

Carbon, Calorimetry, Cataclysms and Consequences

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Though geologic and planetary processes are often viewed as slow and continuous, they are in fact punctuated by sudden cataclysmic events and planetary evolution is irrevocably changed by impacts and intense seismic and magmatic/volcanic activity. Such events are associated with or generate conditions of high temperature, high pressure and low oxygen fugacity. Their traces in the accessible geologic record are not pristine, but altered by subsequent petrologic reactions. Thus identifying likely chemical reactions and phases initially formed is an exercise in planetary forensics. In this talk I will use evidence from the thermochemistry of synthetic materials, largely studied in a materials science context, in M-Si-C-O-H systems under reducing conditions to propose some of the initial reactions and products in such events, with emphasis on carbides and carbon-containing silicate melts, glasses, and amorphous materials.