

SHORT PAPER

Comment on the paper, "The reaction of nitric oxide with atomic nitrogen as a possible excitation source of auroral green line"

D. W. RUSCH, D. G. TORR*, W. E. SHARP and T. M. DONAHUE

Department of Atmospheric and Oceanic Science,
University of Michigan, Ann Arbor, Michigan 48105, U.S.A.

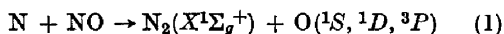
and

K. HENRIKSEN

Geophysical Institute, Fairbanks, Alaska 99701, U.S.A.

(Received 9 January 1975)

The author (HENRIKSEN, 1974) suggests the reaction



as a possible source of O(¹S) atoms in an aurora. Reaction (1) is endothermic with an energy deficit of 0.92 eV (GILMORE, 1965; TINSLEY, 1972) if both reactants are in the ground electronic state, N(⁴S) and NO(*X*² π_r , *v* = 0), and the product atomic oxygen atom in the ¹S state. In addition, the specific reaction does not conserve electron spin, and must be considered highly unlikely to have any significance.

Reaction (1) is exothermic (3.25 eV) and spin

allowed if the product O atom is in the ground (³P) electronic state. Therefore, it is possible that a significant number of the product O atoms could reside in this state.

A different situation arises if the atomic nitrogen atom is excited to the N(²D) state. Reaction (1) is then allowed energetically (1.46 eV excess energy) and conserves spin. The rate of Reaction (1) is believed to be faster if the atomic nitrogen atom is in the ²D (excited, metastable) state (see e.g., LIN and KAUFMAN, 1971), and consequently that process could be an important source of O(¹S) atoms if the N(²D) densities were sufficiently high.

REFERENCES

- | | | |
|--------------------------|------|--|
| GILMORE F. R. | 1965 | <i>J. Quant. Spectrosc. Transfer</i> 5 , 369. |
| HENRIKSEN K. | 1974 | <i>J. atmos. terr. Phys.</i> 36 , 1437. |
| LIN C. F. and KAUFMAN T. | 1971 | <i>J. Chem. Phys.</i> 55 , 3760. |
| TINSLEY B. A. | 1972 | <i>Annls Géophys.</i> 28 , 155. |

* National Astronomy and Ionosphere Center, Cornell University, Ithaca, N.Y., U.S.A. on leave from N. I. T. R. of the C. S. I. R., P. O. Box 3718, Johannesburg, South Africa.