

Safety measures in the chemistry laboratory

The mentors are responsible for instructing the competitors as to the risks to which they are subjected when working in a chemistry laboratory, as well as to the basic safety measures, and first aid. Specific behavioural and safety measures must be obeyed to prevent accidents.

Rules in the lab:

- Use protective clothing all the time (e.g. lab coat and safety glasses)
- Use a hair band to keep your hair away from your face.
- Do not smoke, eat or drink in the laboratory.
- Work carefully and follow the given instructions.
- Follow the safety instructions for handling chemicals (R/S classification).
- Do not leave the laboratory without permission.
- Keep the work place clean and organized.
- Do not put yourself or anyone else in danger.
- Do not cause panic in case of an unwanted chemical reaction, equipment damage or injury. Call the supervisor.
- Work in the fume cupboard:
 - whenever you work use hazardous or toxic substances,
 - for every experiment where easily evaporable substances or chemicals are employed,
 - for experiments where flammable gases and vapours are produced,
 - working under vacuum
- Use electric heaters to heat the receptacles with flammable substances. Do not expose them to an open flame.
- Wear protective gloves and safety glasses while working with concentrated acids or alkalis, or whenever the mixture might react quickly and aggressively.
- In case a chemical comes in contact with your skin, immediately rinse the spot with water and neutralize if necessary. Remove the affected clothing. In case a chemical comes in contact with your eye(s), wash it (them) with running water (for at least 15 minutes). Call the supervisor.
- Do not pipette harmful or evaporable substances by mouth. Use a pipette-bulb.

- You are allowed to work with compressed gases only in the presence and under the guidance of a mentor.
- Be very careful when working with vacuum. Wear safety glasses and use only the labware designated for evacuation.
- Disposal of the waste material:
 - You are allowed to pour neutral or very dilute solutions down the drain, but with a lot of running water. Neutralize any acids and alkalis before pouring them down the drain.
 - Put any heavy metal waste in the designated container (heavy metals can be regenerated).
 - Pour organic solvents or extremely hazardous and toxic substances into the designated waste container.
 - Do not mix flammable liquids with oxidising substances, as this can cause a fire!
- Before leaving the laboratory:
 - Ensure that your work place is neat and clean.
 - All the chemical containers must be closed and returned to their designated places.
 - Shut off the gas and water valves.
 - Switch off the electric heaters and other equipment.
 - Verify that there is no fire hazard.
- Wash your hands before leaving the laboratory.

LABORATORY HAZARDS AND FIRST AID

While working in the chemistry laboratory, you may encounter cuts, burns, injuries caused by chemicals (skin, eyes), or poisoning caused by inhaling poisonous vapours or swallowing poisonous substances.

There is always a risk of fires, explosions and electric shocks.

In order to avoid all these dangers in the laboratory, you need to respect the above mentioned safety measures. It is also important that you react in time to help yourself and others.

DO NOT CAUSE PANIC – This is the very first step in providing first aid.

CUTS are usually found on hands, and are mostly caused by glassware. Verify if there is a shred of glass, metal or other material in the wound. Use sterile tweezers to pull it out, cover the injury with a piece of sterile gauze or bandage, and apply pressure to stop the bleeding. In case of profuse bleeding, apply a compression bandage and seek medical help.

BURNS are usually found on hands too, and are mostly caused by handling hot objects or hot reagents. If there is no significant damage to the skin, cool the burned spot with cold water (or ice placed on a sterile cover). In case the clothing has become stuck to the skin and blisters have formed, use a piece of sterile gauze to cover the burn and immediately seek medical help.

CHEMICAL INJURIES TO SKIN

If a chemical has come in contact with your skin, rinse the spot with running water and neutralize if necessary (acids should be neutralized with saturated solution of sodium bicarbonate, and alkaline with a 2% solution of acetic acid).

In case of a more severe skin damage, cover the spot with a piece of sterile gauze and seek medical help.

In case your eye(s) come in contact with any kind of chemical, wash it (them) with running water (for at least 15 minutes) and seek medical help.

POISONING CAUSED BY INHALING POISONOUS VAPOURS

The affected person has to be carried out, where he or she can inhale fresh air. Remove the affected clothing and seek medical help if necessary. If the person has lost consciousness, position him or her on his or her side, and immediately seek medical help. If necessary, apply the CPR technique.

POISONING CAUSED BY SWALLOWING CHEMICALS

The stomach contents have to be diluted with large quantities of water (or water with activated carbon). If you know the composition of the substance swallowed, you can induce vomiting. You are not allowed to do this in case the person has

swallowed concentrated acid or alkali. In that case the person should drink large quantities of water and seek medical help.

INJURIES CAUSED BY ELECTRIC SHOCKS

Electric shocks can be caused by faulty wiring. Shut off the source of electric power using insulated equipment. Remove the affected person from the electric circuit and if necessary, apply the CPR technique. Seek medical help.

FIRES AND EXPLOSIONS

The most frequent causes of fires and explosions in the laboratory are the following:

- faulty gas fittings
- mishandling of easily flammable substances (white phosphorus, etc.)
- open-flame heating of easily flammable solvents
- incorrectly assembled and connected equipment
- inadequate control of the chemical reaction (too high temperature, or pressure, too rapid addition of the reagents, etc.)
- working with compressed gases and explosive mixtures

In order to extinguish a fire, use sand, fire blankets, fire extinguishers or water, (when it is safe to use it). Small laboratory fires can be extinguished by applying wet towels or sand, while larger ones are extinguished by using fire extinguishers.

Everyone working in the chemistry laboratory has to be instructed on how to use a fire extinguisher (water-based, sand-based, dry chemical-based extinguishers and CO₂-based fire extinguishers).

How to Use a Fire Extinguisher

Even though extinguishers come in a number of shapes and sizes, they all operate in a similar manner. Here's an easy acronym for fire extinguisher use:

P A S S - Pull, Aim, Squeeze, and Sweep

Pull the pin at the top of the extinguisher that keeps the handle from being accidentally pressed.

Aim the nozzle toward the base of the fire.

Stand approximately 8 feet away from the fire and **squeeze** the handle in short intervals to discharge the extinguisher.

Sweep the nozzle back and forth at the base of the fire. After the fire appears to be out, watch it carefully since it may re-ignite!