APPLICATION OF SPECTROSCOPY METHODS OF ANALYSIS FOR COMPLEX CONTROL OF THE COMPONENTS CONTENT OF HEATRESISTANT WELDED NICKEL ALLOYS.

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Express methods for quantitative determination of the contents of basic (Ni, Cr) and impurity elements (Al, B, Ce, Co, Cr, Cu, Hf, Fe, Mg, Mn, Mo, Nb, Si, Ti, W, V, Zr) in a wide range of concentrations from 10^{-4} to n·10% in heat resistant welded nickel alloys have been developed using the methods of atomic absorption (AAS), atomic emission spectrometry with inductively coupled plasma (AES-ICP) and a glow discharge (AES-GD).

The conditions of chemical sample preparation were optimized and the composition of acids (2MHCl + 0.1M H_3PO_4) was selected to obtain time-stable solutions of easily hydrolyzing matrix and impurity elements. The optimal analytical parameters for determining the elements were found. To eliminate the influence of the matrix elements of nickel and chromium, the interactive matrix matching method was used.

A comparison of the possibilities of applying the methods AAS, AES-ICP and AES-GD was made.Certified solid standard samples are required for analysis by method AES-GD. It was shown, that the methods of AAS and AES –ICP are the dominant for determining ofthe elements contents from 10^{-4} to n%. The method of AES-GD is preferable at the determination of high concentrations from10^{-2}% and above.

The use of these methods with mutually complementaryanalytical capabilities and mathematical models for taking into account the matrix effect in combination with optimized sample preparation methods both in open systems and in autoclaves with microwave exposure provided complex controlof the components contents in heat-resistant alloys without using certified solid standard samples with improved metrology characteristics.The relative standard deviation (S_r) is 0.05-0.005 at the element content from 1 to 70% and does not exceed 0.15 at the element content from 0.0005 to 0.1%.

New methods of analytical control allowed to ensure the implementation of work on the improvement of metallic connections in liquid rocket engines.

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