USING INTERACTIVE METHODS IN TEACHING THE TOPIC "HALOGENS"

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In the field of chemistry education, particularly when teaching the topic of halogens, the use of interactive methods plays a crucial role in enhancing lesson effectiveness. Modern educational systems emphasize the integration of innovative pedagogical technologies to make the learning process more engaging, productive, and active. Interactive teaching methods encourage students to develop independent thinking, as well as creative and critical thinking skills, which are essential for mastering complex scientific concepts [1].

The implementation of interactive approaches allows students to actively participate in lessons, collaborate in groups, and work independently. These methods enable teachers to apply their innovative ideas effectively, individualize the teaching process, and establish meaningful communication with students [2]. Examples of widely applied interactive methods in chemistry education include brainstorming, round-table discussions, conceptual tables, and the cinquain technique. These methods not only facilitate understanding of chemical concepts but also make the learning process more dynamic and student-centered [3].

The term "halogen" is derived from the Greek words halos, meaning salt, and genos, meaning birth. Among the halogens, fluorine, chlorine, bromine, iodine, and astatine are the most significant. Fluorine, chlorine, bromine, and iodine are commonly encountered, whereas astatine is rare and is obtained artificially through nuclear reactions. Halogens are highly reactive elements known for their oxidizing properties and biological activity. Their outer electron shell contains seven electrons, which makes them one electron short of a full shell, resulting in high chemical reactivity. Under standard conditions, halogens exist as diatomic molecules.

Fluorine was first successfully isolated in 1886 through the electrolysis of anhydrous hydrogen fluoride in potassium fluoride. It is a yellow gas with a pungent odor that dissolves in liquid HF and liquid oxygen. Solid fluorine forms a monoclinic structure below 288°C and a cubic molecular lattice at higher temperatures. Chlorine was discovered in 1772 by Scheele by reacting manganese dioxide with hydrochloric acid. It is a yellow-green gas that occurs mainly in compounds. Bromine was isolated in 1826 by Balard from sea salts and exists as a reddish-brown liquid with sharp, unpleasant fumes. Iodine was discovered by the French scientist Courtois in 1811 from the ashes of seaweed and usually coexists with bromine. It appears as brown rhombic crystals with metallic luster. Astatine is extremely rare in nature and was first synthesized artificially in 1940 by bombardment of bismuth atoms with accelerated particles in a cyclotron.

Interactive methods such as brainstorming, round-table discussions, conceptual tables, and the cinquain technique can significantly enhance students' understanding of halogens. Brainstorming allows students to freely express their thoughts and ideas about the topic, generating new concepts and solutions. This method can be implemented orally, where each student shares ideas concisely, or in writing, where ideas are recorded on cards and organized into groups. It fosters creativity, independent thinking, and deeper understanding of the topic.

Round-table discussions encourage students to exchange ideas, ask questions, and engage in debates, promoting active listening, critical thinking, and cooperative learning. By applying this method to halogens, students can explore chemical and physical properties, reactivity, and applications in industry and daily life, while learning to respect different viewpoints.

Conceptual tables provide a structured representation of halogen characteristics, including types, physical and chemical properties, and applications. For example, columns or rows can include elements (fluorine, chlorine, bromine, iodine, astatine), physical states (gas, liquid, solid), colors, chemical properties, and uses in medicine, industry, and research.

The cinquain method is another interactive approach, where students summarize concepts in a five-line poetic structure. Each line focuses on different aspects: the topic, two descriptive words, three actions or characteristics, a four-word phrase, and a single word that captures the essence. For halogens, this might include "halogens," "reactive, strong," "oxidize, react, combine," "natural group of elements," and "element." This

technique enhances comprehension, encourages creative thinking, and helps students retain information effectively.

By integrating these interactive methods, teachers can create an engaging and productive learning environment. Students actively participate in discussions, collaborate in groups, and develop a deeper understanding of halogen elements, their chemical behavior, and their industrial and medical applications. Such approaches also cultivate critical thinking, communication skills, and a sense of responsibility, making the topic both educational and inspiring.

Halogens are highly reactive elements widely found in nature, with significant chemical and physical properties that are essential in both scientific research and practical applications. The use of interactive teaching methods in chemistry lessons enhances students' understanding of halogens, making the learning process more engaging, effective, and collaborative. Methods such as brainstorming, round-table discussions, conceptual tables, and the cinquain technique stimulate critical thinking, creativity, and independent learning. By integrating these approaches, teachers can create a dynamic learning environment that fosters deeper comprehension, active participation, and lasting knowledge retention. Interactive methods thus serve as an effective tool for improving both the quality of education and students' interest in chemistry.

References

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