

Laboratory Safety Regulations

In the experiment, we often use all kinds of chemical drugs, instruments and equipment, as well as water, electricity and gas. We often encounter high temperature, low temperature, high pressure, vacuum, high voltage, high frequency and radiation source conditions and instruments. If we lack the necessary safety protection knowledge, we will cause great loss of life and property. Therefore, according to the requirements of "four prevention" (fire prevention, theft prevention, damage prevention and public security disaster prevention), the laboratory must establish and improve the safety responsibility system and various safety systems of the safety responsible persons at all levels with the main person in charge of the room as the main one, and strengthen the safety management.

1. Important provisions:

1.1 dress code:

- 1) When entering the laboratory, you must wear the necessary work clothes according to the regulations.
- 2) Wear protective equipment (protective mask, protective gloves, protective glasses) when conducting operation experiments or studies on hazardous substances, volatile organic solvents, specific chemicals or other toxic chemicals listed by EPA.
- 3) Do not wear contact lenses during the experiment. (prevent chemical splashes into glasses and corrode eyes)
- 4) Long hair and loose clothes should be properly fixed and shoes should be worn during all drug handling.
- 5) Wear high temperature gloves when operating high temperature experiments.

1.2 dietary regulations:

- 1) Avoid eating and drinking food in the laboratory and wash your hands before eating after using chemicals.
- 2) No chewing gum is allowed in the laboratory.
- 3) Do not store food in refrigerators or cabinets with chemicals.

1.3 relevant regulations on drug collection, storage and operation:

- 1) When handling dangerous chemicals, please follow the operation rules or the teacher's operation procedures or carry out experiments; do not change the experimental procedures by yourself.
- 2) When receiving the drug, confirm whether the Chinese name on the container is the required experimental drug.
- 3) When receiving drugs, please see clearly the drug hazard label and pattern; whether there is any harm.
- 4) The use of volatile organic solvents, strong acid, strong alkaline, highly corrosive, toxic drugs must be operated under the special fume hood and table type smoke pipe.
- 5) Organic solvents, solid chemicals, acid and alkali compounds should be stored separately. Volatile chemicals should be placed in the drug cabinet with air extraction device.
- 6) Chemicals with high volatility or easy oxidation must be stored in refrigerator or freezer.
- 7) Avoid doing dangerous experiments alone in the laboratory.
- 8) If it is necessary to conduct unsupervised experiments, fire prevention, explosion-proof and water-proof must be taken into consideration. The laboratory lamp should be turned on, and the telephone number of the contact person for emergency treatment and possible disasters should be left on the door.
- 9) The dangerous experiment must be approved by the laboratory director and can be carried out only when there are more than two persons present. It is strictly forbidden to do

dangerous experiment on holidays and at night.

- 10) The experiment of harmful gas must be carried out in the fume hood.
- 11) Strict safety measures should be formulated and personal protection should be done for the experiments with serious harm to human body such as radioactivity and laser.
- 12) Please mark the waste liquid or expired liquid medicine or waste according to the classification. The waste (liquid) waste after the drug is used is not allowed to be poured into the water tank or ditch, and should be recycled in the special collection container.

1.4 relevant regulations on electricity safety:

- 1) The installation and use management of electrical equipment in the laboratory must comply with the management regulations of safe power consumption. The power consumption of high-power experimental equipment must use special line. It is strictly forbidden to share it with lighting line. Be careful to avoid ignition due to overload.
- 2) The determination of the laboratory capacity should take into account the needs of the development of the cause, leaving a certain margin. However, it is not allowed to pull or connect wires arbitrarily.
- 3) The power lines and distribution boards, boards, boxes, cabinets and other devices in the laboratory, as well as various switches, sockets and plugs in the circuit system, should always be kept in good condition. The fuse used in the fuse device must match the allowable capacity of the line, and it is forbidden to replace it with other wires. Indoor lighting appliances should always be stable and available.
- 4) In the building where flammable and explosive gases or powders may be dispersed, explosion-proof electrical circuits and devices shall be used according to relevant regulations.
- 5) Be aware of the parts and devices that may generate static electricity in the laboratory, and have clear marks and warnings, and take proper preventive measures for possible hazards.
- 6) The high-voltage and high-frequency equipment used in the laboratory should be maintained regularly and reliable protective measures should be taken. If the equipment itself requires safe grounding, it must be grounded; regularly check the circuit and measure the grounding resistance. The self-designed and manufactured equipment for automatic control of existing electrical devices must be accepted by the technical safety office of the laboratory and equipment department before use. The electrical circuit part of the self-designed and manufactured equipment or device should also be checked by professionals before putting into use.
- 7) Open fire is not allowed to be used for heating in the laboratory, and smoking is strictly prohibited. The place where open fire test must be used must be approved before use.
- 8) Do not touch electrical appliances or electrical equipment when there is water or humidity on your hands; do not use the electrical socket beside the water tank (to prevent electric leakage or electric induction).
- 9) The professional personnel in the laboratory must master the performance and operation methods of the instruments and equipment in the laboratory, and operate in strict accordance with the operating procedures.
- 10) Mechanical equipment shall be equipped with protective equipment or other protective covers.
- 11) Please do not connect too many plugs to the electrical socket, so as to avoid the electric charge load failing to cause electrical fire.
- 12) Do not use electrical equipment without grounding facilities to avoid electric shock or

electric shock.

1.5 safety regulations for pressure vessels

- 1) The gas cylinder should be used for special purpose, and other kinds of gas cannot be modified at will;
- 2) The gas cylinder should be stored in a cool, dry place far away from heat source. The distance between flammable gas cylinder and open fire should not be less than 5 m; hydrogen cylinder should be isolated;
- 3) The gas cylinder should be handled lightly and stably and placed firmly;
- 4) Don't mix all kinds of barometers;
- 5) Do not allow oil contamination on oxygen cylinders, and pay attention to oil stains on hands, spanners or clothes;
- 6) The gas in the cylinder shall not be used up to prevent backfilling;
- 7) Stand on one side of the barometer when opening the valve, and do not align the head or body with the main valve of the cylinder, in case the valve or barometer rushes out to hurt people.
- 8) It is necessary to make sure that the protective cover is locked before carrying.
- 9) The container shall not be lifted directly by electromagnet, chain or rope.
- 10) Use the trolley as far as possible to ensure the safety and upright position.
- 11) When moving the container by hand, the container should be moved vertically instead of being rolled down.
- 12) It should be fixed during use, and the external color of the container should be kept clear and easy to identify.
- 13) The container can only be used after confirming that its use is correct.
- 14) Check the pipeline for air leakage every month.
- 15) Check whether the pressure gauge is normal.

1.6 Environmental Hygiene

- 1) Each laboratory should pay attention to environmental hygiene and keep it clean and tidy.
- 2) In order to reduce the dust flying, the sweeping work should be carried out outside the working hours.
- 3) The covered dustbin should be cleaned and disinfected to keep the environment clean.
- 4) The garbage removal and treatment must meet the sanitary requirements, and should be dumped in the designated place. It is not allowed to dump and pile up arbitrarily, which will affect the environmental sanitation.
- 5) All toxic or flammable wastes should be specially treated to prevent fire or harm human health.
- 6) Windows and light transmitting parts of lighting appliances shall be kept clean.
7. Keep all corridors and stairs clear.
- 7) When oil or chemicals overflow the ground or workbench, wipe and rinse immediately.
- 8) Form a good habit for users to pick up the sundries on the ground at any time to ensure the cleanliness of the practice site.
- 9) Garbage or waste shall not be accumulated in the operation area or office.
- 10) Industrial fire water should be placed in certain places separately from drinking water.
- 11) Toilets, toilets and ditches should be kept clean.

2. Safety protection

2.1 fire prevention

- 1) Prevent gas leakage from gas pipe and gas lamp, and close the valve after using gas;
- 2) Ether, alcohol, acetone, carbon disulfide, benzene and other organic solvents are inflammable. Do not store too much in the laboratory, and do not pour them into the sewer, so as to avoid fire caused by accumulation;
- 3) Sodium, potassium, aluminum powder, calcium carbide, yellow phosphorus and metal hydride should be used and stored, especially not in direct contact with water;
- 4) in case of fire, we should soberly judge the situation and take appropriate measures to extinguish the fire. According to different situations, we should use water, sand, foam, CO₂ or CCl₄ fire extinguishers to extinguish fire.

2.2 explosion proof

2.2.1 chemical explosion is divided into branch chain explosion and thermal explosion

- 1) Hydrogen, ethylene, acetylene, benzene, ethanol, ether, acetone, ethyl acetate, carbon monoxide, water gas, ammonia and other combustible gases mixed with air to the explosion limit, once a heat source induced, it is very easy to cause branch chain explosion;
- 2) Peroxide, perchlorate, lead azide, copper acetylene, trinitrotoluene and other explosive materials may cause thermal explosion due to shock or heating.

2.2.2 explosion proof

- 1) To prevent branch chain explosion, it is mainly to prevent combustible gas or vapor from being lost in the indoor air, and to maintain good indoor ventilation. When a large amount of combustible gas is used, it is forbidden to use open fire and electrical appliances that may produce electric spark;
- 2) For the prevention of thermal explosion, strong oxidant and strong reducing agent must be stored separately, handled with care and away from heat source.

2.3 burn protection

In addition to high temperature, liquid nitrogen, strong acid, strong alkali, strong oxidant, bromine, phosphorus, sodium, potassium, phenol, acetic acid and other substances will burn the skin; pay attention not to let the skin contact with it, especially prevent splashing into the eyes.

2.4 radiation protection

- 1) Radiation in chemical laboratory mainly refers to X-ray. Long term repeated X-ray irradiation will lead to fatigue, memory loss, headache, leukopenia, etc.
- 2) The method of protection is to avoid all parts of the body (especially the head) directly exposed to X-ray. Shielding and shrinking are needed during operation. Lead and lead glass are commonly used as shielding materials.

3. "Three wastes" treatment

3.1 exhaust gas

- 1) The experiment of producing a small amount of toxic gas should be carried out in the fume hood. A small amount of poisonous gas is discharged to the outdoor through the exhaust equipment;
- 2) The experiment that produces a large amount of toxic gas must be equipped with absorption or treatment device.

3.2 waste residue

A small amount of toxic waste residue should be buried in underground fixed place.

3.3 waste liquid

- 1) For the waste acid solution, it can be filtered with acid resistant plastic mesh or glass fiber, and then neutralized with alkali. After adjusting the pH value to 6-8, it can be discharged. A small amount of waste residue is buried underground.
- 2) For the highly toxic liquid waste, corresponding measures must be taken to eliminate the toxic effect before treatment.
- 3) A large amount of condensate water is used in the laboratory, which can be directly discharged without pollution.
- 4) For washing and washing, it has little pollution and can be discharged into the sewer.
- 5) The acid, alkali and brine solutions are poured into the acid and alkali salt waste water bucket after being used, and then discharged into the sewer after neutralization.
- 6) The organic solvent is recovered in the organic waste drum and separated by distillation and distillation.
- 7) Centralized treatment of heavy metal ions (including precipitation method)

4. Pretreatment of laboratory injury

- 1) Common wound: clean the wound with physiological salt water and fix it with adhesive tape.
- 2) Scald (burn): rinse with cold water for 15 to 30 minutes until heat dissipation and pain relief → wipe with physiological salt water (do not smear with ointment, toothpaste, soy sauce or covered with gauze) → send to hospital in an emergency. (Note: blisters should not be punctured by themselves)
- 3) Chemical burns: wash with plenty of water → cover the wound with sterile gauze or sterilized cloth → send to the hospital for treatment.