HIGH RESOLUTION FOURIER TRANSFORM UV EMISSION SPECTROSCOPY OF THE 410 NM BAND OF THE TiCl RADICAL

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High resolution UV emission spectrum of the 410 nm band of the TiCl radical was measured by Fourier transform spectrometer (Bruker IFS120HR) with the resolution of 0.04 cm^{-1}. This band was assigned as the electronic transition of $^2\Phi - ^2\Delta$ band of the TiCl radical by Phillips and Davis [1], but recent study of ZrCl[2] suggested that this band might be $^4\Gamma - X^4\Phi$ or $^4\Phi - X^4\Phi$ band.
In the present work a new electronic assignment of $^4\Gamma$ - $X\,^4\Phi$ was proposed. The vibrational assignments were made for each subbands. The vibrational bands of (0-0), (1-1), (2-2), (3-3), and (4-4) were assigned for the subbands of $^4\Gamma_{5/2} - ^4\Phi_{3/2}$ and $^4\Gamma_{7/2} - ^4\Phi_{5/2}$. For the subband of $^4\Gamma_{9/2} - ^4\Phi_{7/2}$, the (0-0), (1-1) and (2-2) bands were assigned, but for the $^4\Gamma_{11/2} - ^4\Phi_{9/2}$ subband, only (0-0) band was assigned. Rotational analysis were done for $^4\Gamma_{5/2} - ^4\Phi_{3/2}$ and $^4\Gamma_{7/2} - ^4\Phi_{5/2}$ subbands. The band origins, rotational constants, and centrifugal distortion constants were determined by the least square method. The rotational constants were consistent with those reported by Ram and Bernath [3] within the experimental error. ¿From the line intensities of *P*- and *R*- branches, $\Delta\Lambda$ was derived to be +1, and therefore upper state was determined to be $^4\Gamma$. Further measurements and analysis for the subbands of $^4\Gamma_{9/2} - ^4\Phi_{7/2}$ and $^4\Gamma_{11/2} - ^4\Phi_{9/2}$ should be needed to confirm the present electronic assignment definitely.

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