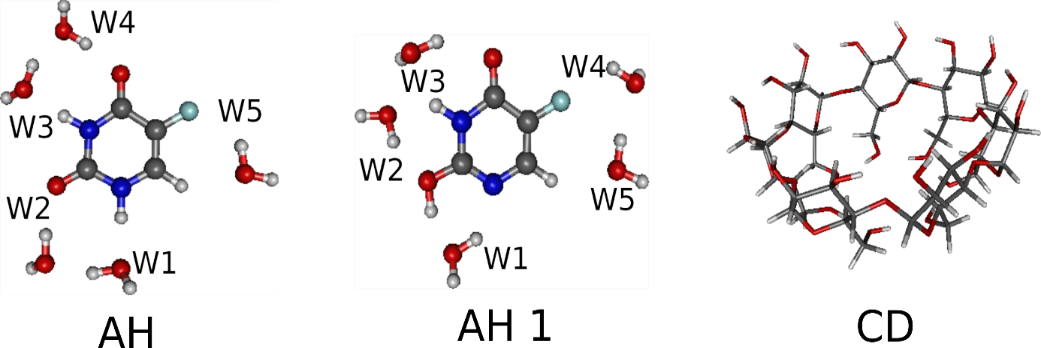
**INTERACTION OF 5-FLUOROURACIL WITH WATER AND β-CYCLODEXTRIN**

Christian Hebenstreit1, Aneta Buczek2, Małgorzata Broda2, Anne-Marie Kelterer1

*1Institute of Physical and Theoretical Chemistry, Graz University of Technology, NAWI Graz, 8010 Graz, Austria*

*2University of Opole, Faculty of Chemistry, 45-052 Opole, Poland*

The pyrimidine base uracil is known to be a component of the RNA. The fluoro derivate of uracil, 5-fluoruracil (5FU), is used as an anticancer-drug. Its improved bioavailability was recently described [1] as an inclusion complex with β-cyclodextrin (CD). To simulate such a complex in the presence of water, 5FU can be combined with CD and water in various positions. In this study, the interaction of 5FU with water, and of 5FU in an inclusion complex with CD will be discussed with regard to the interaction between the 5FU drug and the surrounding.



**Figure 1.** Optimized geometries of two different tautomeric forms of 5FU with water, AH (left) and AH1 (center), respectively, and the -cyclodextrin before complexation (right).

Density Functional Theory was applied using the B3LYP-D3/6-31+G(d,p) method. First, water molecules were placed around the two most stable tautomeric forms of 5FU [1] in five different H-bonding situations to find out the position with the highest stabilization interaction. Frequency calculations were carried out to confirm true minima, and the interaction energies were computed.

In a second step, the 5FU with and without water was placed inside / below the β-cyclodextrin to form the complex. The geometries and the interaction energies of various 5FU-CD complexes are compared, and the stability of the different clusters is discussed in this presentation.

**References**

[1] C. Di Donato, M. Lavorgna, R. Fattorusso, et al., Molecules 21 (2016) 1644.

[2] Tomasz Płowucha, Structural and spectroscopic properties of 5-fluorouracil and its complexes with -cyclodextrins, Master Thesis, University of Opole, 2017.