

# *Osmotic Analysis of Green Chemistry Education Concept in Chemistry Experiment Teaching*

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**Abstract:** In the stage of college learning career, the purpose of learning is no longer simply excellent grades, whether to master the knowledge points or not, but more importantly, to cultivate students' core quality through learning. Chemistry, as an important subject to promote the development and progress of human beings, students should not only learn chemistry professional knowledge in the process of learning chemistry, but also promote the cultivation of chemistry thinking through chemistry learning. Green chemistry is also known as environmental protection chemistry. Green chemistry is a new subject proposed under the new educational reform environment in the new era. The purpose is to cultivate students' awareness of protecting the ecological environment through the concept of green chemistry, and to make efforts to improve the ecological environment.

## 1. Introduction

With the vigorous development of China's economy, social construction and development of the demand for chemical products is increasing, the development of chemical industry is relatively rapid, chemical industry in the economic development at the same time, to China's ecological environment caused some damage, and even has threatened the safety of human life. Therefore, experimental teaching, as the main means of chemistry course education, permeates the concept of green chemistry education in the experimental classroom of university chemistry, which is an inevitable requirement of modern development and an important way to implement the national sustainable development strategy. This paper will combine personal teaching experience, first elaborate the concept of green chemistry, preliminarily analyze the importance of infiltrating green chemistry education concept in the experimental teaching of chemistry in universities, and finally put forward the corresponding scientific and effective measures.

## 2. Green chemistry related elaboration

### 2.1 Explanation of the concept of green chemistry

Green chemistry is a new concept put forward after the concept of green food and green ecology. Green chemistry, also known as environmental protection chemistry, is a discipline dedicated to the

study of technically feasible chemicals and chemical engineering that have no pollution to the environment or minimal pollution. Green chemistry is the combination of chemical knowledge and technology, which reduces the degree of pollution produced in the process of chemical experiments, and scientifically and effectively controls the pollution of chemical pollutants to the ecological environment.

## **2.2 The concept of green chemistry education**

The concept of green chemistry education is based on the subject of green chemistry. In the actual course of the teaching process of chemistry, teachers should start from the perspective of ecological environment protection, cultivate students' awareness of ecological environment protection, and comprehensively grasp the product design and manufacturing. In the process of implementing the concept of green chemistry education, teachers should train students to take green environmental protection as the standard in the design concept, and lay a solid foundation for the future social practice activities.

## **2.3 Green Chemistry Core Content**

The foundation of environmental protection chemical industry is to reduce environmental pollution through the basic principles of chemical industry and new chemical science and technology, with atomic economic benefits as the basic criterion. Its content involves the "5R" criterion of atomic economic benefits. Economy between molecules refers to the full use of all molecules in the generated gas, which can make full use of natural resources and avoid environmental pollution. Atomic utilization efficiency means that the combination of the target product reduces the chemical reaction of waste and causes less harm to the natural environment. In chemical practice, the "5R" standard, namely Reduction: reduce the use of raw materials, to reduce the generation and pollution of experimental wastewater.

## **3. The significance of infiltrating green chemistry education concept in college chemistry experiment Teaching**

Green chemistry plays an important role in promoting the development of industrial technology. At present, China attaches more importance to the ecological environment, which requires the coordinated development of economic development and ecological protection. In this context, it is of profound significance to infiltrate the concept of green chemistry education into the chemistry experimental teaching in universities. In addition, with the continuous advancement of China's education reform, the training of talents in higher education has changed from professional and technical personnel training to having a high sense of responsibility and comprehensive professional quality. As an important measure to realize the sustainable development of ecological environment, green chemistry is the basic quality for college students in the new era.

### **3.1 The concept of green chemistry education can improve the green environmental awareness of contemporary college students**

In the new period, the new educational reform clearly put forward that the education of college students should take the cultivation of students' core literacy as the educational goal. Through the education of green chemistry concept, learning green chemistry knowledge can not only improve students' understanding of the importance of the ecological environment protection, make due contributions to reducing the damage of chemical industry to the environment in the social and

economic development, promote the cultivation of environmental protection chemical talents, but also cultivate students' core literacy.

### **3.2 The concept of green chemistry education is conducive to cultivating college students' sense of social responsibility**

In the final analysis, the green chemistry teaching concept advocates the formation of a good teaching system in the actual chemistry experiment teaching process, closely combines the content of chemistry knowledge closely with the actual life, and realizes the teaching goal of "learning for use". The concept of green chemistry education is consistent with the concept of quality education in China. In the actual chemistry experiment teaching, teachers can use the concept of green chemistry education to cultivate the innovative spirit of contemporary college students, and on this basis, promote the formation of socialist college students' responsibility. Through the teaching of green chemistry concept, it can not only cut off the source of pollution, but also better protect the ecological environment. While effectively improving the efficiency of chemistry teaching, we should cultivate the comprehensive talents with a strong sense of social responsibility needed for socialist construction.

### **3.3 The concept of green chemistry is conducive to enriching the teaching content of chemistry experiment**

The concept of green chemistry education into chemistry experiment teaching in colleges and universities can broaden the future career choice of college students, improve their comprehensive quality, and enrich the content of teachers in chemistry experiment teaching. In the actual teaching process of chemistry experiment teaching, teachers can let students discuss the current ecological pollution problem, and put forward the improvement measures of ecological environmental pollution problem through the experimental verification of the chemical knowledge. At the same time, they can guide students to explore some effective measures to prevent environmental pollution

### **3.4 Green chemistry is an important part of chemistry teaching in colleges and universities**

Learning experiment teaching is the main means of efficient chemistry course education in schools, and universities also more and more emphasize the basic ability training for students to practice chemistry experiment in chemistry course. With the proposal of the national sustainable development strategy, higher education also puts more and more emphasis on the cultivation of green human resources. It is of great significance to improve the chemistry education system of the chemistry experiment teaching in schools, and it is also the main teaching content of chemistry education in Chinese colleges and universities. For example, the use of chemical tests to develop new materials, to reduce automobile pollution to the atmospheric environment pollution, and then to achieve the purpose of transforming the atmospheric environment.

### **3.5 The concept of green chemistry education meets the overall requirements of the state for chemistry teaching in colleges and universities**

The road of socialist construction is the road of sustainable development. In the process of sustainable development, ecological and environmental issues are issues related to the healthy economic development. Green chemistry education is an effective measure to improve China's ecological environment. The educational responsibility of colleges and universities is not only to cultivate intellectual talents, but also to train the successors of the future socialist construction of the motherland. Colleges and universities should realize the importance of green chemistry education.

Green chemistry meets the overall requirements of the national chemistry education in colleges and universities.

#### **4. The infiltration strategy of green chemistry education concept in chemistry experiment teaching**

Experiment is an important means of chemistry research, and experimental teaching is the basis of chemistry education. Experimental teaching can not only make students better understand chemistry knowledge, but also play a promoting role in consolidating chemical theoretical knowledge. Through experimental teaching, students' ability to find, analyze and solve problems can be improved. However, it is inevitable to involve toxic and harmful substances in chemistry experiment teaching. Green chemistry and chemistry experiment are the most direct and closely related, so it is very necessary to infiltrate the concept of green chemistry education in chemistry experiment teaching.

##### **4.1 Take the green chemistry teaching content as the teaching focus**

As for how to penetrate the concept of green chemistry education through actual classroom chemistry experiment teaching, the author believes that first of all, green chemistry teaching content should be implanted in classroom teaching, and students should break the traditional chemistry learning methods, break through the thinking restrictions, and understand the close relationship between chemistry experiment and environmental protection. In chemistry experiment practical teaching, on the basis of the teaching material, combined with the actual situation of students to chemical knowledge, implanted green chemistry content, in enhance the students of chemistry science at the same time, develop the new ideas of learning chemistry knowledge, through chemical experiment increase knowledge, accumulate professional knowledge experience, let the students take the initiative to accept and habit and green chemistry concept. For example: the concept of haze is a hot topic for several years, in chemistry experiment teaching teachers can through social attention to attract students learning attention, in the process of haze phenomenon teachers can implant the concept of green chemistry, green chemistry and daily life common problems together, improve the practicability of chemical knowledge at the same time, virtually can enhance students' ecological environment protection consciousness, let students learn more active and active chemical experiment knowledge.

##### **4.2 Strengthen students' awareness of green chemistry through experimental teaching**

In experimental teaching, teachers should encourage students to solve the pollution problem of chemical experiment pollution with innovative thinking, reduce the damage and pollution to the ecological environment, and subtly affect students' awareness of ecological environment protection, so as to strengthen students' green chemistry concept. For example, mercury thermometer is commonly used in chemical experiments to chemical experiment tools, in the preparation of "methyl orange" experiment, the teacher explained the experimental principle before the experimental operation, the teacher can explain the students mercury harm to human body, at the same time emphasize the thermometer accidentally broken, to timely treatment with mercury, mercury through chemical reaction into mercury sulfide, so as to reduce the pollution and harm to the environment. From the teaching point of view, this is a very small thing, but through the long-term use of green chemistry by teachers to influence students, over time, students will establish the awareness of green chemistry.

### **4.3 Combined with the teaching content of chemistry experiment, the micro chemistry experiment is used appropriately**

Microchemical experiment is a new chemical experiment method emerging this year. The advantage of microchemical experiment is that it can still achieve the same chemical experiment effect while reducing the chemical reagents needed for the experiment. The reduction in the amount of chemical reagents is bound to reduce the amount of pollutants generated. For example, in the preparation experiment and synthesis experiment, the amount of drugs will be reduced to one fifth of the conventional amount; in the nature experiment, change to trace analysis, change the large test tube used in the conventional experiment to small test tube, the experimental liquid dosage will be a few drops, the experimental imagination will be more significant and intuitive. The microchemistry experiment is not the shrinkage of conventional chemical experiments, nor the opposite of conventional chemical experiments, but the reduction of pollutants in the experiment under the background of green chemical education concept. Microchemistry experiment is the reform and innovation of conventional experiments. And in the operation of the experiment, the micro-chemical experiment is more convenient and easy to do, the experimental phenomenon is more convenient to observe, and more importantly, the pollution to the ecological environment is small or even zero pollution. It is consistent with the concept of green chemistry education, that is, to achieve the teaching purpose, and has played a role in promoting the students to establish the concept of green chemistry.

### **4.4 Strictly implement the laboratory three waste treatment regulations, to eliminate environmental pollution**

The phenomenon of "three wastes" and "three wastes" produced in chemical experiments is relatively common, and the university chemistry laboratory has clear regulations on the treatment of "three wastes". For the treatment of three wastes in chemical experiment, chemical treatment should be adopted for scientific and reasonable treatment, which not only achieves the purpose of green chemical education concept, but also saves the raw materials of chemical experiment. For example, in the preparation teaching of cobalt hexaamide trichloride, teachers should pay attention to the design of students' recycling experiments on cobalt and silver metal recycling. For ineffective chemical liquids, they should take proper treatment methods, neutralization or reduction by chemical reaction to minimize the pollution caused to the environment. In the process of actual chemistry experiment teaching, teachers should strengthen students' attention to the treatment of three wastes, cultivate students' good experimental habits, and gradually improve students' cognition of the concept of green chemistry.

## **5. Conclusion**

In the process of chemistry experiment teaching in colleges and universities, teachers should try every means to penetrate the green chemistry concept into students, which can not only increase students' knowledge, but also importantly establish students' awareness of ecological environment protection, so that students can have a comprehensive understanding of the society and better serve the society after graduation. Therefore, whether from the perspective of national development or ecological environment protection, chemistry teachers in the new era should take the goal of "green chemistry penetration into chemistry experiment teaching" as their own responsibility, and make efforts to cultivate talents needed for socialist construction.

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