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Structural Elucidation of Organic Natural Products By 1D, 2D and Multidimensional-NMR, Spectroscopy

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Abstract

Nuclear magnetic resonance spectroscopy is the most important technique in the structural analysis of natural organic products. NMR spectroscopy uses three methods; They are one-dimensional (1DNMR), two-dimensional (2DNMR) and three-dimensional (3DNMR). The first method of 1DNMR. 1H and 13C NMR spectroscopy is the first tool used by chemists to analyze the structure of products on a routine basis. Also, DEPT, 31P, 15N, 19F, etc. they can generate good information on the structure of simple organic compounds, but in the case of larger molecules, the 1DNMR spectrum is often too saturated. Therefore, the second method of 2DNMR (COZY, HETCOR, HSQC HMBC, TOCSY, NOESY, etc.) is used for large molecules such as proteins. Multidimensional NMR has opened a new window to study the problem of protein folding. By providing the necessary resolution to analyze their complex spectra, determine the basis of the three-dimensional structure of biomolecules (protein, DNA, RNA). The purpose of this research is to highlight the latest developments in the application of nuclear magnetic resonance technology as a structural analysis tool to meet the current challenges in the field of natural organic products. This research is supported by the interpretation of the structure of different organic compounds using different NMR techniques.

For the past 50 years, nuclear magnetic resonance spectroscopy (commonly called NMR) has been one of the most versatile techniques for elucidating the structure of organic compounds. Among all available spectroscopic measurement methods, NMR is the only technique that can fully analyze and interpret the entire spectrum. Thanks to improved experimental techniques and novel methods, nuclear magnetic resonance (NMR) has made tremendous progress in the past decade. Generally, NMR spectroscopy uses three methods: they are one-dimensional (1D), two-dimensional (2D), and three-dimensional (3D). Usually the first method of 1DNMR (1H DEPT, 13C, 15N, 19F, 31P, etc.) can generate good information about the structure of simple organic compounds, but in the case of larger molecules, the 1DNMR spectrum is usually too crowded. Therefore, the second method of 2DNMR (COZY, DQFCOSY, MQFCOSY, HETCOR, HSQC, HMQC, HMBC, TOCSY, NOESY, EXSY, etc.) is used for larger molecules, but the spectrum of 2DNMR also changes when it is used for larger molecules. complex and overlapping with other very large molecules, such as proteins. Therefore, to achieve high resolution and reduce overlap in the spectra of supermacromolecules, multidimensional (homonuclear and heteronuclear) NMR is often used. This article supports the interpretation of the structure of different organic compounds through different NMR techniques.

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