

# *Discussion and Innovation of Basic Chemistry Experiment Teaching*

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**Abstract**—Basic chemistry experiment is an introductory experiment of chemistry in university. The good or bad teaching results will have a profound impact on students' future chemistry study. This paper analyzes and discusses the content, scheme, report writing, laboratory opening and teaching method of basic chemistry experiment teaching at present, and puts forward some new innovative methods, so as to achieve the goal of reform and innovation of basic chemistry experiment teaching.

**Keywords**—basic chemistry experiment; teaching content; innovation

## I. INTRODUCTION

Chemistry is a subject based on experiments. For students majoring in chemistry, the whole university study should be accompanied by experiments. As one of the many kinds of chemistry experiments in universities, basic chemistry experiment plays an extremely important role and is the cornerstone of other experiments. Basic chemistry experiment is not only the practical application of theoretical knowledge, but also can cultivate students' practical ability and independent innovation ability, which is conducive to students to develop a rigorous scientific attitude and lay a good foundation for scientific inquiry in the future. However, most of the current basic chemistry experimental teaching is still in the stage of passively drawing experimental conclusions in strict accordance with the experimental content and experimental operation mode stipulated by teachers, which cannot stimulate students' innovative thinking and consciousness, but only mechanically copy and do. Therefore, new teaching contents and new teaching methods are required in the teaching of basic chemistry experiments to satisfy students' desire for knowledge exploration and lay a solid foundation for their future development in chemistry. This paper mainly discusses how to promote students' learning enthusiasm in the teaching of basic chemistry experiments, so as to achieve the effect of "playing in the classroom" and happy learning.<sup>[1]</sup>

## II. INNOVATION IN BASIC CHEMISTRY EXPERIMENTS

### A. To Enrich and Innovate in Experiment Content

Basic chemistry experiment is the introductory experiment for students after entering the university. Teaching the experiment content with a single teaching method will make students feel boring. In the long run, students will lose interest in the experiment and fail to cultivate students' active practical ability and innovative thinking. Therefore, enriching the

content of innovation experiments is conducive to expanding students' knowledge and developing their innovative consciousness.<sup>[2]</sup> For example, the interesting experiment of water burning, fireworks, white flowers turning into red flowers, solid alcohol, etc., can't only mobilize students' interest in learning chemistry through common chemical magic, but also cultivate students' active exploration thinking, so that students can develop a good sense of knowledge on the basis of feeling the magic of chemistry.

In addition to traditional verification experiments, basic chemical experiments should also include design experiments, which can be closely related to real life. For example, for the determination of calcium and magnesium content in eggshells, students are allowed to design experimental schemes, experimental operation steps and post-experiment results processing according to the experimental principles. Students are allowed to apply the existing theoretical knowledge to practice, so as to cultivate their practical problem-solving ability and strong interest in learning.

### B. Innovation of Experimental Scheme

The teaching of basic chemistry experiment should attach importance to quality rather than quantity. Therefore, in the process of experiment, teachers should not blindly pursue conclusions, but find problems and solve problems in the process of experiment. Through guided teaching, students' ability to find problems, think about problems and solve problems should be constantly promoted, so as to avoid infilling class and mechanical class. In addition, when the experiment operation is wrong, do not stop the experiment directly, but guide the students to use the existing theoretical knowledge to find the reasons, analyze the reasons for the mistakes, so as to achieve the effect of putting what they have learned into practice.

In the process of experimental scheme design, teachers can design different experimental methods for the same experiment, and obtain the same experimental conclusion through different methods, so as to cultivate students' ability to think from multiple perspectives. Shell, for example, the determination of calcium and magnesium content in, can be done by EDTA complexometric titration method can also be spread by acid-base titration method or by potassium permanganate method, the determination of three kinds of experimental methods, determination of value has a little difference, can guide students to analyze each measurement principle, find out the most suitable means of measurement. In the process of

analysis, deepen the students' understanding of the experiment, so as to achieve the purpose of the experiment.

#### C. Innovation in Experimental Report Writing

Traditional experimental report writing content includes experimental purpose, experimental principle, knowledge analysis, experimental content, data processing and thinking questions, etc. The student union completes the above projects step by step in accordance with experimental handouts, and the writing mode is relatively fixed. This form of experimental report makes students lack of initiative to think, easy to produce inertia. Therefore, the use of heuristic model to write experimental reports in the teaching process is conducive to students' active thinking and diversification of learning. In the process of heuristic teaching, teachers need to continuously guide students to analyze and solve experimental principles and problems encountered in the whole experimental process with existing theoretical knowledge, so as to cultivate students' independent thinking. In addition, at the end of the experiment, students should be guided to recall the whole experimental operation steps, experimental phenomena and experimental conclusions, and record the actual process in the experiment report. Meanwhile, problems found in the experiment process should be recorded in the experiment report, so as to cultivate students' ability to think from multiple perspectives. Improving experimental skills and the application of theoretical knowledge in the process of chemical experiments not only improves students' ability to analyze and solve problems independently, but also promotes the rapid development of chemical teaching.

#### D. Open Laboratory

Basic chemistry experiment class hours are not enough, students will only enter the laboratory once a week, for some difficult to understand experimental principles and experimental phenomena students can only be limited to the class time to solve. As a result, students do not have enough time to understand and analyze these difficult principles and phenomena, so they do not have enough time to play their imagination. Open laboratories can solve this problem easily. Students' learning in their spare time can't only improve their understanding of knowledge, but also promote their scientific research ability.

At the same time, in order to attract students into the laboratory, some innovative experimental plans can be designed. Students and teachers can confirm the feasibility of the experiment through mutual communication to ensure the smooth development of the experiment. Among them, the opening of the laboratory needs to establish relevant open system to ensure the safety of teachers and students in the process of carrying out experiments. The opening of a variety of laboratories can't only broaden students' knowledge horizons, but also cultivate their interest in experiments and improve their innovative ability.<sup>[3]</sup>

#### E. Teaching Method Innovation

Traditional experimental teaching mostly use blackboard writing to write experimental purpose, experimental principle and experimental content. In the process of teaching experiments, teachers can only rigidly explain the experimental

principles and matters needing attention based on the existing experience. Students should make notes while listening to the experiment, understand it quickly, and have higher requirements for students to listen to the lecture. At the same time, due to many matters needing attention in teaching, the teacher's blackboard writing cannot cover everything, and the students cannot fully grasp the key links of the experiment, which often leads to this or that low-level situation in the experiment process, so it is very important to improve the experimental teaching method. The reform of teaching method can obtain from the following two aspects: one is the experimental course teaching with the method of combining multimedia and blackboard writing, teachers focus tagging experimental matters needing attention in the multimedia, focuses on analyzing the student to understand difficult link in blackboard writing, teachers' teaching, students have any questions or no record clear note can refer to multimedia and blackboard writing, at any time to ensure no longer appear in the experimental process low-level error; Second, the introduction of virtual simulation experiment is appropriate, through the simulation experiment to explain some can't explain the theoretical link or demonstrate the students' constant operation of the experimental link, can achieve impressive and ensure personal safety. The third is to encourage students to participate in the teaching process through the way of dividing classes. The teacher should give the direction of designing experiments, so that students can participate in the experimental design and teaching process, cultivate students' sense of ownership and make the class move.<sup>[4]</sup>

### III. CONCLUSION

The idea of experimental teaching is student-oriented. Students are the main body of learning; teachers are the guide of knowledge. By enriching the content of basic chemistry experiments and the innovation of related experimental projects, students' learning enthusiasm can be improved and a strong and interesting experimental class can be created. Experiment scheme modifications and writing way of innovation can improve the students' subjective initiative, trains the student to discover problems, thinking, problem solving skills, let students learn to use the existing explain observed experimental principle and the theory of knowledge, and through the recall and reflection of the way to let the students to understand the principle and experimental process, causes the student to deepen the understanding of theoretical knowledge and strengthen their ability to learn. The close combination of experimental learning and life is helpful for students to apply chemical knowledge to explain different phenomena in life, use chemical experimental means to analyze chemical problems in real life, improve students' grasp and application of what they have learned, and achieve the teaching goal of putting what they have learned into practice. The opening of the laboratory helps students better understand chemical experiments, acquire solid experimental skills, explore different scientific research methods, and lay a solid foundation for future study and work. In a word, through the exploration of basic chemical experiment teaching and innovation, for the students in the learning process in university to build a good learning atmosphere, and form a good habit of

learning for the future, through the exploration of basic chemical experiment teaching and innovation, promote students' ability in learning other majors, it lays a good foundation for the country to cultivate new application-oriented talents.

## REFERENCES

- [1] Hong JIANG, Zhiqiu ZHANG, Mei ZHANG, Jiguo DUAN. Discussion and Innovation of Chemistry Experiment Teaching in University, [J]. Education Teaching Forum, 2018 (45): 279-280
- [2] Hongxia ZHAO, Ling ZHANG, Kun ZHANG. Reform of Basic Chemistry Experiment Teaching in International Model College. [J]. Pharmaceutical Education, 2018 (34): 66-69
- [3] Shengjie YAN. Exploration of Experimental Teaching Reform and Innovative Talent Cultivation. [J]. Science and Technology Forum, 2018:111
- [4] Yanhui, ZHAO. Reform and Innovation of Basic Chemistry Experiment in University. [J]. Intelligence, 2014:177