The Reactivity of Sodium Borohydride with Various Species as Characterized by Adiabatic Calorimetry

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ABSTRACT

The reactivity of sodium borohydride in the presence of other species has been examined by adiabatic calorimetry. In combination with water, sodium borohydride exhibits an exotherm at room temperature accompanied by generation of gas (presumed to be hydrogen). Addition of potassium hydroxide to a sodium borohydride-water mixture is found to stabilize the solution and require a higher temperature for reaction to occur. However, if iron oxide is also included, reaction takes place near room temperature. Very rapid reaction was found when a metal chloride was brought in contact with a solution containing sodium borohydride, water, and potassium hydroxide. When sodium borohydride was added to an oxygenated hydrocarbon, reaction at room temperature also took place, but to a more limited extent. Peak temperatures above 200°C and maximum pressures in excess of 2000 psia were observed in most cases. Kinetics extracted from the calorimetry data are presented for some of the sodium borohydride combinations.