Compatibility of Trans-1,4,5,8-tetranitro-1,4,5,8-tetraazadacalin (TNAD) with Some Propellant Components Evaluated by DSC Method

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Abstract: The compatibility of trans-1,4,5,8-tetranitro tetraaza dacalin (TNAD) with some energetic components and inert materials of solid propellants was studied by using the DSC method. Where, cyclotetramethylenetetranitroamine(HMX), cyclotrimethylenetrinitramine (RDX), 1, 4-dinitropiperazine (DNP), 1.25/1-NC/NG mixture, lead 3-nitro-1,2,4-triazol-5-onate (NTO-Pb), aluminum powder (Al, particle size of 13.6 μm) and *N*-nitrodihydroxyethylaminedinitrate (DINA) were used as energetic components and polyethylene glycol (PEG), polyoxytetramethylene-co-oxyethylene (PET), addition product of hexamethylene diisocyanate and water (N-100), 2-nitrodianiline (2-NDPA), 1,3-dimethyl-1,3-diphenyl urea (C_2), carbon black (C. B.), aluminum oxide (Al_2O_3), cupric 2,4-dihydroxy-benzoate (β-Cu), cupric adipate (AD-Cu) and lead phthalate (φ-Pb) were used as inert materials. The results show that the binary systems of TNAD with NTO-Pb, RDX, PET and Al powder are compatible, TNAD with DINA and HMX are slightly sensitive, TNAD with 2-NDPA, φ-Pb, β-Cu, AD-Cu, and Al_2O_3 are sensitive, and TNAD with PEG, N-100, C_2 and C. B. are incompatible.

Key words: physical chemistry; compatibility; energetic component; differential scanning calorimetry (DSC); trans-1,4,5,8-tetranitro tetraaza dacalin (TNAD)

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由捷克 Pardubice 大学化工学院含能材料研究所主办的第 11 届"含能材料研究新趋势国际研讨会"于 2008 年 4 月 9 日-11 日在捷克 Pardubice 大学召开。来自捷克、美国、俄罗斯、英国、德国及中国等 30 多个国家的 230 余名专家学者参加了会议,会议论文集择优收录论文 108 篇,多数论文被 CA 收录。

四位国际知名专家应邀作了大会特约报告。他们分别是英国的 Prof. Adam Cumming: Recent and Current NATO RTO Work on Munitions Disposal. 美国的 Dr. Ruth Doherty: A New Look at Evaluating Shock Sensitivity by Gap Test. 荷兰的 Prof. Hans J. Pasman: Basic Safety ABC 和德国的 Dr. Manfred Held: Blast-Fragment Loads. 大会报告 30 篇,中国工程物理研究院化工材料研究所王军在大会上宣讲了他的论文,涉及的 DNTF 炸药研究动态受到国际同行专家关注。

本次会议收录论文内容展现了近年来含能材料领域多个方面的研究最新进展和动态,具体涉及数字模拟;新型含能材料分子设计、构效关联、合成、表征及性能;炸药制备工艺和新方法;炸药感度和安全性;炸药钝化;爆炸反应机理探讨;爆轰过程物理和化学及工业炸药等内容,尤其是在富氮零氧平衡新型含能材料分子设计与合成方面呈现活跃研究势头。大会达到了国际同行专家学术交流预期目的。

(中国工程物理研究院化工材料研究所 王军 供稿)