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Book of
ABSTRACTS

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Confirmation preferences of carbamazepine molecules in chloroform and supercritical CO₂ by NMR spectroscopy

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Information on the conformational preferences of molecules of biologically active compounds is important for finding effective ways to create new drugs, as well as for improving existing ones. In the process of this work, a conformational analysis of carbamazepine in deuterated chloroform was carried out using modern two-dimensional NMR spectroscopy technique. Usually, conformational NMR-analysis is based on the internuclear distances, obtained from the experiments (¹H-¹H 2D NOESY) and quantum chemical calculations. However, due to the symmetry of the carbamazepine molecule, it is not possible to determine the conformation-dependent distance using this approach. This is due to the fact that the conformational mobility of the carbamazepine molecule is determined by the amino group. For identification of the conformations, the approach using heteronuclear two-dimensional spectroscopy ¹H-¹⁵N 2D HMBC was used. This analysis revealed minor conformations of carbamazepine molecules, that are in equilibrium with the dominant conformer fraction in solution at room temperature.

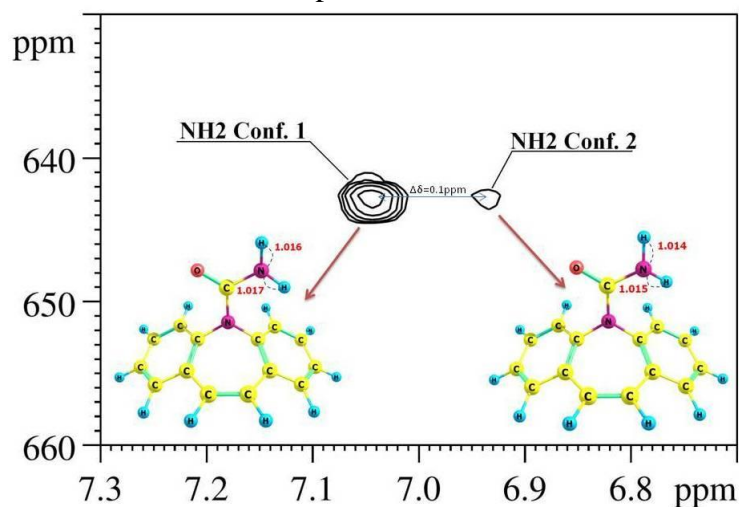


Figure 1. ¹H-¹⁵N HMBC spectrum of carbamazepine in chloroform at room temperature.

In the presented figure 1, two cross-peaks are observed, indicating the presence of two conformers with different N-H bond lengths. This approach was used for carbamazepine in supercritical carbon dioxide (CO₂) and allowed to determine the distribution of conformers at high pressure and high temperature.

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[1] I.A. Khodov, S.V. Efimov, M.Y. Nikiforov, V.V. Klochkov, and N. Georgi, *J. Pharm. Sci.*, 103 (2014).

[2] I.A. Khodov, S.V. Efimov, M.G. Kiselev, L.A.E. Batista De Carvalho, and V.V. Klochkov, *J. Mol. Struct.*, 1113 (2016).