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### **Signatures of multi-Megabar chemistry<sup>1</sup>**

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Simple, strongly-bonded dielectrics, such as carbon, hydrogen, and silica, undergo chemical transitions well into the Megabar range giving rise to an extended polymeric fluid regime spread over tens of thousands of degrees. Signatures of such ultra-high pressure bonding changes include gradual increases in optical conductivities, elevated specific heat capacities, and subtle changes in shock compressibility. For initially solid insulators the lower boundary of this reactive, polymeric fluid regime is almost always the melt line indicating that significant bond-breaking is precipitated by melting but continues deep into the fluid phase. More detailed examination of multi-Megabar chemistry has been undertaken through the study of hydrocarbon mixtures and the use of x-ray absorption fine structure measurements.

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