

- TIAN De-yu, ZHAO Feng-qi, LIU Jian-hong. Handbook of energetic materials and the related compounds[M]. Beijing: National defense industry press, 2011: 53.
- [14] Berger B. Parameters influencing the pyrotechnic reaction[J]. *Propellants Explosives Pyrotechnics*, 2005, 30(1): 27-35.
- [15] ZHAO Feng-qi, HENG Shu-yun, HU Rong-zu. A study of kinetic behaviours of the effective centralite/stabilizer consumption reaction of propellants using a multi-temperature artificial accelerated ageing test[J]. *Journal of Hazard Mater*, 2007(145): 45-50.

Influence of Magnesium on Combustion Performance and Artificial Fog Forming Performance of Fog Aerosol

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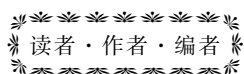
Abstract: Combined with the calculation results of combustion products and correlative thermodynamic properties of fog aerosol by CEA(Chemical Equilibrium and Application), the influence of Mg on combustion reaction and visibility light shielding performance was studied. The combustion temperature, linear burning velocity and combustion residue of fog aerosol with different Mg content were tested by infrared radiation thermometer, high-speed camera and X-ray diffraction. The theoretical calculation results show that the composition of equilibrium products includes gas state such as CO₂, CO, H₂O, H₂ and condensed state such as MgO. The experiment results show that Mg plays an important role in the combustion performance and the nucleation process of the coagulant nucleus by control of combustion temperature and linear burning velocity of fog aerosol. The combustion temperature and burning rate increases as the increasing of Mg. The combustion temperature reaches almost 2000 K and burning rate is 1.26 mm · s⁻¹ as the content of Mg is 8%. When the combustion temperature beyond 1773 K, the nucleation process of chloride finishes thoroughly and the visibility light shielding performance of artificial fog get better gradually. The experiment results are consistent with the theoretical calculation results on the variation tendency of combustion temperature and composition of combustion products, but the combustion residue is much different from the theoretical condensed phase faction.

Key words: fog aerosol; Mg; combustion temperature; combustion products

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《含能材料》高效毁伤弹药专栏征稿

高效毁伤弹药以“利用最小化成本获得最大化效果”为目标,对含能材料的性能和能量提出了更高的要求。为进一步促进高效毁伤弹药及其技术的研究,本刊将于2015年增设高效毁伤弹药专栏,内容涉及(1)传统含能材料的优化和改进以及先进含能材料的开发和应用,包括:传统含能材料合成、制造、处理和应用的新技术,新的CHON含能材料的开发和应用,金属化炸药,非传统概念炸药(如燃料空气炸药、温压炸药),高能量密度材料;(2)含能材料能量的控制输出研究,包括:能量输出增强(如组合装药),能量输出聚焦/定向,能量输出模式可控(如多模装药),能量输出范围可控(如低附带毁伤炸药)。欢迎广大学者投稿,来稿时请选择对应的专栏。

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