INTENSITIES OF ZERO-PHONON DOUBLE TRANSITIONS INVOLVING H_2-HD OR D_2-HD PAIRS IN SOLID HD

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Solid hydrogens (H_2, D_2, HD, etc) have been recognized as unique cryogenic media for spectroscopic studies of molecular rotational-vibrational dynamics in the condensed phase.[a] This has motivated high resolution infrared absorption studies of the rovibrational spectra of dopants embedded in solid hydrogens. Theoretically, to start with, it would be useful first to understand the spectra of solid hydrogen of a specific isotopomer containing small concentrations of another isotopomer as a dopant, where the intermolecular forces are extremely weak. Recently, while developing intensity formulas for multipole-induced transitions in solid HD, HT, etc, we realized that most of the expressions for double transitions can be applied to double transitions involving para-H_2-HD or ortho-D_2-HD pairs.[b] Intensity expressions for mixed double transitions involving ortho-H_2 or para-D_2 $(J = 1)$ can be derived using the same formalism. Details will be discussed in the present paper.

[a] T. Oka, *Annu. Rev. Phys. Chem.* **44**, 299 (1993)

[b] A. P Mishra, R. W. Field, S. V. N. Bhaskara Rao, R. D'Souza and T. K. Balasubramanian, *Phys. Rev. B* (in press).