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How and When Metals React in High Performance Explosives.

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The reaction kinetics of aluminum and other metals in detonations has long been studied with the goal to obtain the full enthalpy energy of aluminum oxidation at early timeframes. This requires the oxidation reaction to occur at the same rate as explosive CHNO compounds. While the literature claims some success with model formulations, few fielded formulations obtain such performance due to competing carbon oxidation of the inert formulation binder ingredients. Moreover, from gas analysis data in detonation calorimetry, it is hypothesized that high pressure/high temperature gas equilibrium concentrations are one of some factors that play a role in obtaining early reactivity of metals in the detonation. The mechanism of these reactions and the effect on detonation responses such as detonation pressure and velocity will be discussed

¹Membership pending