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Regeneration of AlH_3 studied with Raman and Infrared Spectroscopy DAVID LACINA, J. WEGRZYN, J.J. REILLY, JASON GRAETZ, Brookhaven National Lab — Aluminum hydride compounds are known to exhibit a 10% by weight hydrogen storage capacity that makes them suited for technologies that require hydrogen as a fuel. The current challenge associated with this material is how to regenerate the hydride from the spent fuel and H_2 gas. We employ a two-step process to regenerate the hydride compound which first requires the formation of a stable aluminum hydride adduct using a tertiary amine. This is followed by a second step consisting of adduct separation and hydride recovery, involving transamination to create a less stable adduct. We present results which show that alane-amines can be formed by hydrogenation of catalyzed aluminum in a solvent at low pressures using one of several tertiary amines. Raman and infrared spectroscopy was performed on the products of these reactions to better understand the structure of the alane amines that are formed, as well as the hydrogenation reactions that take place. A vibrational analysis of the regeneration products performed with Raman and infrared spectroscopy is presented and will help clarify the molecular and vibrational structures of these alane amine adducts.

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