

HIGH-RESOLUTION INFRARED SPECTRUM OF THE DIATOMIC VANADIUM OXIDE

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Small molecules made of refractory materials are thought to play an important role in the dust formation processes around late-type stars. Likewise, they take part in the opacity process of variable late-type stars, as has been shown for the molecule TiO.^a Because of similar formation conditions, the diatomic molecule vanadium oxide (VO) is thought to occur in similar locations around stars as TiO.^b VO has already been detected in the near-infrared region in the envelope of the red hypergiant VY CMa^c, but due to the lack of high-resolution laboratory spectra, no astrophysical search of VO in the mid-IR region has been performed. In this work, we report the ro-vibrational absorption spectrum of $X^4\Sigma^-$ VO, including its hyperfine structure. In our experiment we used a frequency modulated quantum cascade laser in combination with Herriott-type multipass optics. The molecules were produced by laser ablation of a vanadium rod and an N₂O/He buffer gas, which was subsequently adiabatically expanded into a vacuum chamber. The rotationally cooled spectrum was analyzed using the pgopher software and the molecular constants were determined. The experimental data as well as line predictions will enable a dedicated search for this molecule in space at mid-IR wavelengths.

^aM.J. Reid & J.E. Goldston, *The Astrophysical Journal* **568**, 931 (2002)

^bL.K. McKemmish *et al.*, *Monthly Notices of the Royal Astronomical Society* **463**, 771 (2016)

^cJ. Bernal *et al.*, 74th International Symposium on Molecular Spectroscopy (2019)