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In-situ measurement of shock-induced reactive flow in a series of related hydrocarbons S.A. SHEFFIELD, D.M. DATTELBAUM, D.B. STAHL, Los Alamos National Lab. — Understanding of the chemistry that occurs under extreme, high-pressure, high-temperature shock environments poses both a significant scientific challenge, due to the difficulty of direct experimental observations, and an opportunity for discovery of new materials and bonding constructs. The combined high pressure, high temperature conditions induced by shock loading results in prompt reactions that may include dynamic bond breaking, dimerization and polymerization, and dissociation to small molecules. Detonating high explosives represent a case where the exothermicity of the chemical reactions drives a steady reactive flow field. Understanding of the evolution of different reaction pathways as a function of shock input remains a significant challenge, due to both the very short shock timescales, and difficulty in measurement of reaction intermediates and products. We have used *in-situ* electromagnetic gauges to measure mechanical variables (such as multiple shock waveforms) that result from the chemistry occurring in the shock. This allows us to gain some understanding of the nature of the input conditions necessary to start the reaction. Among the materials studied are benzene, toluene, phenyl acetylene, benzonitrile. This work has led to a systematic study of shock-induced chemistry as a function of chemical structure.

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