STUDY ON THE SPECTROSCOPY OF TRANSITION METAL FLUORIDES

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We present the spectra of NiF and CuF by using pulsed dc discharge to produce the species and laser induced fluorescence technique under free jet-cooled conditions. For NiF molecule, twenty one electro nic transition in the 400-580 nm region, involving five high-lying electronic states[18.1]$^2\Delta_{5/2}$, [19.7]$^2\Pi_{3/2}$,[20.0]$^2\Delta_{5/2}$, [20.3]$\Pi_{3/2}$ and [22.9] $^2\Pi_i$ and two lower states, the ground state X $^2\Pi_{3/2}$ and the low-lying state [0.25]$^2\Sigma$, respectively, are rotationally analyzed. The molecular constants of these five upper states are determined. The [20.3] $\Pi_{3/2}$ state is identified and may be linked to the component of a unreported quartet state. A previously reported [20.0]$^2\Pi_{1/2}$ component may be rea ssigned as a $^2\Delta_{5/2}$.

For CuF molecule, the spectra in the 450-510nm region are observed. They mainly result from the B-X and C-X transitions. The rotationally resolved bands B($^1\Sigma^+, v^{'}$)($v^{'} = 0-3$) $- X$($^1\Sigma^+, v^{''} = 0$) and C($^1\Pi, v^{'}$)($v^{'}$=0-2)-X($^1\Sigma^+$) are observed. The spectroscopic isotopic shifts between ^{65}CuF and ^{63}CuF are observed. The rotational constants for low and upper states are derived.