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pardInvestigation of the Direct Hydrogenation of Aluminum to Alane in Supercritical Fluids CRAIG JENSEN, University of Hawaii, SEAN MCGRADY, REYNA AYABE, University of Hawaii, BEN REDDY, University of New Brunswick — Alane, AlH_3 has many of the properties that are requisite for materials to be considered viable for onboard hydrogen storage applications. Most notibly, it contains 10.1 wt% hydrogen and undergoes dehydrogenation at appreciable rates at temperatures below 100°C. However, the very low, ≥ 6 kJ/mol, enthalpy of dehydrogenation of AlH_3 prohibits subsequent re-hydrogenation through standard gas-solid techniques except at very high pressures or very low temperatures. The extremely low solubility of gaseous H_2 in conventional organic solvents also vitiates a solution-based approach. Re-hydrogenation of Al using a supercritical fluid potentially offers a workable approach since the fluid can act as a solvent, at the same time remaining completely miscible with permanent gases like hydrogen. Recently, it has been found that mixtures of NaH and Al can be hydrogenated to sodium alanate, $NaAlH_4$ under modest pressures and temperatures in supercritical fluids. We have now extended these studies to the hydrogenation of Al to AlH_3. The results of these studies and experimental details will be reported.

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