FTIR STUDIES OF AMMONIA PHOTOCHEMISTRY IN SOLID PARAHYDROGEN

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It is believed that producing and trapping high concentrations of reactive species in solid molecular hydrogen will ultimately lead to the development of new high performance rocket fuels.[a] We think the NH radical could be a viable candidate and try to produce it by photolyzing ammonia (NH_3) at low temperature in solid parahydrogen. Upon 193.3 nm photolysis of NH_3, we observe both NH_2 and NH radical photoproducts. No significant changes in the NH radical concentration have been detected during a period of 3 hours at 1.8 K, even though the reaction NH + $H_2 \rightarrow NH_3$ is highly exothermic and can occur by quantum mechanical tunneling even at these low temperatures. In contrast, the NH_2 radical is only observed in FTIR scans recorded during photolysis and rapidly decays once the 193.3 nm laser is turned off. We will discuss the possible fates of NH_2 and how conditions can be optimized to produce high concentrations of NH radicals.

[a] M. E. Fajardo, S. Tam, T. L. Thompson, and M. E. Cordonnier, *Chem. Phys.* **189**, 351-365 (1994).