

TEACHING THE SUBJECT OF "TERPENES"  
IMPLEMENTATION OF "MENTAL ATTACK" TECHNOLOGY*Tashbayeva Shoira Kasimovna**Department of Chemistry, Gulistan State University, senior teacher*

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**Abstract**

The article describes the methodology of teaching the topic of terpenes based on the "Brainstorming" technology, and the methods aimed at acquiring knowledge on the topic.

**Keywords:** terpene molecule, isoprene, technology, chemistry, teacher, oxygen, reaction, camphor, formula.

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Terpene compounds differ from most lower molecular weight bioregulators by their wide distribution and diverse structure. Depending on the number of isoprene chains in the terpene molecule, monoterpenes are divided into  $C_{10}H_{16}$ , sesquiterpenes  $C_{15}H_{24}$ , diterpenes  $C_{20}H_{32}$ , triterpenes  $C_{30}H_{48}$ , etc. According to the structure, there are acyclic (open chain), for example, myrcene, and cyclic with one or more rings, for example, limonene, camphene, pinene, terpenes. Taking this into account, we have developed a series of teaching problems related to the structure and classification of terpenes so that the information presented in our work can be fully and well mastered by the student during independent work and practice.

**Brainstorming technology**

This technology enables and encourages students to actively participate in the learning process and work with inspiration. The introduction of this technology to the teaching of the subject is carried out in a seminar or practical training of a group of 24-30 students. In order to brainstorm on the topic, the teacher assigns the students to study the knowledge of the topic as an independent study, and he prepares ideas on the topic. In order to brainstorm ideas, students are required to independently read materials from the Internet, interesting chemistry and history of chemistry.

**Brainstorming technology** we present the processes of solving ideas related to the acquisition of subject knowledge.

**1 – an idea.** It is known that sanatoriums that treat lung diseases are built near coniferous forests, or many coniferous trees are grown around sanatoriums. Justify the medicinal effects of conifers by relating them to the knowledge of the subject. Here are the students' responses to the presented idea.

**1 – student.** To solve the problem, the answer is that the pleasant aroma of the essential oils contained in the resins of coniferous trees has a healing effect on lung diseases.

**2 – student.** He tries to justify the idea that the atomic oxygen released as a result of intensive photosynthesis in the leaves of conifers combines with air oxygen to form a small amount of ozone, and because it kills microbes in the lungs, the sick will find a cure.

**3 – student.** G'oyani hal qilishi uchun chaqmoq chaqqanda havo kisloroddan oz miqdorda hosil bo'ladigan ozon gazi o'pka kasalliklariga shifobaxsh ta'sir ko'rsatadi deb javob beradi.

O'qituvchi qaytarilgan javoblardagi o'pka kasalliklariga oz miqdordagi ozon gazining shifobaxsh ta'sirini to'g'ri hal qilinganligini lekin ozonni hosil bo'lish mexanizmi o'rganilayotgan mavzuga bevosita bog'lanmaganligini o'qtiradi.

Shundan so'ng 4 – talaba ozonning hosil bo'lishini terpenlarning havo kislorodi bilan oksidlanishi xossasi bilan tushuntiradi. Bunda kislorod terpenlarning qo'sh bog'li qismiga birikib, perkosid bog'lanishini hosil qilishi, uning oksid va atomlar kislorodga parchalanishini so'ngra molekulyar kislorod bilan birikib ozon hosil bo'lishini reaksiya tenglamasini yozib tushuntiradi. Masalan, terpenlar vakili bo'lgan pinening havo kislorodi bilan oksidlanishi jarayonida ozonning hosil bo'lishini keltiramiz:

**2 – g'oya.** Terpenoidlar vakili bo'lgan yurak xastaliklarini davolashda ishlatiladigan kamforaning olish va strukturasi aniqlash muammosi.

Taqdim etilgan g'oya bo'yicha o'quvchilarning bergan javobini keltiramiz:

**1 – talaba:** Kamfora yurak kasalliklarini davolashda ishlatiladigan qimmatli dori bo'lganligi uchun uni ishlab chiqarish sanoat ahamiyatiga egadir.

**2 – talaba:** Kamfora dastavval Yaponiyada o'stiriladigan dafna daraxtidan olingan edi. Shuning uchun Yaponiya uzoq vaqtgacha kamfora ishlab chiqaradigan va boshqa mamlakatlarga sotadigan yagona davlat edi. Shuning uchun bir qancha mamlakatlarda kamfora tuzilishini aniqlash, sintez qilish usullarini ishlab chiqishga oid tadqiqotlar olib borilgan.

**3 – talaba:** Ko'p olimlar kamforani tuzilishini aniqlashga oid tadqiqotlar olib borib, uning 40 ga yaqin tuzilish formulalarini taklif etganlar, lekin ularning birontasi kamforaning xossalarini to'liq tushuntirib berolmagan.

**4 – talaba:** Kamforaning molekulyar formulasi  $C_{10}H_{16}O$  ekanligi aniqlangandan so'ng uning terpenlarga o'xshashligi, bitta kislorod borligi bilan farq qilishi ma'lum bo'ldi va tuzilish formulasi aniqlandi.

**5 – talaba:** Kamforaning pinendan sintez qilish reaksiya tenglamalarini yozib, kamforani hosil bo'lishini keltiradi.

**6 – talaba:** Kamfora Respublikamizda o'sadigan shuvoq o'simligining Artemisin maritim turidan olinishini keltiradi va kamforaning xossalariga to'xtaydi. Kamfora 177 0C da saqlanadigan kristall, achchiq mazali, o'ziga xos hidli modda. Suvda erimaydi, lekin organik erituvchilarda eriydi.

**3 – g'oya.** Fenantren va siklopentan yadrolaridan siklopentanper-gidrofenantren yadrosining hosil bo'lishi, uni saqlaydigan miyada, hujayra membranalarida ko'p uchraydigan, o't pufagi toshlarini asosini tashkil etgan xolesterin molekulasini tuzilishi, inson faoliyatidagi funktsiyasi, foydali va zararli ta'siri.

**4 – g'oya.** The types of sex hormones secreted by the pituitary gland and gonads of man, their function, the basis of their structure, issues of artificial synthesis of all the main sex hormones by American scientist Woodward, winner of the Nobel Prize.

**1, 2** – Similar to the solutions of ideas, "Brainstorming" about ideas 3-4 also led to great interest of students and heated discussions, which indicates that students have mastered the knowledge of the topic well. In this case, it is assumed that the improvement of the efficiency of the lesson will occur, first of all, only when the independent education of the students on the subject is carried out at the required level.

The ideas presented to the group should include a wealth of knowledge on the topic. Students actively participate in solving the given ideas to brainstorm on the topic. There can be no criticism regardless of how students respond when solving ideas. Each student's response to the ideation is recorded by 2 honors students. The ideas given by the students should be within the main topic.

"**Brainstorming**" incorrect or duplicated answers recorded at the end will be excluded. The correct answers are collected by the students by their last names, arranged by ideas, and written on posters showing their scores. As a result, a page with all the answers and scores of the participants will be created.

**"Brainstorming"** to introduce the 2nd method into the lesson, the group is divided into 2 groups. Each group is tasked with solving a separate idea for brainstorming. After the 1st group solves the given idea, the students of the 2nd group identify the mistakes and shortcomings of the 1st group in solving the idea and respond to them. Defects in solving the given idea of the 2nd group are corrected by the students of the 1st group, who state the correct answers. Disputed answers will be corrected by the teacher. As a result, there will be a page with the answers of both groups to the main ideas given to them and the correct answers given by the other group to the shortcomings. Depending on the correctness and completeness of the answers shown on the page, points are assigned to the requirements of both groups, and the winning group is determined based on the sum of points. Brainstorming in this way will dramatically increase student engagement.

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