REACTION OF $NFCl_2$ WITH ARGON METASTABLES

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The reaction of $NFCl_2$ with metastable argon atoms was investigated. When $NFCl_2$ was admitted to a stream of argon metastables ($^3P_2$), visible and UV emission was observed. Two sources of the visible emission were identified. A sharp peak at 528 nm was assigned to the Δv=0 sequence band of the $b^1\Sigma^+ \rightarrow X^3\Sigma^-$ transition in NF, and a peak at 664 nm was assigned to the Δv=0 sequence band of the $b^1\Sigma^+ \rightarrow X^3\Sigma^-$ transition in NCl. The Δv= -1, +1, +2, and +3 sequence bands of the NCl b$\rightarrow$X transition were also observed with up to v$\prime$=12 levels populated. The vibrational excitation in the NF and NCl fragments has implications for the geometry of the excited state of $NFCl_2$ formed in the $Ar(^3P_2)$+$NFCl_2$ reaction . The UV emission spectrum consisted of two bands with maxima at 256 nm and 198 nm. The intensity distribution of the UV emission was identical to the emission that was observed when Cl_2 was added to the stream of argon metastables and was assigned to electronically excited Cl_2 formed via Cl_2 +$Ar(^3P_2)$. The source of the Cl_2 is either Cl_2 contamination in the $NFCl_2$ sample, or Cl_2 formed during the reaction of $NFCl_2$ with $Ar(^3P_2)$. To examine the energetics of the $NFCl_2$+$Ar(^3P_2)$ reaction, G1 and G2 methods were used to calculate the ΔH_{form} of $NFCl_2$.