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Charge exchange and chemical reactions with trapped thorium ions MICHAEL DEPALATIS, LAYNE CHURCHILL¹, MICHAEL CHAPMAN, Georgia Institute of Technology — Most atomic nuclei have excitation energies ranging from keV to MeV. A unique exception is the ²²⁹Th nucleus, which has an excited state just several eV above the nuclear ground state.² Th³⁺ provides a convenient level structure for laser cooling in an rf Paul trap.³ Unlike many ions commonly utilized in precision measurements, the trap lifetime of Th³⁺ is limited to only several minutes. This is a severe limitation to experiments involving ²²⁹Th as it is only available in minute quantities. Here we have studied the loss mechanisms by introduction of various contaminants and analyzed reaction products using trapped ion mass spectrometry techniques.⁴

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