

## Fundamental principles of the evolutionary development of A.M. Butlerov's theory of chemical structure into the unified theory of the structure of chemical compounds

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### Abstract

In this paper, the analysis of the current state of A.M. Butlerov's theory of chemical structure; the tendency of attracting less attention was noted, including attempts to diminish its fundamental importance in the formation of the individuality of chemical science and the formation of its theoretical foundations, which distinguish it from other natural sciences. The issue of fragmentation of chemistry into a variety of subsections (separate "chemistries"), which hinders the development of A.M. Butlerov's ideas and have led, among other things, to the absence in the list of Ministry of Education and Science of the Russian Federation Higher Attestation Commission of a scientific specialty aimed at the development of common theoretical foundations of chemistry, like "General chemistry" or "Theoretical foundations of chemistry". Based on the analysis of the main principles of A.M. Butlerov's theory of chemical structure and identification of reserves in their content, an attempt was made to evolve it into a unified theory of structure of chemical compounds (UThSChC). This theory develops the ideas of A. M. Butlerov, while shifting the focus from the fundamental development of the meaning of just "chemical structure" of the molecules (substances) in his theory onto the expression "the structure of chemical compounds". Therefore in UThSChC an attempt was made to formulate three basic theoretical principles defining not just the specifics of chemical structure of molecular substances, but the features of the *occurrence* (1), *structure of chemical compounds of elements* (2) and *properties* (3) of different chemical substances. This is necessary to identify the difference in the influence of chemical structure of elements' compounds (molecular and non-molecular, etc.) on characteristics of different classes of chemical substances. At the same time, the formulation of these three provisions of the UThSChC within the paradigm of multilevel organization of matter and substance is based on the assumption that a chemical substance in the form of a chemical compound of elements is considered as a closed material system characterised by fundamental distinctions from substances of physical and biological levels. It was also shown that, in accordance with the theory developed, the unity of the nature of chemical substances and the difference in their chemical structure and properties is revealed within a unified model of chemical bond and a system of chemical bonds, and homo- and heteronuclear compounds using the symbiosis of classical and quantum-chemical calculations of bond characteristics. The present paper represents the content of the talk given at mini-symposium "Butlerov Heritage – 17-18".

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