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Accession number:20123015268741
Title:High resolution spectral analysis of oxygen. II. Rotational spectra of a¹Δ<inf>g</inf> O<inf>2</inf> isotopologues
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Source title:Journal of Chemical Physics
Abbreviated source title:J Chem Phys
Volume:137
Issue:2
Issue date:July 14, 2012
Publication year:2012
Article number:024305
Language:English
ISSN:00219606
CODEN:JCPSA6
Document type:Journal article (JA)
Publisher:American Institute of Physics, 2 Huntington Quadrangle, Suite N101, Melville, NY 11747-4502, United States
Abstract:As part of a comprehensive review on molecular oxygen spectroscopy, we have measured rotational spectra of isotopic forms of molecular oxygen in its a ¹Δ<inf>g</inf> electronic state with high-resolution terahertz spectroscopy. The data are recorded in close proximity to predicted positions. Due to the high resolution and good signal-to-noise ratio, the fundamental hyperfine parameters eQq and C<inf>I</inf> are determinable for ¹⁷O-substituted species for the first time. A refined nuclear spin orbit coupling constant, a -211.9328(283) MHz, was determined, and is roughly two orders of magnitude more precise than values determined from near infrared spectroscopy or electron spin resonance studies. Vibrationally excited oxygen in the a¹Δ<inf>g</inf> electronic state was also observable with small signal levels for many of the rotational transitions. © 2012 American Institute of Physics.
Number of references:45
Main heading:Oxygen
Controlled terms:Electronic states - Near infrared spectroscopy - Spectrum analysis
Uncontrolled terms:Close proximity - High resolution - High-resolution spectral analysis - Hyperfine parameters - Isotopologues - Nuclear spins - Orders of magnitude - Oxygen spectroscopy - Rotational spectra - Rotational transition - Signal level - Vibrationally excited
Classification code:943 Mechanical and Miscellaneous Measuring Instruments - 942 Electric and Electronic Measuring Instruments - 941 Acoustical and Optical Measuring Instruments - 944 Moisture, Pressure and Temperature, and Radiation Measuring Instruments - 921 Mathematics - 801 Chemistry - 712.1 Semiconducting Materials - 804 Chemical Products Generally

DOI:10.1063/1.4719169
Database:Compendex