HIGH PURITY SUBSTANCES – PROTOTYPE OF ELEMENTS OF PERIODIC SYSTEM

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In 2019, the world scientific community celebrates the 150th anniversary of the discovery of the Periodic System of Chemical Elements (PS) by D.I. Mendeleev. A huge number of scientific studies are devoted to this system, new elements have been discovered. PS has become an integral part of scientific and technological progress in the field of chemistry and related sciences.

It should be noted that each of the elements of the PS is an idealized substance with certain morphology (structure) and properties in accordance with the existing theoretical substantiations. In the real, we are dealing with a substance that is close by composition to the investigated PS element, but differs in the presence of other elements in it - impurities that distort (sometimes, drastically) the structure and properties of the target research object.

For centuries, humanity has sought to obtain pure substances in order to achieve the desired properties. A systematic approach to this problem was proposed and implemented by academician GG Devyatikh in the second half of the 20th century. In 1974, on his initiative, a unique Exhibition-collection of high-purity substances was created, which included samples that are prototypes of PS elements, since contain record low content of trace elements.

With the development of scientific and technological progress, the achieved purity of substances and, consequently, their approximation to idealized elements of PS, continuously increases. This is facilitated by new technological processes for obtaining and storing high-purity substances with a constant decrease in the level of impurities; creation of isotope-pure substances; development of a complex of ultra-sensitive multi-element methods of analysis; identifying the unique properties of high-purity substances that bring them closer to the capabilities of PS analog elements and much more. Progress in these areas is the focus of this report.

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