

# The Penetration of Environmental Awareness in Organic Chemistry Experiment Teaching

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## ABSTRACT

With the continuous development and progress of science and technology and society, the relationship between education and environmental protection is increasingly close, and people's attitude towards pollution is more and more serious, away from the formalism. We have the responsibility and obligation to implement this important measure of environmental awareness in chemistry teaching. Therefore, in this paper, the existing problems and pollution sources of organic chemistry experiments, the necessity and measures to achieve environmental chemistry are described.

## KEYWORDS

Environmental awareness; Organic chemistry experiment; Greenization

## 1. INTRODUCTION

As one of the main elements in chemistry experiment teaching, organic experiment has a unique position in experimental teaching, and can effectively cultivate students' practical ability and creative ability. Due to the popularization of experimental teaching and the extensive use of experimental reagents, a large number of toxic and harmful by-products have been produced, which not only pollute the environment [1], And for the teachers and students' body also caused great harm, if not properly treatment, the consequences are unimaginable.

## 2. CURRENT SITUATION OF ORGANIC CHEMISTRY EXPERIMENTAL TEACHING REFORM

### 2.1. Status Quo of Domestic Research

In order to promote the development of education, improve the teaching level, strengthen scientific research team, stimulate students learn chemistry curiosity, a series of organic chemistry experiment reform, from the teaching material content, teachers, teaching forms, teaching methods and assessment content made the rectification, therefore, we should timely rectify the present situation of chemical experiment teacher said what is what, not limited to the rigid teaching, at the same time to strengthen the chemical experiment inquiry design [2]. From the traditional teaching assessment to now is given priority to with students, teachers' complementary teaching mode, timely introduction of new technology, give priority to with student ability development, at the completion of the teaching task, at the time of the national policy, the environmental protection consciousness always, from the source, and green chemistry can follow the current law of economic development, also can adapt to the education development characteristics, green chemical promote harmony between man and nature,

the pursuit of resource sustainable development, organic chemistry experiment teaching process also want to conform to the development of The Times.

## **2.2. Current Situation of Overseas Research**

With the rapid development of global green industry and green economy, green experiment is accepted by more and more people, and the development of green technology and industry is valued by governments and enterprises of all countries. New ideas, new means and new achievements are constantly emerging, thus giving teaching more connotation and rich content. For the organic chemistry experimental teaching, for the environment of human survival, actively implement green chemistry, from the teaching process, program design, specific implementation, and strive to implement the environmental awareness while completing the teaching objectives. In recent years, green chemistry has developed rapidly in Europe and the United States. Most countries have actively promoted green production technology and implemented the waste minimization and optimization method, which has achieved great success.

## **3. PROBLEMS EXISTING IN THE ORGANIC CHEMISTRY EXPERIMENTS**

### **3.1. Learning Attitude is not Rigorous Enough**

In the current experimental teaching, most students do the experiment in line with the idea of completing the task, for the basic operation is disdain, the teacher in the explanation of knowledge is always careless, left ear into the right ear out, do the experiment error, and even may occur dangerous accidents. Without a rigorous and serious attitude, resulting in random waste of laboratory drugs, improper operation, random disposal of waste, such violations are widespread. Here, the teacher must set an example, strengthen their own operational norms and environmental awareness, in the future teaching edification and infection of students, let students be influenced, correct their learning attitude, passive learning for active learning, reduce unnecessary mistakes. As a student, do a good job of preview before class, complete the preview report, properly understand the basic properties and precautions of the substances used in the experiment, choose appropriate treatment methods according to their characteristics, rationally use instruments, for volatile substances to use, immediately cover the lid, to avoid pollution.

### **3.2. Use of Toxic and Harmful Drugs**

According to the rapid development of scientific research and the strict requirements of teaching, a large number of students and teachers cannot avoid using some toxic and corrosive solvents and catalysts in the process of organic experiments [3]. In this way, students need to master the identification and use methods of general toxic and corrosive drugs. This kind of drugs should be classified, and cannot be stored for a long time, do timely window ventilation, and the treatment should also meet environmental standards.

### **3.3. The Experimental Design is not Reasonable Enough**

A good experiment must first have a perfect experimental scheme, so that the experiment can proceed smoothly. On the one hand, we experiment scheme do perfect, so we can organize students to pre-class discussion, combing theoretical knowledge, environmental protection consciousness, put forward their own views, each design a feasibility experiment scheme, under the premise of not change the nature of the experiment as much as possible to reagent low toxicity, nontoxicity, less dosage, experiment used in short time, simple product processing, finally choose the optimal scheme, from the source to eliminate waste, reduce the pollution of the experiment, so not only exercise the students' ability to explore, also developed their thinking ability. On the other hand, the design of the

experiment time is unreasonable, and the theory part is carried out without systematic learning, resulting in the derailment of practice and theory, leading to students' leaping learning and failure to connect knowledge. Our teaching process should be based on the students' cognitive laws, and we should properly deal with the relationship between theoretical knowledge and practical knowledge, and carry out meaningful teaching.

### **3.4. The Teaching Content is Backward and the form is Single**

#### **3.4.1. Textbook content lags behind**

Textbook is a school main tool to achieve the goal of education, is the main guidance of course material, is also the reference of teaching teachers, due to the rapid development and subjective and objective reasons make textbooks can not include all kinds of new knowledge, the current part of colleges and universities use old textbooks, backward experimental content, and old instruments, cannot reach the effect. At the same time, it will cause students' thinking backward, cannot keep up with the pace of the development of The Times, be squeezed out of the social flow, easy to cause inferiority complex.

#### **3.4.2. The teaching form is single**

In previous experiments, whether inorganic experiment, analysis experiment, physical and chemical experiment or today we explore organic experiment, teachers adopt the traditional way, directly to the students a set of preview scheme shows that the purpose of the purpose of the experiment, experimental conditions, experimental process and experimental results, for the preview report, students are also step-by-step copy up, for slightly change is too late to respond. And organic chemistry experiment including basic operation, validation experiment, developmental test, research experiment, most mainly validation experiment in colleges and universities, teachers before the experiment theory knowledge and experimental steps of guidance, students step-by-step, students form the habit of not active thinking, not develop thinking ability, gradually lose interest in learning. It will also cause students to fish in troubled waters, conformist appearance, do not know how to be flexible, even if the academic situation is excellent, is also a "bookworm".

## **4. SOURCE OF CONTAMINATION IN ORGANIC CHEMISTRY LABORATORIES**

### **4.1. Waste Liquid and Waste Residue are not Treated**

Chemical experiments will inevitably produce low utilization rate or not use of waste, especially in organic chemistry experiments, a large number of the use of toxic and harmful drugs is to produce a lot of waste liquid, waste gas, waste residue, due to the wrong operation and handling, such as direct waste liquid into the sewage, waste gas, waste dumping, make these toxic and harmful substances volatile into the atmosphere, into the underground, cause certain harm to the environment, so I think our experiment process must be waste processing, really processing of recycling to the corresponding container. Before, the treatment of waste liquid was generally carried out by teachers, and students did not have this awareness. Now we should make up for this loophole, organize team members and even individuals to treat the experimental waste liquid, strengthen the awareness of environmental protection, develop standardized experimental habits, and improve students' ability and scientific literacy.

### **4.2. Insufficient Capital Investment and Recognition**

On the one hand, at present, some universities do not have enough awareness of the rigor of experimental teaching and insufficient capital investment, resulting in the shortage of funds and the

end of the experiment, unable to complete the follow-up treatment work, so they can do nothing about environmental pollution. On the other hand, teachers and students for the experimental scheme is not thorough, no preview in advance, systematically understand knowledge, drug waste, the failure of the experiment, and some schools only pay attention to teaching progress to ignore environmental protection education, in order to complete the teaching goal, compression experiment project, neither source processing nor the end processing, think once twice not necessary, not much damage to the environment, but little makes a mickle makes a mickle, cause a lot of pollution. Under the guidance of these absurd streams of consciousness, it is not conducive to the formation of students' environmental awareness, and it is not conducive to the healthy development of students' physical and mental health.

## **5. THE NECESSITY OF ACHIEVING ENVIRONMENTAL CHEMISTRY**

Along with the social reform of education and teaching, the organic chemistry experiment should also keep up with the pace of The Times, make the corresponding rectification, and gradually form a complete teaching system [4]. In recent years, our country has made great efforts to build ecological civilization and build the sustainable development of chemistry teaching. Therefore, green chemistry and environmental protection chemistry have become the theme of The Times and the general direction of development. We should gradually implement the environmental awareness from teaching, and improve students' awareness of environmental protection and sustainable development concept. Green chemistry fundamentally reduces pollution, controls pollution, uses non-toxic and harmless or low toxicity reagents, as far as possible to achieve high utilization rate of atoms, to achieve zero emissions, so it is also called environmentally friendly chemistry, rather than pay attention to the end treatment, after the waste treatment. This also saves the development cost, lays the foundation for the development of organic chemistry, reduces the burden of social development, makes contributions to the sustainable development of China, and also contributes to the cultivation of students' awareness of saving and environmental protection.

## **6. MEASURES TO ACHIEVE ENVIRONMENTAL PROTECTION CHEMISTRY**

### **6.1. Reasonable Design of Experiments**

The problems exposed in the teaching reform is the single teaching content, the teaching process of sloppy, experimental operation is not standard, the intuitive expression of the intuitive expression, the experiment content, experiment scheme no innovation, experimental equipment upgrading slow, the traditional teaching method only requires students to master the experimental steps and results, the experiment problems and pollution how to solve little, lack of humanistic care, to the theoretical knowledge, is not conducive to improve students' comprehensive quality [5]. As a basic course of chemistry, chemical industry, medicine, biology and other majors, organic chemistry experiment requires students to master the name, use method and basic operation of instruments, so as to lay a solid foundation for the cultivation and training of students' practical ability. Therefore, the organic chemistry experiment occupies a certain proportion in the teaching. For the experimental process, we must uphold the rigorous attitude, professional operation, green methods to develop a feasible (small environmental pollution, high atomic utilization rate, low price, short time) scheme. Organize students to explore the experimental scheme, from the experimental knowledge, experimental principle, experimental steps, expected results, step by step to determine the experimental scheme, the teaching method can not only let students master the experimental operation, also can exercise students' ability to design experiment scheme, both the green experiment, also cultivate the students' environmental protection consciousness and innovation consciousness, improve the experimental skills, is advantageous to the students' all-round development, fully staffed.

And now the university syllabus of organic experiment mainly has basic operation, validation experiment, material synthesis, we can integrate these experiments, the basic operation and property validation in material synthesis experiment, make them no longer a single independent part, both saves the experiment time, reduce the number of related reagents, and exercise the students' comprehensive application ability. Or conduct tandem experiments, using the products of this experiment as raw materials for other experiments [6], Such an experiment has more strict operational requirements for students, because the purity of the previous experimental product directly affects the effect of this experiment, which can effectively cultivate students' scientific and rigorous experimental attitude, and solve the problem of environmental pollution caused by the long-term storage of synthetic substances.

## 6.2. Green Experiment

The greening of the experiment means that the experiment produces less pollution from the beginning to the end, as far as possible not to produce pollution. Pollution not only has an impact on our living environment, but also is the main culprit of rhinitis, vision loss, hair loss, respiratory diseases and blood diseases. Only set up the correct experiment and environmental protection consciousness, using emerging technology to maximize the atomic economy, step by step from a small use of toxic and harmful reagents and catalyst to use toxic and harmful substances, from less waste to not produce waste, from processing by-products to produce by-products, finally achieve zero emissions, zero pollution. Using the principles of green chemistry to constantly explore the teaching materials, design reasonable experiments, so that we will have a beautiful living environment. We will green up the experiment from the following aspects:

- (1) The greening of chemical reagents, as far as possible to choose non-toxic and harmless reagents for experiments, choose a clean and fast synthesis route, from the source to prevent the generation of pollutants.
- (2) The green catalyst, the use of non-toxic and harmless, low volatility, high selectivity catalyst, such as concentrated sulfuric acid for solid acid and base catalyst, titanium silicon molecular sieve, enzyme catalyst, etc. [7]. Choose the right catalyst, not only can speed up the reaction rate, significantly improve the reaction capacity, reflect the high selectivity, reduce energy consumption, but also can fundamentally reduce or even eliminate the by-product, reduce waste emissions, resource utilization to the extreme, in terms of environmental impact and economic impact has an important role.
- (3) Chemical reaction greening, choose reagent utilization degree, high conversion rate, less by-product reaction, improve the experimental results, as follows: with propionaldehyde and methanol instead of acetone-cyanol method preparation of methyl methacrylate, this method is the advantage of the raw material with methanol instead of hydrocyanic acid (highly toxic substances), reduce toxicity, catalyst sulfuric acid corrosion is solved, step to complete the reaction, improve the atomic utilization rate.
- (4) Solvent green, avoid volatile ability, toxic use of large solvent, the main use of aromatic hydrocarbons, petroleum ether, ketone, etc., these volatile solvents have caused photochemical smoke and human emphysema, bronchitis disease, try to use water, ethanol non-toxic or low toxic substances, conditionally without solvation reaction.
- (5) The greening of by-products, according to the current development of organic experiments, there are not many reactions in line with atomic economy, and most of the reactions will still produce corresponding by-products. The products are selected as available or non-toxic and harmless, such as water and solid substances.
- (6) The greening of the synthesis method adopts the hydrothermal synthesis method, sol-gel method and other mild conditions, simple operation and low production cost methods.

### 6.3. Mimic Chemical Experiments Using Modern Techniques

The operation of organic chemistry experiment is relatively small in the teaching process, some experiments are difficult, and the insufficient laboratory conditions, organic reagent toxicity, strong volatility, expensive instruments and other reasons, so that students do not get many opportunities to exercise. Nowadays, with the continuous development of science and technology, China has basically had the corresponding computer technology. In my opinion, it is necessary for colleges and universities to set up computer simulation laboratories, to show the inconvenient experiments through computer intuition, and to use the forms of video, audio and multimedia animation to supplement the shortcomings of traditional teaching [3]. The attention in ordinary experiments can also be made into animation form, so that students can fully feel the harm, which can not only exercise students' computer operation ability, but also let students keep a high degree of concentration in the experiment, and fundamentally realize the penetration of environmental awareness in the organic chemistry experiment. In addition, we can understand the connection between chemistry and life through video, such as extracting pectin from apples and extracting caffeine from milk tea, etc., so as to combine theory with practice. Compared with the conventional experiment, the micro experiment has the advantages of less experimental cost, short operation time and less operation safety pollution, which maintains the enthusiasm of students in the experimental operation to a certain extent.

### 6.4. Organize Extracurricular Activities to Promote Environmental Awareness

After all, there are not many opportunities for environmental protection education in teaching, so we should cultivate students' environmental awareness as much as possible. Students' awareness of environmental protection is gradually formed in practice and communication, and is shown through practice and communication.

(1) Through the lecture, the relevant national laws and regulations are introduced to understand the national attention to environmental awareness, so as to enhance students' awareness of environmental protection.

(2) Organize students to read newspapers and periodicals, use the traditional form to intuitively understand the connection between environmental protection and education, and systematically summarize and learn the knowledge.

(3) Through multimedia, such as short video platform, animation and other forms, the current stage is the Internet era, students use electronic devices with high frequency, short video platform with high exposure rate, fast transmission speed, is a fast and effective way to promote environmental awareness.

(4) Combined with the current environmental pollution situation, the publicity and education can be combined with the analysis of the environmental pollution situation in the province and cities, so that students can effectively solve the problem through the analysis of the pollution source.

(5) Understand the festivals and activities related to environmental protection, actively participate in the activities, learn environmental protection in the activities, and use hand-copy newspapers, publicity newspapers and other forms to let students feel the awareness of environmental protection in action.

(2) If possible, organize students to visit the chemical plant, understand the difficulties and norms of chemical process, and cultivate students' awareness of environmental protection and scientific and rigorous attitude.

## 7. EPILOGUE

This article mainly discusses that, with the increasing development of society, Continuous progress in the experimental teaching of organic chemistry, we should keep up with The Times, the teaching problems exposed in the past, and a list of the sources of organic pollution, what happened, why, how, what do teachers and students do in teaching? In addition to teaching, how to implement environmental protection education to describe, moving from someone who listens to ask questions, think about a problem, as logical as problem solving, In the process of learning and exploration, constantly competing with yourself, enhance your own awareness of cleanliness, exercise your own thinking ability and practical ability, Be a person of all-round development in the new era. At the same time, teachers should also change the traditional assessment system, combine theory with practice, build academic, interesting and life-oriented experimental teaching, and cultivate students to become people who can truly learn.

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