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High resolution infrared spectra of protonated benzene isolated in solid parahydrogen YU-JONG WU, National Synchrotron Radiation Research Center, MOMO BAHOU, YUAN-PERN LEE, Department of Applied Chemistry, National Chiao Tung University, NSRRC COLLABORATION, NCTU COLLABORATION — Identification of infrared (IR) spectra of protonated polyaromatic hydrocarbons (PAH) is important in understanding the unidentified IR bands of interstellar media. We demonstrate a new method that is superior to the Ar-tagging IR photodissociation or the IR-multiphoton-dissociation (IRMPD) methods currently used. The protonated benzene ($C_6H_7^+$) was produced on electron bombardment of a mixture of benzene (C_6H_6) and *para*-hydrogen (p-H_2) during deposition. IR features of $C_6H_7^+$ and C_6H_7 were identified by observing the change in intensity upon photolysis and comparison with theoretical calculations. Lines of $C_6H_7^+$ decreased in intensity when the matrix was irradiated with light at 365 nm, those of C_6H_7 increased in intensity. Similar experiments were performed for a sample of C_6D_6/p-H_2 and the production of $C_6D_6H^+$ was confirmed. Observed wavenumbers, relative IR intensities and deuterium isotopic shifts agree with those predicted for $C_6H_7^+$ and C_6H_7. Compared with previous methods, this method provides a wider spectral coverage with much narrower lines and more accurate relative IR intensities, and may be readily applied to larger protonated and neutral PAH.

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