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Case Design of Ideological and Political Teaching of Inorganic Chemistry - Taking REDOX Reaction as an Example

Qinghong Wang, Qiuyan Li

School of Chemistry and Materials Science,Jiangsu Normal University, Xuzhou 221116, China

Abstract: Inorganic Chemistry is a basic course for chemistry-related majors, which is of great significance for cultivating students' professional quality and scientific thinking. This paper takes REDOX reaction as an example to elaborate how to carry on ideological and political construction in the teaching of Inorganic Chemistry.

Keywords: Inorganic chemistry; Curriculum thinking and politics; Teaching cases; REDOX reaction

To this end, colleges and universities across the country continue to innovate teaching concepts, improve teaching methods, and explore new models of ideological and political education [1-3]. It is conducive to cultivating students' feelings of home and country, sense of social responsibility, ecological environmental protection and other awareness, and is of great significance to promoting the teaching reform of Inorganic Chemistry and cultivating chemical professional and technical personnel with both morality and ability [4-6].

The teaching content of Inorganic Chemistry mainly includes elemental chemistry, substance structure, coordination chemistry, solid chemistry, inorganic chemical reactions, etc. Among them, REDOX reaction is not only a basic scientific concept, but also the key to understanding the nature of chemical reactions and energy conversion [7,8].

1. Introduction of REDOX reaction teaching content

The seventh chapter of Inorganic Chemistry (Sixth edition), edited by Meng Changgong and other teachers from the Inorganic Chemistry Teaching and Research Department of Dalian University of Technology, is REDOX reaction. The teaching content mainly includes the basic concepts of REDOX reaction, electrochemical cells, electrode potential and their applications [9]. It involves the change of valence and the transfer of electrons, the balancing of REDOX reactions, the working principle of batteries and electrolytic cells and other knowledge points, which is of great significance for students' future study and application in energy, materials science and other fields.

2. Ideological and political teaching design of REDOX reaction

2.1 Teaching Objectives

1) Knowledge objective: Basic concept of REDOX reaction, balance of REDOX reaction equation, construction of galvanic cell, electromotive force of galvanic cell, maximum work of galvanic cell and Gibbs function, standard electrode potential and Nernst equation, electrode potential application.

2) Ability goal: enable students to learn how to analyze material changes in chemical reactions and cultivate students' logical thinking ability; Guide the students to sum up the reaction rule, and cultivate the students' ability to sum up.

3) Ideological and political goals

Inspire students' patriotic feelings and scientific research enthusiasm, and cultivate students' social responsibility and innovative spirit.

2.2 Case of integration of teaching content and ideological and political content

Case 1. History of chemical power supply

Introduce the development process from voltaic pile to modern lithium battery, let students understand how science and technology are advancing step by step, and affect the way of life of society and the development direction of industry, through this historical context to help students establish the connection between science and technology and social progress.

Case 2. Case discussion of modern battery technology

Introducing the application of modern battery technology in new energy vehicles, mobile devices and other fields, students can intuitively feel the practical benefits brought by scientific and technological progress. Discuss the challenges facing battery technology, such as energy density, safety, environmental impact, etc., and guide students to consider how to ensure technological progress while taking into account environmental protection and sustainable use of resources. This discussion helps students realize the complexity and multifaceted nature of technological development. And this kind of reflection can cultivate students' sense of responsibility and ethics.

Case 3. Experimental operation and practical experience

Arrange for students to conduct experiments on battery assembly and testing, deepen their understanding of the principles of REDOX reactions, and develop experimental skills. In the experimental activities, students are encouraged to try using different electrode materials (such as lithium iron phosphate, lithium cobalt oxide, ternary materials, etc.) or electrolytes (ether or ester electrolytes, etc.) to explore the possibility of improving battery performance. This innovative attempt can stimulate students' creativity and problem-solving skills. Combined with the experimental results, we discuss the application prospects and possible social impacts of battery technology in real life, such as its potential in the field of renewable energy storage and electric vehicles. Such discussions can help students combine theoretical knowledge with practical applications and develop their scientific literacy and sense of the future.

2.3 Teaching methods

Interactive teaching methods such as case analysis and group discussion are adopted to allow students to participate in the process of knowledge inquiry. Multimedia, virtual simulation laboratory and other modern teaching means are used to enrich the teaching content and improve students' learning interest. For example, by playing video materials about the application of REDOX reaction in real life, students can intuitively understand the practical value of theoretical knowledge.

2.4 Evaluation of teaching effect

1) Timely understand and feedback students' knowledge of REDOX reaction and ideological and political elements through homework, quizzes and classroom questions. Students are encouraged to apply their knowledge to the analysis and solution of practical problems in order to cultivate their comprehensive application ability. Ideological and political elements are incorporated into the homework, such as discussing the application of REDOX reaction in energy development or environmental protection, and guiding students to think about the interaction between science and technology and social development. Make timely correction and feedback on assignments submitted by students, point out mistakes and provide correct answers. Conduct homework commentary in class, emphasize common mistakes and their causes, and help students understand and remember correct knowledge points.

2) Select practical cases related to REDOX reactions, such as the development trend of battery technology or environmental pollution control, the application of electrochemical corrosion in the field of construction, electroplating and metal corrosion and protection, for students to analyze and discuss, cultivate students' ability to analyze and solve problems, and stimulate their enthusiasm for scientific research and exploration.

3. Teaching reflection and improvement

In the process of combining the teaching content of Inorganic Chemistry with ideological and political content, there may be some problems that the combination of ideological and political elements and professional knowledge is not close enough or fails to resonate with students. Teachers should summarize teaching experience in time and adjust teaching plans and methods according to students' learning feedback and teaching effect.

1) Collect feedback from students regularly: understand students' opinions on course content, teaching methods and teaching effects through questionnaires, group discussions or individual interviews. This will help teachers to understand the needs and expectations of students, so as to adjust teaching strategies.

2) Analysis of teaching effect: Evaluate teaching effect by analyzing data such as students' test scores, homework completion and classroom performance. This will help teachers to understand their own teaching strengths and weaknesses, so as to formulate corresponding improvement measures.

3) Innovative teaching methods: Try to adopt different teaching methods, such as case teaching, group discussion, role playing,

etc., to stimulate students' learning interest and enthusiasm. At the same time, teachers can also use multimedia and network resources to enrich the teaching content and improve the teaching effect.

4) Participate in education training: regularly participate in education training activities to understand the latest education concepts and teaching methods. This will help teachers renew their knowledge and improve their teaching level.

4. Conclusion

In the teaching of REDOX reaction in Inorganic Chemistry, the ideological and political goals of the course are realized, which not only imparts professional knowledge, but also cultivates students' social responsibility, innovative spirit and scientific attitude. This is not only a reform of traditional teaching methods, but also an active exploration in response to the educational requirements of the new era. Through continuous optimization of teaching content and methods, teachers can better guide students to form correct values and cultivate high-quality talents with both professional skills and good moral qualities for the society.

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About the author:

Qinghong Wang, 1985.11, female, Han, Linyi, Shandong, graduated from School of Chemistry, Nankai University, Doctor of Engineering, major in materials physics and chemistry, research direction: new energy materials

Qiuyan Li, 1981.10, female, Han, Yantai, Shandong Province, graduated from Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Ph. D. candidate, Chemistry education, functional metal-organic framework materials research