

**Review of the scientific supervisor for the bachelor's final qualification work of  
Kuzmin Artyom Alekseyevich “The synthesis of propargyl type acetylenic hydroxyketones  
and their reactions in strong acids”**

The bachelor's final qualifying work of Kuzmin A. A. is devoted to the synthesis of 1-aryl-4-hydroxybut-2-in-1-ones (acetylene hydroxyketones of the propargyl type) and the study of their transformations under the conditions of electrophilic activation under the action of strong Bronsted and Lewis acids. The main result of the work is to evaluate the reactivity of intermediate reactive species generated from acetylene hydroxyketones in various acid systems.

While performing his bachelor's work, Kuzmin A. A. mastered the basic techniques of laboratory organic synthesis, including such a complex operation as conducting syntheses in an inert atmosphere in absolute solvents when obtaining initial compounds by the Sonogashira reaction. Apart from that, Kuzmin A. A. received practice working with various acid systems: Bronsted superacid  $\text{CF}_3\text{SO}_3\text{H}$ , strong Lewis acids  $\text{AlCl}_3$  and  $\text{AlBr}_3$ , zeolites, and other reagents, many of which are aggressive substances. He perfectly mastered the instrumental physical-chemical methods of analysis of organic substances: NMR, mass spectrometry, infrared spectroscopy and skillfully applied these methods to identify the resulting compounds.

The main difficulty that A. A. Kuzmin encountered in performing the work was that he had to deal with very reactive intermediate cations generated from acetylene ketones in acidic media. Often, this led to the formation of complex oligomeric mixtures of the products of the studied reactions. However, by carefully selecting the reaction conditions (time, temperature, acid activator), Kuzmin A. A. was able to find suitable conditions for selective electrophilic transformations of acetylene ketones, leading to new unusual structures.

The results of the study by A. A. Kuzmin were presented as a poster presentation in remote mode at the International Scientific Conference of Students, Postgraduates and Young Scientists "Lomonosov-2021", held at the Moscow State University on April 12-21, 2021.

During the course of his bachelor's work, A. A. Kuzmin proved himself to be a capable and thinking experimental chemist. Good theoretical and practical training, obtained during his studies at the Institute of Chemistry of St. Petersburg State University, contributed to the formation of Kuzmin A. A. as a promising young specialist in the field of organic synthesis.

The work deserves an **EXCELLENT** rating.

Scientific supervisor



*Dr. Sci., Professor Aleksander V. Vasilyev*