

Spectroscopic Studies of Di- and Tetra-Phosphorus in Adamantane Matrices

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Storable matrices with adamantane as a host have been developed some years ago. The technique has some drawbacks compared to classical noble gas matrices, but opens novel possibilities for investigations of reactive molecules.¹ Otherwise difficult to employ methods, like nuclear magnetic resonance (NMR) spectroscopy may be used for the investigation of these matrices. P₄ vapor and mixtures of P₄ and P₂ are deposited in adamantane by co-condensation. The physical properties of ³¹P (high gyromagnetic ratio, spin 1/2) along with modern NMR spectrometers and techniques (MAS) allow experiments at higher dilutions. Selective variations of the experimental conditions provide new insights into the morphology of the adamantane matrices, as well as the dynamics and interactions of the isolated species. The experimental results are discussed with quantum chemical calculations and know data from classical experiments.

¹ A. Kaufmann, A. Kornath, M. Torheyden, Raman spectroscopic studies on matrix-isolated phosphorus molecules P₄ and P₂. *J. Chem. Phys.* **2002**, *116*, 3323.