MAGNETIC DIPOLE TRANSITION ($^2P_{1/2} \leftarrow {}^2P_{3/2}$) OF IODINE ATOM PRODUCED BY IN SITU PHOTOLYSIS OF ALKYL IODIDES IN SOLID PARAHYDROGEN

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In a series of papers[a b], we have shown that alkyl iodides imbedded in solid hydrogen are easily photolyzed into the alkyl radical and iodine atom very efficiently. This is a remarkable contrast to the case of conventional rare gas matrices, in which the so-called cage effect prevents iodides from being separated into the radical and iodine atom. This feature of solid hydrogen can be attributed to the softness of the quantum solid. The radicals thus produced have been subjected to the study of high-resolution rotation-vibration spectroscopy. On the other hand, no information on the counterpart iodine atom has been obtained so far. Here, we report an observation of the magnetic dipole transition ($^2P_{1/2} \leftarrow {}^2P_{3/2}$) of iodine atom produced by the photolysis of iodide molecules imbedded in solid parahydrogen.
The iodine atom was produced by 253.7 nm UV photolysis of iodides. Absorption observed at 7,640 cm^{-1} with a doublet structure is assigned to the spin-orbit transition of an isolated iodine atom in solid parahydrogen. The doublet structure is accounted for the partially resolved hyperfine structure of the iodine atom. In addition to the doublet, other absorptions were observed at 7,660 cm^{-1} with a doublet structure, and at 7,670 cm^{-1} with more complicated spectral structure. The former absorption is assigned to the spin-orbit transition of an iodine atom weakly interacting with the alkyl radical produced by the photolysis, while the latter is assigned to an iodine atom interacting with the alkane produced by further photolysis of the radical by 193nm UV radiation. Details of the observed absorption will be discussed.

[a] T. Momose and T. Shida, *Bull. Chem. Soc. Jpn.* **71**, 1-15 (1998).
[b] M. Fushitani, N. Sogoshi, T. Wakabayashi, T. Momose, and T. Shida, *J. Chem. Phys.* **109**, 6346-6350 (1998).