

MOLECULAR ABSORPTION STUDIES USING
INFRARED LASERS [CO, DF, CO₂]

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ABSTRACT

Accurate knowledge of atmospheric molecular absorption coefficients at infrared laser wavelengths is required in order to evaluate the usefulness of these devices as elements of various kinds of atmospheric probing devices.

We have recently been involved in a laboratory measurement program with CO, DF, and CO₂ lasers [1,2,3,4]. Absorber samples were contained either in a one km multi-traversal cell or an acoustic spectrophone. Absorbers that have been studied include CO₂, N₂O, H₂O, and HDO, all broadened with N₂ to one atmosphere total pressure.

The paper will emphasize a comparison of the results obtained at the different wavelengths.

Some emphasis will be placed on recent studies of the 10 μ water vapor continuum using both the spectrophone and multi-traversal cell techniques. Several P branch CO₂ laser lines in addition to the P(20) line were studied. The new results are compared to previous laser [1,4] and non-laser measurements [5].

1. McCoy, Rensch, and Long, Applied Optics, Vol. 8, p. 1471, July 1969.
2. Long, et. al, "Experimental Absorption Coefficients for Eleven CO Laser Lines," RADC-TR-73-126, March 1973.
3. Mills and Long, "Nitrous Oxide Absorption Measurements Using a Single Frequency DF Laser," OSA Washington, D.C., April 1974.
4. Trusty, "Water Vapor Absorption Measurements Near 10.4 μ m Using a CO₂ Laser and a Spectrophone," OSA Denver, Colorado, March 1973.
5. Burch, Philco-Ford Corp. U-4784, 31 January 1970.