

# Exploration and Reflection on the Curriculum Construction of Vocational Undergraduate Applied Chemistry Major

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**Abstract:** Vocational education undergraduate applied chemistry major is of great significance in cultivating applied talents, however, the traditional curriculum and teaching mode can no longer fully meet the needs of students and the requirements of the industry. In order to improve students' practical ability, innovation ability and application ability to meet the industry demand and improve students' employment competitiveness, the curriculum construction of VET undergraduate applied chemistry major needs to be explored and considered. Taking the curriculum construction of VET undergraduate applied chemistry major as an entry point, this paper analyzes the challenges and problems faced in this field and puts forward a series of strategies and reflections.

**Keywords:** Undergraduate Vocational Education; Applied Chemistry; Curriculum Development; Practical Teaching and Learning

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## 1. Significance of Vocational Education Undergraduate Applied Chemistry Specialization

First of all, applied chemistry is a highly applied discipline, and training applied chemistry professionals is crucial to meet the social demand for chemical applications. These professionals can apply chemical knowledge and technology in various fields to solve practical problems and promote the development of science and technology and social progress. Secondly, vocational undergraduate applied chemistry majors emphasize the cultivation of practical ability. Through laboratory teaching and practical internships, students can master practical skills, experimental design and data analysis ability, and develop the ability to solve practical problems. This makes it easier for Applied Chemistry graduates to adapt to the working environment and improve their employment competitiveness. In addition, Applied Chemistry majors have the advantage of cooperating with industries and enterprises. By cooperating with enterprises in practical projects, internships and employment training, students can be exposed to real working environments and projects, understand the needs of the industry, and adapt to the industry requirements in advance, which is conducive to the employment and career development of graduates. Lastly, Applied Chemistry majors can also promote scientific and technological innovation and industrial upgrading. The research and application of applied chemistry can promote the development of new materials, new energy, environmental protection and other fields, contributing to the sustainable development of society and economy<sup>[1]</sup>.

## 2. Challenges of Vocational Undergraduate Applied Chemistry Programs

### (1) Rapid updating of knowledge

With the continuous progress of science and technology and the rapid development of the field of applied chemistry, new materials, processes and technologies are constantly emerging, and the speed of knowledge updating is accelerated. This brings a series of problems to the curriculum of applied chemistry majors. First of all, teachers need to follow up the latest research results and technological advances and update their knowledge base in time in order to impart the latest knowledge to students. However, this requires teachers to keep up with cutting-edge science through continuous learning and in-depth research. Secondly, the curriculum needs to be flexibly adjusted to introduce new research directions and cutting-edge technologies in order to cultivate students' ability to innovate and cope with changes. However, this also requires schools and educational institutions to have appropriate resources and capabilities, including the professionalism of the teaching team, the updating of experimental equipment and the improvement of laboratory conditions<sup>[2]</sup>.

## 3. Strategies for Vocational Education Undergraduate Applied Chemistry Specialized Curriculum Construction

### (1) Diversity and optimization of curriculum

First of all, the curriculum should cover the core knowledge and basic theories of applied chemistry majors. This includes basic cours-

es such as organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry, etc., to lay a solid theoretical foundation for students. Secondly, specialized courses in the field of applied chemistry should be introduced. These courses can be selected according to the needs of the industry and students' interests, such as chemical process and equipment, environmental chemistry, food chemistry, pharmaceutical chemistry and so on. Through the study of these courses, students can understand the application needs and technical requirements of different fields and prepare for their future employment and research directions. Meanwhile, practical teaching courses, such as laboratory courses, internship courses and engineering practice courses, can also be set up. These courses can help students apply theoretical knowledge to practical operation and develop their practical ability and problem-solving ability. Practical teaching can also strengthen students' teamwork and communication skills and improve their comprehensive quality. In addition, the curriculum can include elective courses and professional orientation courses. Students can choose elective courses suitable for them according to their personal interests and career planning, such as material science, biochemistry, environmental monitoring and governance. Professional orientation courses, on the other hand, can provide more in-depth and specialized knowledge, helping students to deepen and develop in specific fields. In optimizing the curriculum, it can be adjusted and updated according to industry needs and student feedback. Regular course evaluations and surveys are conducted to understand the latest needs and development trends of the industry, so that course contents and settings can be adjusted in a timely manner to maintain the forward-looking and practicality of the courses. In addition, new teaching methods and technical means, such as online learning platforms and virtual laboratories, can be introduced to enrich the teaching forms and resources of the courses. This can improve students' learning effect and interest and stimulate their learning motivation. Through the diversity and optimization of the curriculum, students can be provided with comprehensive professional knowledge and practical ability, and their comprehensive quality and application ability can be cultivated. This will help them to be competitive in the field of applied chemistry and contribute to the development and innovation of the industry. At the same time, it can also improve students' competitiveness in employment and enable them to better adapt to and cope with the challenges of career development <sup>[4]</sup>.

## (2) Importance and innovation of practical teaching

First of all, practical teaching can help students apply theoretical knowledge to practical operation. Through experimental courses and practical projects, students can carry out experimental design, sample preparation, data analysis and other activities with their own hands, so as to deepen their understanding and mastery of theoretical knowledge. Practical teaching can also allow students to experience the working environment and operation process of the chemistry laboratory, and cultivate their experimental skills and safety awareness. Secondly, practical teaching can cultivate students' innovative ability and problem solving ability. In practical projects, students may face various challenges and difficulties and need to apply the knowledge and skills they have learned to solve problems. This process of thinking and innovation in practice can stimulate students' sense of innovation and problem-solving ability, and cultivate their creativity and practical ability. Meanwhile, practical teaching can also promote students' teamwork and communication skills. In practical projects, students usually need to cooperate with team members to accomplish tasks together. Through teamwork, students can learn to work effectively with others, coordinate division of labor, resolve conflicts, and improve teamwork and communication skills. In addition, practice teaching can also cooperate with the industry to carry out practical projects and internship activities <sup>[5]</sup>. Cooperating with enterprises, students can be exposed to the real work environment and project requirements, and understand the actual operation and technical requirements of the industry. Such practical experience can improve students' professionalism and employment competitiveness. In terms of the innovation of practical teaching, virtual laboratories, simulation practice software and other technical means can be introduced to provide more practical opportunities and resources. The virtual laboratory can simulate the real experimental environment and operation process, allowing students to conduct virtual experiments and develop their experimental skills and practical ability. The simulation practice software can provide real cases and problems for students to simulate the process of solving problems and cultivate their problem solving ability and innovative thinking. Through the importance and innovation of practical teaching, students can be equipped with practical ability, innovation and problem solving ability in the field of applied chemistry, which can lay a solid foundation for their career development. Practical teaching can also improve students' comprehensive quality and professionalism, enhance their competitiveness in employment, and enable them to better adapt and cope with the challenges of career development.

## Conclusion

To summarize, the exploration and reflection on the curriculum construction of vocational undergraduate applied chemistry is of great significance for the cultivation of applied chemical talents. Through diversified curricula, emphasis on practical teaching and innovation, interdisciplinary cooperation and industry-oriented curricula, as well as the introduction of innovation and entrepreneurship education, students' practical, innovative and applied abilities can be enhanced to meet the needs of the industry as well as to improve their competitiveness in employment. These efforts aim to nurture professionals who can adapt to the development of the industry and promote the innovation and application of science and technology. Through continuous improvement and practice, we are expected to achieve positive results in the construction of the vocational undergraduate applied chemistry program and contribute to the cultivation of excellent chemical application talents.

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