

Elucidating the structure of sugars in the gas phase

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Carbohydrates are one of the most versatile biochemical building blocks, widely acting in energetic, structural or recognition processes. We present several structural studies on carbohydrates exploiting an experimental strategy which combines microwave (MW) and laser spectroscopies in high-resolution. MW and laser spectroscopies exhibit complementary functionalities. Laser spectroscopy offers high sensitivity coupled to mass and conformer selectivity, making it ideal for medium or large biochemical systems. On the other hand, microwave spectroscopy provides much higher resolution and direct access to molecular structure through the moments of inertia. This combined approach provides not only accurate chemical insight on conformation, structure and molecular properties, but also benchmarking standards guiding the development of theoretical calculations.

In order to illustrate the possibilities of a combined MW-laser approach we present results on the conformational landscape and structural properties of several monosaccharides^{1,2}, disaccharides³, a pentasaccharide⁴ including microsolvation processes of carbohydrates³ and molecular recognition processes using a peptide which can sense *anomeric* and *conformational* differences⁵.

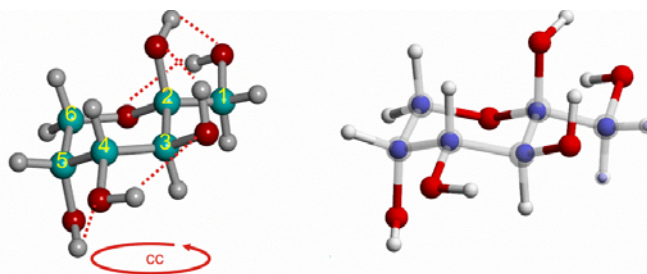


Figure: Structure of fructose: Comparison experiment versus theory

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