

RESONANCE RAMAN SCATTERING FROM OZONE

C. M. Penney

General Electric Corporate Research and Development

Schenectady, New York, U.S.A.

ABSTRACT

Absorption of light in the strong near-uv band of ozone extending from 200-300 nm (Hartley band) is expected to lead to rapid dissociation of the ozone molecule. However, a small fraction of the absorption events can lead to radiative decay before dissociation occurs. Such light emission is of the type that has been designated as resonance Raman scattering by Holzer, Murphy and Bernstein¹, who observed this phenomenon in halogen vapors. Although the probability of decay by emission before dissociation is likely to be quite small for ozone, initial calculations indicate that the resonance scattering cross section may be as large as 10^{-24} cm²/sr; i.e., about five orders of magnitude stronger than the corresponding nitrogen vibrational Raman cross section. Such a large cross section would make possible Raman-Lidar observations of ambient ozone levels (ppb) in the lower atmosphere and similar observations of the stratospheric ozone layer from a high altitude observatory.

Measurements of the spectroscopic characteristics of this scattering, including its absolute magnitude, are presently in progress. The results of these measurements will be described in detail.

Reference

1. W. Holzer, W.F. Murphy and H.J. Bernstein, J. Chem. Phys. 52, 399 (1970).