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Radiation-induced damage studies of energetic materials. MICHAEL PRAVICA, HUBERTUS GIEFERS, ZACHARY QUINE, EDWARD ROMANO, SEAN BAJAR, BRIAN YULGA, HiPSEC, University of Nevada, Las Vegas, WENGE YANG, HANS PETER LIERMANN, HP-CAT, Advanced Photon Source, Argonne National Laboratory, DANIEL HOOKS, Los Alamos National Laboratory — We present studies of synchrotron radiation-induced decomposition of PETN and TATB under conditions of high pressure, high temperature, and crystalline orientation. We have found that the decomposition rate varies dramatically under all three of these variables. The experiments were performed using white beam synchrotron radiation at the 16 BM-B and 16 BM-D sectors of the HP-CAT beamline at the Advanced Photon Source. Diffraction line intensities were measured as a function of time using energy-dispersive methods and angular-dispersive methods TATB showed dramatic slowing of the decomposition rate with pressure implying a positive activation volume of the activated complex whereas PETN showed little change in decomposition rate with pressure. Increased temperature increased the radiation-induced decomposition rate of TATB. Finally, we found dramatic differences in the radiation-induced decomposition rate for single crystals of explosives depending upon their orientation relative to the polarized x-ray beam.

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