Ideological and Political Education in Organic Chemistry Experiments-Take "Caffeine Extracted From Tea" as an Example

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Abstract

Caffeine, one of the drugs, can be used as a central nervous stimulant and is listed as "psychotropic drugs" under control. Taking the teaching of extracting caffeine from tea as an example, in the process of experimental teaching of extracting caffeine, combining the application value, management and use of caffeine, the ideological and political elements of the curriculum are introduced to better enhance students' professional identity and understanding of the school's orientation, stimulate students' love of science and research, and enhance students' concept of law and discipline.

Keywords

Ideological and political education; Caffeine extraction; Organic chemistry Experiment.

1. Introduction

General Secretary Xi Jinping stressed that "we should make good use of classroom teaching as the main channel, and the ideological and political theory courses should be strengthened through improvement, enhance the affinity and pertinence of ideological and political education, and meet the needs and expectations of students' growth and development. Other courses should keep a good channel and cultivate a good responsibility field, so that all kinds of courses and ideological and political theory courses can go hand in hand, and form a synergistic effect"[1].

In order to further promote the construction of the ideological and political curriculum in the chemical experiment teaching, we should unify the value and knowledge in the teaching process, and guide students to become adults and aspire to become talents. Let students know what to do and what not to do, plant the seeds of truth, kindness and beauty in students' hearts, and spread feelings of family and country. The teaching design of caffeine extraction from tea in the organic chemistry experiment was carried out by using the Micro Semi Micro Organic Chemistry Experiment (the fourth edition) published by the Higher Education Press.

2. Teaching Objectives and Contents

2.1. Teaching objectives

(1) Knowledge objectives
Understand the nature of caffeine and the method of extracting alkaloids.

(2) Capability objectives
Through experimental operation, students need to master the basic experimental operations such as caffeine extraction device, heating and drying, sublimation device installation, sublimation and purification, and enhance students' experimental skills.

(3) Quality education
Through introducing the teaching of caffeine experiment, students' professional identity and social responsibility are strengthened.

2.2. Teaching content

(1) Experimental principle
Tea contains about 5% caffeine. In the experiment, 95% ethanol is used as the solvent, and the pure caffeine is obtained by continuous extraction, concentration, roasting and sublimation through Soxhlet extractor.

(2) Experimental drug
Tea, 95% ethanol, calcium oxide

(3) Experimental instruments and materials
See Table 2-1 for the instruments and materials required for the experiment of extracting caffeine from tea.

<table>
<thead>
<tr>
<th>Condenser tube</th>
<th>Soxhlet extractor</th>
<th>Condenser tube</th>
<th>Distilling head</th>
<th>Alcohol lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>thermometer</td>
<td>Thermowell</td>
<td>Electric heating jacket</td>
<td>Evaporation pan</td>
<td>lampstand</td>
</tr>
<tr>
<td>Liquid receiving pipe</td>
<td>Conical flask</td>
<td>Glass funnel</td>
<td>Asbestos mesh</td>
<td></td>
</tr>
</tbody>
</table>

(4) Experimental steps
The steps of extracting caffeine from tea are shown in Figure 2-1.

3. Integration of ideological and political education and teaching content

Through introducing the pharmacological uses of caffeine, students can deeply understand that chemistry is closely related to life. The chemical composition we extracted is not only a substance, but also can be applied to actual production and life. Chemical experiment teaching should not only be limited to mastering the skilled chemical experiment operation, but also should focus on introducing the ideological and political elements of the course in the process of explaining the experiment, so as to better cultivate students' love of science, discipline and law, and enhance their professional identity.
3.1. Enhance students’ professional identity from the application value of caffeine and stimulate students’ love for scientific research

Introduce the application of caffeine to enhance students’ professional identity. The caffeine we extract is not just a substance, but can be used in actual production and life; The experiment teaching of organic chemistry should pay more attention to inspiring students to think about how to transform principles into real objects and apply them to production and life, cultivate students’ creativity and stimulate their love for scientific research.

(1) Enhance the adaptive advantages of caffeine containing nectar plants
Induce bee pollination. The bees fed caffeine will form more lasting olfactory memory association[2] and show stronger learning ability[3]. The probability of bees visiting caffeine intake targets or artificial flowers will increase[4-6]. The nectar contains caffeine, and this flower has stronger induction ability to bees than the flowers without caffeine, promoting pollination, and bringing adaptive advantages to plants containing caffeine nectar[7-8].

Plant chemical defense substances. Natural and synthetic caffeine has the function of killing insects at known plant concentrations[9]; Caffeine is a secondary plant metabolite. When synthetic pathway genes are simultaneously expressed in tobacco plants, they can paralyze the ingested insects. Transgenic plants producing caffeine is a potential new strategy for pest control[10].

(2) Advantages and disadvantages of caffeine on human body
Caffeine is a central nervous stimulant that can help patients recover from drowsiness or coma[11]; Compared with non-invasive respiratory support therapy, caffeine therapy has the advantages of short time of mechanical ventilation and oxygen use, no risk of weaning failure, and low incidence of bronchopulmonary dysplasia. It is an important means of treating neonatal respiratory distress syndrome in premature infants[12]; Excessive intake of caffeine and overload of the detoxification function of the liver may lead to life danger, insomnia and inability to concentrate[13-14].

3.2. Enhance students’ sense of discipline and law-abiding from the management and abuse of caffeine

It is very important to introduce the current situation of caffeine management and use in organic chemistry experiments, strengthen the education of students’ concept of rule of law, and cultivate students’ correct scientific concepts.

(1) Caffeine management
Article 35 of the Regulations on the Administration of Narcotic Drugs and Psychotropic Drugs stipulates that if non drug manufacturing enterprises such as food, food additives, cosmetics, paints, etc. need to use caffeine as raw materials, they should obtain approval from the drug regulatory department of the people’s government of the province, autonomous region, or municipality directly under the Central Government where they are located, and purchase from designated wholesale enterprises or designated production enterprises. The State Administration of Medicine has issued the Regulations on the Administration of Caffeine, which clearly stipulates the production and supply of caffeine. If the food is adulterated with or knowingly adulterated with caffeine and sold, it will be sentenced to fixed-term imprisonment of not more than five years and a fine in accordance with the Criminal Law of the People’s Republic of China; Those who cause serious harm will be sentenced to fixed-term imprisonment of not less than five years but not more than 10 years.

(2) Caffeine abuse
When the concentration of caffeine in human plasma C(Plasma caffeine) is ≥ 30mg/L, it will produce symptoms such as excitement and blood pressure rise; When C(Plasma caffeine) > 5g, epilepsy will occur, and severe respiratory and circulatory failure will lead to
death[16]. Caffeine trafficking occurred frequently in Shanxi Province from 2000 to 2003[17]. See Table 3-1 for some cases of illegal trafficking in caffeine in Shanxi Province.

<table>
<thead>
<tr>
<th>S/N</th>
<th>time</th>
<th>Case solving unit</th>
<th>Weight of selling caffeine</th>
<th>Drug traffickers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>June 2000</td>
<td>Shuozhou Public Security Bureau</td>
<td>875.0kg</td>
<td>Yang Chengsuo</td>
</tr>
<tr>
<td>2</td>
<td>March 2001</td>
<td>Hejin Public Security Bureau</td>
<td>43.5kg</td>
<td>Huang Jiasheng</td>
</tr>
<tr>
<td>3</td>
<td>April 2001</td>
<td>Hejin Public Security Bureau</td>
<td>15.0kg</td>
<td>Li Jianjun</td>
</tr>
<tr>
<td>4</td>
<td>May 2001</td>
<td>Hejin Public Security Bureau</td>
<td>38.0kg</td>
<td>Wang Yincai, Li Zhenyou</td>
</tr>
<tr>
<td>5</td>
<td>April 2001</td>
<td>Pingshun County Public Security Bureau</td>
<td>8.8kg</td>
<td>Yang Hongxing</td>
</tr>
<tr>
<td>6</td>
<td>October 2003</td>
<td>Hejin Public Security Bureau</td>
<td>250.0kg</td>
<td>Two suspects</td>
</tr>
</tbody>
</table>

4. Summary

Combining the application value of caffeine, and the situation of the People’s Republic of China on the management of caffeine and the detection of cases of illegal trafficking in caffeine, the ideological and political elements of the curriculum were introduced into the experimental teaching of “extracting caffeine from tea”. During the teaching process, it can be clearly felt that the students' learning attitude is more active and serious, and students' interest in ideological and political elements "enhancing the adaptive advantages of caffeinated nectar plants" and "the advantages and disadvantages of caffeine on human body" is rising. This paper introduces the management and abuse of caffeine in China, and clearly feels that the case of illegal trafficking in caffeine has a warning education effect on students. The introduction of ideological and political elements of the curriculum in experimental teaching can increase students' love for scientific research, cultivate their scientific concept, and enhance their concept of rule of law.

Reference

[1] Xi Jinping presided over a symposium for teachers of ideological and political theory and delivered an important speech [J]Golden Age (Students), 2019 (04): 24


[15] Zhang Lu Study on the Crime of Producing and Selling Poisonous and Harmful Food [D] Hunan University, 2010
