Observation of K-shell resonances in Xe and XeF\textsubscript{2}\textsuperscript{1} STEVE SOUTHWORTH, ROBERT DUNFORD, DIPANWITA RAY, ELLIOT KANTER, BERTOLD KRÄSSIG, LINDA YOUNG, DON WALKO, Argonne National Laboratory — We recently reported on the ion charge states and fragmentation channels of Xe and XeF\textsubscript{2} following K-shell x-ray absorption by the Xe atom [1]. The ion spectra reveal effects of resonant excitations despite the 11.49-eV lifetime width of the vacancy states. Due to the high electronegativity of the F ligands, Xe forms stable molecules such as XeF\textsubscript{2}. With 10 valence electrons, XeF\textsubscript{2} is a prime example of a hypervalent molecule and its structure has attracted interest since its discovery in the 1960s. A strong pre-edge resonance is observed in the x-ray absorption spectrum that we attribute to the antibonding 7\sigma\textsubscript{u} orbital. Excitation of the 7\sigma\textsubscript{u} resonance selects a spatially aligned ensemble of molecules as observed in our ion fragmentation spectra [1]. Analysis of the x-ray absorption spectrum also yields a measurement of the chemical shift of the Xe 1s ionization energy resulting from the F ligands. Results of new measurements on Xe and XeF\textsubscript{2} with an improved x-ray/ion coincidence instrument will also be reported.


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