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The absence of chemical sensitivity in the 4d and 5d X-ray absorption spectroscopy of uranium compounds

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Recently, X-ray absorption spectroscopy (XAS) and related derivative measurements have been used to demonstrate the Pu 5f states are strongly relativistic and have a 5f occupation number near 5. [1] Owing to the success in this regime, it has been argued that the XAS measurements should be a powerful tool to probe 5f occupation variation, both as a function of elemental nature (actinide atomic number) and as a function of physical and chemical perturbation, e.g. oxidation state. It will be shown here that XAS and its related measurements fail in this latter aspect for a wide variety of uranium compounds and materials. [2-9] Possible causes will be discussed.

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