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Polydimethylsiloxane Shock Chemistry. ROBERT SANDER, NORM BLAIS, RAY ENGELKE, DANA DATTELBAUM, RHONDA MCINROY, STEPHEN SHEFFIELD, Los Alamos National Lab — Polydimethylsiloxane, (PDMS) is a common silicone polymer. It consists of methyl side groups on silicon-oxygen-silicon-oxygen chains. Understanding the decomposition product distribution is useful for calculating the equation of state under shock conditions. We have detonated small samples of HMX explosive in contact with the polymer in a high vacuum chamber and used a time-of-flight mass spectrometer to analyze the chemical products of PDMS decomposition. We have used the computer code CTH to model the time history of pressure in the sample. This time scale of a few nanoseconds generates products that are significantly different than the equilibrium products observed in thermal pyrolysis experiments. The mass spectrum under shock conditions predominately shows monomers and the first two oligomers. We compared high molecular weight liquid PDMS, crosslinked solid PDMS, and silica filled solid PDMS. Shocks in PDMS filled with silica particles show somewhat greater decomposition, suggesting that the temperatures generated are higher in that case and cause greater decomposition.

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