Conformation and Tautomerizm of the 2-methyl-4-pyridin-2'-yl-1,5-benzodiazepine Molecule. An Ab Initio Study.

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Benzodiazepine derivatives are well-described heterocycles as they have found applications as an important class of therapeutic agents. They and their annelated derivatives exhibit a wide spectrum of biological activities and have found applications in pharmaceutical chemistry. Some of the benzodiazepine derivatives are used as dyes for acrylic fibers in photography. In addition, 1,5-benzodiazepines are valuable synthons for the preparation of other fused ring compounds such as triazolo-, oxadiazolo-, oxazino- and furano-benzodiazepines. Due to their wide range of applications these compounds have received a great deal of attention in connection with their synthesis. In the present study, we investigated the structural and energetic characteristic of tautomeric forms of 1,5-benzodiazepine and its 2-methyl-4-pyridin-2'-yl derivative by ab initio and the DFT calculations in the gas phase and in water, using the ab initio and density functional theory (DFT) calculations.

The ab initio and DFT calculations were performed utilizing the Gaussian 03W. The geometries were optimized at the HF and B3LYP computational level with the 6-31G* basis set in the gas phase and in water. The solute-solvent interaction was evaluated using the self-consistent reaction field (SCRF) method.

Our calculation showed that the boat conformation is dominant for the seven-membered diazepine ring all of the structures even with different double bond positions. The calculated relative free energies (ΔG) predict that the tautomer 2b is the most stable structure and its conformer 2a is the second in the gas phase and in water.

References