placed in the container before heating begins. When a secret boiling is suspected shut off the heat source and let the liquid cool down without shaking.
24. Thin-walled flat-bottomed containers must not be vacuumed due to a risk of implosion. Only thick-walled round or round bottom flasks are used for vacuum distillation.
25. **The centrifuge arms must be evenly loaded and balanced.** Centrifuges must be closed during centrifugation. The lid must not be opened until the centrifuge completely stops. Most of the centrifuges are protected against premature opening by a safeguard.

First aid in laboratory

1. In the case a chemical enters the mouth, swallowing must be avoided; spits and wash the mouths with water. If the substance or solution is ingested, the mouth will be rinsed repeatedly with water, after drinking about half a liter of fluid, vomiting is induced (irritation of the throat with a finger) and medical help is searched.
2. If the skin is burned with acids or basis, the affected area is rinsed immediately with sufficient current of cold water. In case of greater spillage, seek medical attention. Especially dangerous corrosion and injury is caused by hydrofluoric acid, nitric acid, sulfuric acid, alkaline hydroxides, hydrogen peroxide and phenol.
3. Immediately rinse the affected eye with a stream of cold water, apply a sterile bandage and seek immediately medical help.
4. In case of burning with fire or hot objects, the affected areas should be immediately cooled by ice water or by placing plastic bags with water and ice (not ice itself). Parts of clothing joined and cemented with burns must not be removed in principle. In case of scalding it is necessary to withdraw soaked clothing as quickly as possible, burned areas are covered with a sterile bandage only (no ointments or dusting). In the case of more severe burns or large-scale burns the medical help should be seek.
5. In the case of an electric shock the power supply must be disconnected first if the victim is still under voltage. The rescuer is sufficiently isolated from the dry land wooden, rubber or glass backing. Respiratory, cardiac activity is secured and medical help is get immediately.
6. In the case of incisions or cut by e.g. laboratory glass, the bleeding wound is washed with a jet of water, eventually disinfects. Ajatin, Famosept, Septonex can be used to disinfect smaller wounds. The wound is covered with a bandage or bandaged. If there are foreign bodies, such as glass shards, it must be removed by a physician. In case of extensive bleeding apply compression bandage and seek medical attention immediately.
7. Students are obliged to become familiar with the theory used in the laboratory methods and workflow of the experiment before the practical lesson starts. Before beginning each task you need to think in advance of possible work risks.

**IN THE CASE OF ANY DOUBT OR HAZARD RISK DANGER DO NOT HESITATE
TO ASK ASSISTANT.**

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