

Photochemistry of Cytosine Tautomers

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The building blocks of DNA must be photostable to prevent the loss of genetic information on the sunlit surface of our planet. We investigate the molecular mechanisms responsible for this photostability in the corresponding DNA base chromophores. The DNA base cytosine presents a particular challenge, because the isolated base exists in 3 tautomers with different spectroscopic properties. We resolved the excited state processes in two of the tautomers and assign an excited state tautomerization reaction from the biologically relevant keto tautomer to the keto-imino tautomer. In the condensed phase, we may expect fast, hydrogen-bond catalyzed reverse tautomerization and this process could offer a pathway for rapid excited state relaxation and enhanced photostability.