Comparative Study on Safety Management of Chemical and Chemical Laboratories in Chinese and American Universities Based on Cultivation of Innovation Ability

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Abstract: Laboratory safety management is an important and arduous task in university laboratory management, especially in chemical and chemical laboratories. Safety management rules of chemical laboratories are an important part of University Safety work, and an important guarantee for building a harmonious campus and avoiding safety accidents. Safety management of chemical laboratories in Colleges and universities should be the primary task for teachers and students to carry out experiments. Only safety can make the laboratory work smoothly and realize the scientific development concept of people-oriented. U.S. colleges and universities have accumulated a lot of practical experience in laboratory safety management under the guarantee of strict laws and regulations and perfect management system. In order to promote the institutionalization, standardization and standardization of the safety management of chemical laboratories in universities in China, this paper compares the safety rules of chemical laboratories in universities in China and the United States, analyzes the deficiencies in the safety rules of chemical laboratories in China, and then puts forward corresponding measures and feasible suggestions.

1. Introduction

The chemistry laboratory of colleges and universities is an important place for chemistry teaching and scientific research. It is the main battlefield for cultivating high-quality chemistry talents and high-level research results under the new situation. After long-term efforts, the university laboratories have developed by leaps and bounds in construction and management [1]. However, compared with the society's demand for talents, the construction and management of laboratories are still relatively backward. There are many kinds of chemical laboratory reagents, many of which are flammable, explosive, toxic or corrosive. Experimental teaching and research have certain risks [2]. The chemistry major in American universities is not a popular major and the number of students is relatively small. However, chemistry is a basic subject, and many related professional courses require basic knowledge of chemistry, so students need to take basic chemistry courses and their corresponding experimental courses [3]. With the strict laws and regulations and perfect management system as the guarantee, American colleges and universities have accumulated a lot of practical experience in the safety management of laboratories, which provides an important reference for laboratory management in other countries [4]. The safety management of chemical laboratories in colleges and universities should be the primary task for teachers and students to carry out experiments. The safety management of chemical laboratories in colleges and universities should be the primary task for teachers and students to carry out experiments. Only when safety is ensured can all laboratory work be carried out smoothly and the scientific concept of development based on people be realized.

In recent years, China has also gradually strengthened its emphasis on the safety of laboratories in colleges and universities. The Ministry of Education, the Ministry of Environmental Protection and other national ministries and local governments have formulated relatively perfect management systems [5]. The safety management of chemical laboratories in colleges and universities should be

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the primary task for teachers and students to carry out experiments. The teaching and scientific research in Chinese universities will surely enter a crucial period of overcoming difficulties. First-class universities should be equipped with first-class comprehensive teaching and scientific research experimental bases and first-class laboratory safety management level [6-7]. There are many kinds of reagents in chemical laboratory. Many chemicals are flammable, explosive, toxic or corrosive. Experimental teaching and research have certain risks. Due to the lack of effective countermeasures and measures, the phenomenon of “focusing on construction but neglecting management” has not been fundamentally improved [8]. By comparing the safety rules of chemical laboratories in China and the United States, this paper reflects on the safety management of chemical laboratories in colleges and universities in our country, and promotes the institutionalization, standardization and standardization of the safety management of chemical laboratories in colleges and universities in our country.

2. Comparison of Safety Rules between Chinese and American Chemical Laboratories

There are no regulations on the safety of students' experiments in the teaching materials for chemistry majors in colleges and universities in our country, and there is no uniform safety rules for students in chemistry laboratories in our country. Due to the differences in political and economic, historical and cultural backgrounds between China and the United States, there are great differences in chemistry education thoughts and experimental teaching methods. There is no independent and unified safety management department in China's colleges and universities. Laboratory safety work is generally undertaken by the Laboratory and Equipment Management Office. Some domestic colleges and universities have also imitated some forms of foreign colleges and universities, but the implementation is not so ideal. It may be that there are too many students in our country who are not well managed, or that students see complicated processes and produce resistance, or that safety awareness is weak and humanized management is lacking [9]. American universities have very strict management of laboratory staff. Depending on the type of hazard that may be present in the laboratory, the laboratory is divided into different safety categories and levels, and a conspicuous mark is placed on the laboratory door. As an important place for the implementation of experimental teaching and effective guarantee, the chemical laboratory must strive to create a safe and humanized experimental environment for teachers and students.

There are few full-time staff in China's university laboratory safety management, and the safety management system is still in the stage of existence and cannot guarantee the feasibility and operability of the system policy. Comparing the safety rules of chemical laboratories between China and the United States, there are similar aspects in the purpose of formulation, requirements for students, style of writing and content, and there are still major differences. There are many safety management personnel in colleges and universities in the United States, and most of them have experience in enterprise safety management. With years of practice, the laboratory safety management system of American universities has been very sound. Safety education in China often emphasizes how to operate correctly, the serious consequences of accidents, and the responsibility for accidents. Finally, it may mention some measures for safety and self-rescue. Chinese colleges and universities have begun to attach importance to the construction of laboratory safety education system, and have set up safety education training and examination systems to varying degrees. Some schools require freshmen to complete safety education examination before reporting for duty, and only after passing the examination can they enter the school. These details are different, which often requires us to reflect on what is the purpose of safety education and how to effectively learn from foreign safety education forms and contents according to the actual situation of our laboratory.

3. Comparison of Laboratory Management between China and America

3.1. Construction of laboratory safety facilities

U.S. university laboratories have standardized fire fighting equipment, including fire fighting

systems that are easy for firefighters to operate and fire alarm devices that are easy for ordinary laboratory personnel to use, foam extinguisher, barrier-free fire exits, etc. China is a country that advocates pragmatism. The safety rules for students in chemical laboratories in colleges and universities are formulated in a specific, detailed and operable way. To some extent, it is the reflection of pragmatism in chemical experiment teaching. Each kind of safety management project has detailed rules and regulations, which provide effective basis for implementation and operation, thus making the laboratory safety management work highly operable and ensuring the implementation of policies. At the time of the accident, the experimenter can quickly evacuate to the designated meeting place according to the instructions. Domestic universities have greatly improved the construction of safety facilities. Most laboratories and experimental teaching buildings are equipped with fire extinguishers and fire protection systems, but the details have yet to be further improved. The responsibility management network of the Faculty of Chemistry should be established. Schools should improve the responsibility management mechanism of chemical departments. From college administrators to department heads, laboratory directors and laboratory teachers, a safety responsibility system should be implemented at every level.

Most colleges and universities in China are confused in chemical safety management, with unclear classification and label. The purchase and management of toxic and harmful drugs are relatively lax and often lose. In the process of construction and management of chemical laboratories and the formulation of safety rules, we should consider and implement the core concept of people-oriented from beginning to end, so that safety can determine everything. At present, the hardware facilities of domestic laboratories are not inferior to foreign countries, and some are even better than foreign universities. However, many domestic university laboratories are not as efficient as foreign laboratories, and the benefits and resources sharing of large-scale equipment are often just shouting. The slogan is above and formally. Good safety habits should include: chemical experiment safety awareness, proper use of the instrument, standard operation, compliance with safety rules, and attention to drug usage control. Instructions for the use of safety emergency telephones and safety emergency facilities are also indicated in the corresponding locations of the laboratory so that laboratory staff can receive timely guidance and assistance in the event of an emergency.

3.2. Laboratory and laboratory personnel management

With the continuous expansion of the scale and enrollment of domestic universities, and in order to cultivate innovative talents, the requirements for openness and sharing of laboratory resources are higher. In order to meet the needs of students' basic security and dignity, it is priceless to embody people's lives and is the first consideration in all work. As the main body of the laboratory, the safety training of laboratory staff is an essential link. The safety rules and management of chemical laboratories in colleges and universities in our country mainly do not embody the core concept of people-oriented. University chemical laboratories must enforce safety training courses and examination systems, and implement rigid safety education and chemical laboratory access systems. There are security guards such as doormen in domestic laboratory buildings, but there are no doormen in foreign laboratories. In foreign countries, the entrance to the laboratory building is by credit card, and the corridor door will be closed automatically after work time. Because the safety standards change year by year, all scientific researchers must also participate in regular safety training according to the provisions of the school laboratory safety management.

4. Conclusions

By comparing the safety management of laboratories in American universities in China, we can find that although there are political and economic differences between China and the United States. In the work of laboratory safety training in our country's colleges and universities, the establishment of laboratory safety training mechanism in colleges and universities has become a top priority. U.S. colleges and universities have accumulated rich experience in laboratory management after a long process of development, and many of our newly-built colleges and universities can selectively learn

from their management concepts and methods according to their own conditions. The safety rules of chemical laboratories in Chinese and American universities vary greatly from concept to emphasis. We should recognize and analyze the causes of the differences, learn from the experience of the United States, and reflect on the safety management of chemical laboratories in Chinese universities. In addition, we will create a harmonious environment for teachers and students, so that the teaching and research of chemistry experiments in colleges and universities can be carried out smoothly. Through safety training, you can master the necessary safety equipment operation skills and emergency treatment methods, and standardize experimental operation procedures to prevent accidents. Laboratory safety education should be incorporated into the daily teaching work of colleges and universities, and safety training courses should be set as compulsory courses, so that the safety training of college laboratories is scientific, standardized and normalized.

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