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Inductively coupled plasma mass spectrometry in the analysis of biological samples and pharmaceutical drugs 335

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Inductively coupled plasma mass spectrometry is widely used in the analysis of biological samples (whole blood, serum, blood plasma, urine, tissues, *etc.*) and pharmaceutical drugs. The drawback of this method related to spectral and non-spectral interferences shows up when analysing the target analytes, which are inherently complex and strongly differ in their composition. The spectral interferences are connected with overlapping of the masses of the target component and sample matrix components. Non-spectral interferences are caused by the influence of sample matrix components on the physicochemical processes taking place during formation and transportation of liquid sample aerosols into plasma, on the value and spatial distribution of plasma temperature and on the transmission of the ion beam from the interface to mass spectrometer detector. The present review is devoted to the analysis of different mechanisms of occurrence of non-spectral interferences and to establishing ways of their minimization or elimination. Special attention is paid to the techniques of biological sample preparation, which largely determine the mechanisms of the influence of sample composition on the accuracy of analysis. The ways of lowering of non-spectral interferences by instrumental parameter tuning and application of internal standards are also considered. Bibliography — 189 references.

Theoretical grounds of relativistic methods for calculation of spin–spin coupling constants in nuclear magnetic resonance spectra 356

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The theoretical grounds of the modern relativistic methods for quantum chemical calculation of spin–spin coupling constants in nuclear magnetic resonance spectra are considered. Examples and prospects of application of relativistic calculations of these constants in the structural studies of organic and heteroorganic compounds are discussed. Practical recommendations on relativistic calculations of spin–spin coupling constants using the available software are given. Bibliography — 622 references.

Mass spectrometric methods for direct elemental and isotopic analysis of solid materials 427

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Methods for direct analysis of solids have a number of undeniable advantages over the methods that require preliminary dissolution of samples. High sensitivity and selectivity make direct mass spectrometric techniques the most in-demand. The review concerns spark source mass spectrometry, laser ionization mass spectrometry, laser ablation inductively coupled plasma mass spectrometry, secondary ion mass spectrometry, secondary neutral mass spectrometry and glow discharge mass spectrometry. Basic principles, analytical characteristics and trends in the development of these techniques are discussed. Particular attention is given to applications of the techniques as well as to their competitive advantages and drawbacks. Bibliography — 123 references.