Abstract Submitted
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Characterization of Solid Residue Formation in LX-17 Abnormal Thermal Environments JOHN REYNOLDS, EVAN KAHL, NICK MUETTERTIES, A. J. NELSON, HARRIS MASON, JONATHAN CROWHURST, LLNL, EMC TEAM — LX-17 (98 % TMD) was thermally treated in the small-scale vessel cook-off reactor to understand the response to abnormal thermal environments. The cylindrical sample with 14% void-space, was sealed in the reactor at room pressure heated at 0.1 C/min heating rate until explosion at 3000 psi due to decomposition gas pressure. The LX-17 was consumed leaving a minimal amount of yellow-black-brown residue in the vessel. Standard DSC of the residue showed a shift in the decomposition temperature range (40 C) and a reduction in the amount of heat flow (approx. 90%) compared to LX-17. The DSC-TGA showed the residual material still produced exothermic heat flow after 425 C with T_{max} = 756 C. IR of the residue exhibited evidence of C-N but little evidence of TATB, indicating the residue was significantly reacted. XPS showed the primary species are C & N at a ratio of about 1 (atomic basis) and to a lesser extent, O. Detailed analysis of the C 1s, N 1s, and O 1s spectra indicated C-C, C-N, N-H, N-C, $O^{=}$, OH, and H_2O in the residue. Solid state ^{13}C and ^{1}H NMR corroborated the C-C, C-N and N-H structures and identified some sp^3 carbon. The properties of this residue will be compared to residues produced under other thermal cook-off conditions.

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