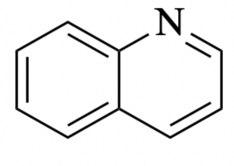
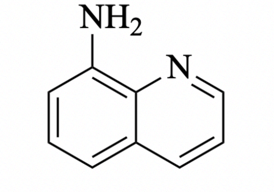
# Investigating Amino-substituent effects on the photobasicity and Triplet-State interactions of Quinoline

**Indy Pisitkasem**, Class of 2027

Proton transfer (PT), the movement of a positively charged hydrogen ($H^+$), is a vital component of various important biological processes such as the synthesis of ATP. Given its ubiquitous nature, the ability to spatially and temporally control PT has various potential applications. This summer in the Takematsu Lab, I underwent training with photoacids, molecules that become significantly more acidic upon exposure to light and increase their likelihood of donating a proton to surrounding molecules. The model I worked with was 2-naphthol (2OH), and my goal during training was to evaluate the molecule's photoacidity through spectroscopic techniques. I employed thermodynamic equations to prove its photoacidic properties by finding its pKa (a numeric measure of acidity) in both the ground and excited state. UV-Vis spectroscopy was used to measure 2OH's absorbance in the ground state, and steady-state emission spectroscopy was used to monitor 2OH's fluorescence during deexcitation from the excited state.



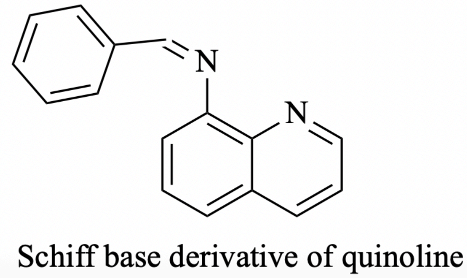
Quinoline



8-aminoquinoline

After gaining a spectroscopic handle on 2OH, I proceeded to study quinoline, a cyclic photobase containing nitrogen as its proton "acceptor". Similarly to photoacids, photobases become more basic upon irradiation, increasing their ability to take a proton from surrounding molecules. Using both steady-state emission spectroscopy and transient absorption spectroscopy (TAS), I studied quinoline's PT mechanism in solvent alcohols with varying pKa values, along with water at different pHs and acetonitrile (ACN) as a control. I hypothesized that solvents with lower pKa values were more acidic and likely to have their protons accepted by quinoline, and either aprotic solvents (like ACN) or solvents with higher pKa values would be less likely to donate their protons to the photobase. Subsequently, I proceeded to study the PT mechanisms of 8-aminoquinoline, a quinoline derivative containing an electron-donating amino group that I believed would increase the photobasicity of the molecule.

In the future, I plan to continue exploring how the placement of substituents on different carbon positions of quinoline can tune its photobasicity, eventually incorporating Schiff bases as my substituents.



Schiff base derivative of quinoline

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