Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Studies in useful hard x-ray induced chemistry MICHAEL PRAVICA, LIGANG BAI, DANIEL SNEED, University of Nevada, Las Vegas, CHANGYONG PARK, HP-CAT, Carnegie Geophysical Laboratory — The observed rapid decomposition of potassium chlorate (via $2KClO_3 + h\nu \rightarrow 2KCl + 3O_2$) via synchrotron hard x-ray irradiation (>10 keV) has enabled experiments that are developing novel and useful hard x-ray chemistry. We have observed a number of radiation-induced *in situ* decomposition reactions in various substances which release O_2, H_2, N_2, NH_3, and H_2O in a diamond anvil cell (DAC) at ambient and high pressures. These novel acatalytic and isothermal reactions represent a highly controllable, penetrating, and focused method to initiate chemistry (including x-ray induced combustion) in sealed and/or isolated chambers which maintain matter under extreme conditions. During our studies, we have typically observed a slowing of decomposition with pressure including phase dependent decomposition of $KClO_3$. Energy dependent studies have observed an apparent resonance near 15 keV at which the decomposition rate is maximized. This may enable use of much lower flux and portable x-ray sources (e.g. x-ray tubes) in larger scale experiments . These developments support novel means to load DACs and control chemical reactions providing novel routes of synthesis of novel materials under extreme conditions.

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Date submitted: 17 Jan 2013

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