Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

OBSERVANCE OF SAFETY RULES WHEN PERFORMING EDUCATIONAL LABORATORY WORKS

M. S. Nabiyeva1
R. A. Hakimova 1,
Sh. Sh. Ramazonova 1,
J. O. Arabov 2
1Buxoro davlat universiteti Mehnat muhofazasi va texnika xafsizligi ta'lim to'nalishi talabalari.
2Buxoro davlat universiteti geliofizika, qayta tiklanuvchi energiya manbalari va elektronika kafedrasi o'qituvchisi.
hakimovaruxshona909@gmail.com,
maftunanabiyeva1996@gmail.com,
j.o.arabov@buxdu.uz

Abstract:
This article will highlight the importance of observance of safety rules when performing educational laboratory work. The need to observe safety rules in order to minimize the risks that arise in the process of laboratory research and experiments is emphasized. The article presents the potential hazards of working in chemistry, physics, biological and electronics laboratories, as well as practical recommendations for their prevention and safety.
Compliance with safety rules ensures the quality and success of scientific work, while protecting the life and health of students and teachers. The article discusses the important role of safe laboratory work in the educational process and the importance of forming a culture of safety for each student. There are also practical instructions on proper behavior and safety in emergency situations.
This article helps to understand the importance of safety in the process of laboratory work in educational institutions and encourages students and teachers to study and apply safety rules in practice.

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

Keywords: educational laboratory work, equipment safety, safety rules, chemistry laboratory, physics laboratory, biological laboratory, electronics laboratory, hazards, protective equipment, laboratory security.

Introduction

In modern education system, it is very important to strengthen theoretical knowledge by practice. Educational laboratory works, especially in the field of natural sciences, engineering and engineering, are the main tool for deepening knowledge, analyzing and forming a scientific approach. However, the work to be done in the laboratory involves various sources of hazards — chemicals, electrical equipment, heat sources, and mechanical devices. Therefore, compliance with safety regulations in the training laboratory is an important factor for the life and health of students, teachers and other participants.

Real-life example: In 2022, in the physics laboratory of a university, students did not use safety glasses while working with a laser device. As a result, a light beam fell directly into one student's eye, causing temporary damage to his eyesight. This situation proved once again that simple carelessness, disregard for safety leads to serious consequences.

Therefore, before participating in laboratory work, every student should thoroughly study and apply safety rules.

The purpose and significance of process safety

Environmental safety is a part of the occupational safety system, it is a set of rules aimed at protecting human life and health in the process of work. By observing these rules in educational laboratories:

- is taken in advance of dangerous situations;
- the experiment is carried out qualitative and continuously;
- students and educators feel confident;
- Skills to act correctly in emergency situations are formed.

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

Basic safety rules to be followed in the laboratory

Before you get started:

- Familiarize yourself with the instructions of the teacher or laboratory assistant when entering the laboratory.
- Wearing personal protective equipment (gown, goggles, gloves, mask).
- Pull the hair back, avoid loose clothes.
- Prior knowledge of chemicals or equipment.
- Not to start the equipment or substances without the permission of the Master.

During Operation:

- Only perform the specified experiment, not change the conditions of the experiment.
- Pour chemicals into designated containers, care when mixing.
- Dry hand work with electrical devices.
- Do not place flammable materials near open flame sources.
- If an event occurs (eg, spill, explosion, combustion), immediately report to the teacher.

Ish tugaganidan so'ng:

- Disabling and cleaning equipment.
- Put chemicals in a special container, put in a safe place.
- Collection of work area and disposal of garbage to a designated place.
- Wash hands, face and eyes with clean water.

Factors that pose special risks

The following conditions are the most common risk factors for educational laboratories:

- **Improper handling of chemicals** (e.g., handling with acid and alkali).
- **Careless reaction to electric current** (open wires, connection with wet hands).
- **Work with open flame and explosive** mixtures.
- **Negligence in handling mechanical equipment** (screwing machines, presses).

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

Emergency procedures

In case of emergency, the following rules must be observed:

- Not to risk one's own life, not to panic.
- Quickly alert the master or the head of the lab.
- Separate the damaged person from an electric current using a wooden rod or other dielectric tool.
- The use of fire extinguishing agents (sand, fire extinguisher) in case of burning.
- Provision of first aid to affected victims (use of medicines located at the destination site).

There are several dangers from training laboratory work that can seriously affect human life and health. Laboratory work carried out in different disciplines involves different sources of risk. Below are some examples of some of the most dangerous work in educational laboratories:

Chemical laboratory works

- The most common risks associated with work in chemical laboratories are:
- **Handling of chemicals**: When handling chemicals such as acids, alkalis, oxidants, organic solvents and other hazardous chemicals can result fatally. For example, acids or alkali can touch the skin, get into the eyes, or inhale, resulting in severe burns, poisoning, or vision loss.
- **Explosion Hazard**: Some chemical reactions can cause an explosion, especially when working under unfavorable conditions or when working with improperly stored substances. For example, the reaction of an acid and metal compound, improper mixing of chemical groups can create an explosion hazard.
- Poisoning: Contamination or release of chemicals into the air can cause poisoning through the respiratory tract.
- **Works of the Physics Laboratory**
- There are various risks associated with physics laboratories:
- **High voltage and electrical current**: Caution is necessary when handling electrical appliances, wires, and measuring instruments. An electric shock can result in life-threatening injuries.

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

- **High temperature and heat sources**: When using heat sources, such as when working with ovens, foamers or lasers, there is a risk of burns. Burns of the eyes or skin may occur from laser beams or high-temperature sources.
- **Radiation: Some** physical experiments may require radioactive material or high-energy radiation. This, in turn, can lead to radioactive damage or exposure to high-energy radiation.

Biological Laboratory Works

- Risks in biological laboratories are more closely related to microbiological and biological impacts:
- **Pathogenic microorganisms**: In microbiology and genetics laboratories, working with pathogenic bacteria, viruses or fungi creates a risk of damage due to their airborne or direct contact. For example, transmission of E. coli, salmonella or other infectious diseases.
- **Handling biological agents**: When performing experiments on plant or animal tissues, or genetics, biological agents can be hazardous. They can lead to allergic reactions, infection, or other health problems.
- **Mixing of chemicals with infection**: New risks can arise from the mixing of chemicals and biological materials.

Works of the Laboratory of Informatics and Electronics

- Laboratories in the field of electronics and informatics also pose unique risks:
- **Handling** electric shocks: Touching high-voltage devices while working in electronics laboratories can lead to electric shocks. This is especially dangerous if you work with equipment with powerful current sources or large energy capacities.
- **High Temperature in Electronic Devices**: In some electronic devices, such as when working with batteries, switches or inductors, high temperatures can be exposed and can cause burns or other thermal damage.

Food and agriculture laboratory Jobs

- When working in the food industry or agricultural laboratories, there are the following risks:

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

- **Contamination by chemicals**: Risk of poisoning from pesticides, chemical fertilizers for plants, or substances used to preserve food.
- **Biological hazard**: Contact with pests or infected organisms when working with plants and animals can provoke infection or allergic reactions.

Conclusion

Strict adherence to safety regulations in educational laboratories is not only an obligation, but a necessity. Violation of all these rules can lead to conditions that are dangerous to health, and sometimes even life-threatening. Therefore, every student should follow a safety culture and make this knowledge and skills an integral part of their life in order to protect their own health and the health of others. Only then will laboratory classes be effective, safe and useful.

References

1. State standards. (2007). Safety regulations in educational laboratories. Tashkent: Ministry of Education of the Republic of Uzbekistan.
2. Gaibullaev, R. & Karimov, M. (2015). Safety and Health in Chemistry Lab. T. : Science and technology publishing house.
3. Aliyev, T. & Isakov, R. (2018). Engineering safety and ecology. T.: O'zbekiston State University Publishing House.
4. ISO 45001 (2018). Occupational health and safety management systems — Requirements with guidance for use. International Organization for Standardization (ISO).
5. Balandin, N. V. (2017). Safe Lab Practice: A Student Guide. Moscow: Akademiya Publishing House.
6. Khamidov, A., & Turaev, S. (2016). Safety and sanitary and hygienic requirements. T.: Uzbekistan Technical University Publishing House.
7. Labour Code of the Republic of Uzbekistan (2020). Occupational Safety and Health Regulations Tashkent: Oliy Majlis of the Republic of Uzbekistan.
8. UNESCO (2014). Science and Technology Education: A Resource Book for Teacher Educators, Curriculum Developers, and Policy Makers. UNESCO Publishing.

Modern American Journal of Engineering, Technology, and Innovation
ISSN(E): 3067-7939
Volume 01, Issue 02, May, 2025
Website: usajournals.org

9. Kormilitsyn, P. P. & Kravchenko, A. (2019). Creating a Safe Working Environment and Occupational Health (2nd edition). Moscow: Izd-vo Nauka.
10. HSE Guidelines (2017). Health and Safety Executive - Laboratory Safety and Chemical Safety Management. UK Health and Safety Executive.
11. Kurbanov, D. (2015). The importance of compliance with safety rules in the training process. Journal of Pedagogy and Scientific and Technical, 7(3), 55-60.
12. Smith, J., & Walker, L. (2016). Laboratory Safety Handbook. New York: Wiley & Sons.
13. Olimboyevich A. J. FIZIKA FANIDAN MASALALAR ISHLASHDA ZAMONAVIY PEDAGOGICAL TEKHNOLOGIYALARDAN FOYDALANISH //Scientific impulse. – 2025. – T. 3. – No. 29. – C. 202-208.
14. Asadovna F. X., Olimboyevich A. J. ANALYSIS OF MODERN WEB PLATFORMS USED IN TEACHING MECHANICS (GOOGLE CLASSROOM, MOODLE, EDMODO, KHAN ACADEMY ETC.) //Scientific Impulse. – 2025. – T. 3. – No. 29. – C. 195-201.
15. Akhmatovna M. D., Olimboyevich A. J. APPLICATION OF INNOVATIVE APPROACHES IN MOLECULAR PHYSICS PRACTICAL TRAINING //Scientific Impulse. – 2025. – T. 3. – No. 29. – C. 187-194.
16. Arabov J.O., Fayziyeva X. A. General considerations on the methodology for solving problems in physics // Gospodarka i Innowacje (2022) №22, C 619-623.
17. Atoeva M.F., Arabov J.O., Kobilov B.B. Innovative Pedogogical Technologies For Training The Course Of Physics.// Journal of Interdisciplinary Innovations and Research, (2020). 2(12), PP 82-91.
18. Arabov J.O., Sattorova G.H. Technique For Solving Problems in Mechanic // Central
19. Asian Journal Of Mathematical Theory And Computer Sciences (2021) №2 (10),pp 37-42
20. J.O. Arabov. Grouping of methods of teaching physics in schools. Scientific Focus, Vol. 1 No. 10 (2024). pp. 201-205.