DOPPLER-FREE STUDY OF THE TiO MOLECULE

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We have studied the yellow-orange absorption spectrum of the TiO molecule by use of a Doppler-free spectroscopy experiment in which a cw tunable laser beam crosses an effusive beam of titanium monoxide. Thousands of wavenumbers belonging to the $B^3\Pi$ - $X^3\Delta$(1-0) and $c^1\Phi$ - $a^1\Delta$(0-0) bands have been measured to an accuracy of 10^{-3} cm^{-1} and interpreted in terms of molecular constants. For the first band[a], analysis of fine structure and Λ-doubling shows that the electronic structure of the $B^3\Pi$ state must be revisited. For the second band[b], electronic interactions with distant vibrational levels of the $c^3\Delta$ state must be considered to assign high rotational levels. Analysis of the spectra due to the five isotopes of titanium is on the tracks.

[a] C. Amiot, E. M. Azaroual, P. Luc and R. Vetter, J. Chem.Phys., 102, 4375 (1995).
[b] C. Amiot, M. Cheikh, P. Luc and R. Vetter, J. Mol. Spectroscopy , 179,159 (1996).