

Thermal Behaviour and Decomposition Reaction Kinetics of Graphite/potassium Nitrate

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Abstract: Thermal behaviours of graphite/potassium nitrate (C/KNO₃) with different proportion were studied by TG-DSC technique. The kinetic parameters of thermal decomposition reaction for C/KNO₃ = 90/10 mixture were calculated by Friedman's method. Results show that thermal decomposition of C/KNO₃ is solid-phase reaction. At the same heating rate, proportion and the decomposition characteristics are different. At different heating rates, proportion is same but the decomposition characteristics are also different. C/KNO₃ decomposition process is very complex with three or more reactions. Activation energy of the main decomposition reaction is between 102.84 ~ 374.27 kJ · mol⁻¹ and the pre-exponential factor between about 3.25 ~ 10.39 s⁻¹.

Key words: analysis chemistry; TG-DSC; graphite/potassium nitrate; Friedman's method; kinetic parameters; activation energy; exponential factor

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2012 年火炸药技术学术研讨会于 2012 年 10 月 25 日 ~ 28 日在江西南昌举行。会议由火炸药燃烧国防科技重点实验室、中国兵工学会火炸药专业委员会和总装备部火炸药技术专业组共同承办。来自北京理工大学、南京理工大学、总装陆装科技部、中国工程物理研究院、航天科技集团公司等从事火炸药工作研究的 150 余名专家与学者参加了本次会议。会议围绕炸药及应用技术、固体推进剂及应用技术、发射药及装药技术和分析测试技术 3 个专题展开交流和研讨。会议共有 6 个大会报告, 涉及炮兵防空兵弹药、发射药及装药、固体推进剂技术、不敏感熔铸炸药以及国外火炸药技术的研究进展和发展展望。

会议论文集收录了 178 篇学术论文, 内容涉及高能量密度化合物的合成与应用、新型含能材料及功能材料的合成与应用、火炸药理化分析与测试新技术、钝感火炸药技术、新型火炸药技术、火炸药安全性能、检测及评估新技术、火炸药装药新技术、火炸药数值模拟仿真技术、火炸药燃烧与爆轰理论及测试技术、新概念火炸药及其它新技术等领域。会议为火炸药行业科研工作者搭建了一个科技交流的平台。

(中国工程物理研究院化工材料研究所 林聪妹 供稿)