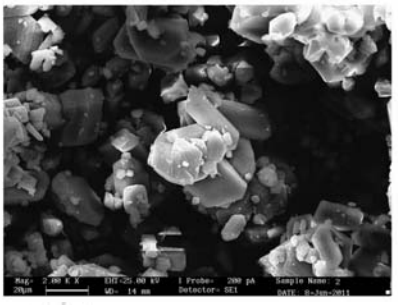
Preparation of Reduced-sensitivity HMX by Recrystallization in the Presence of Ionic Liquids

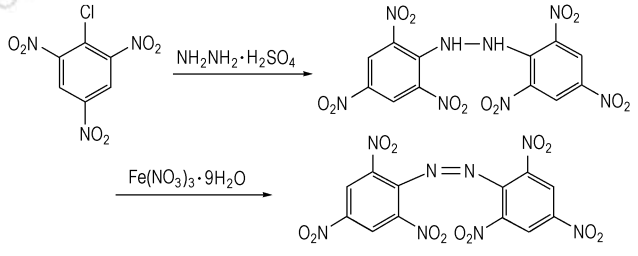


QI Xiu-fang, DENG Zhong-yan, WANG Dun-ju, WANG Qian, CHENG Guang-bin, Lü Chun-xu

Chinese Journal of Energetic Materials, 2013, 21(1): 1 -6

The reduced-sensitivity HMX was prepared in ionic liquid [mimBSO$_3$H]NO$_3$-cyclohexanone system by recrystallization.

Synthesis and Thermal Decomposition Kinetics of Hexanitroazobenzene

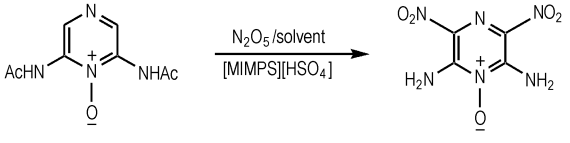


ZHANG Jing, WANG Juan, XU Hai-feng, ZHOU Xin-li

Chinese Journal of Energetic Materials, 2013, 21(1): 7 -11

Hexanitroazobenzene(HNAB) was prepared via nucleophilic substitution reaction and oxidation reaction using picryl chloride as raw materials. The reaction conditions were optimized.

Nitration of 2, 6-Diacetamidopyrazine-1-oxide with N_2O_5 Catalyzed by [MIMPS][HSO_4]

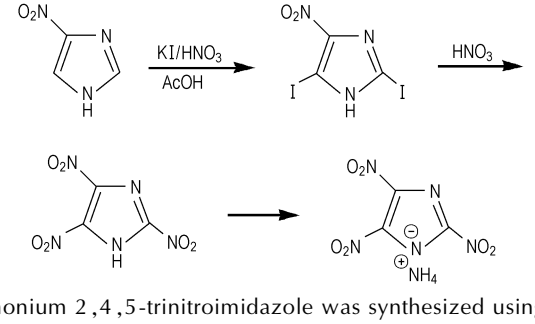


ZHAO Xiao-feng, CHENG Jian, LIU Zu-liang

Chinese Journal of Energetic Materials, 2013, 21(1): 12 -15

Ionic liquid 1-sulfonicacidpropyl-3-methylimidazole hydrosulfate [MIMPS][HSO_4] was prepared as a catalyst to synthesize 2,6-diamino-3,5-dinitropyrazine-1-oxide(LLM-105) from nitration of 2,6-diacetamido-pyrazine-1-oxide with N_2O_5/solvents. The effects of reaction solvents, temperature, time and repeated use of [MIMPS][HSO_4] on the yield of LLM-105 were studied. The structures of intermediates and LLM-105 were determined by ^{1}H NMR, IR, MS.

Synthesis and Performance of Ammonium 2,4,5-Trinitroimidazole

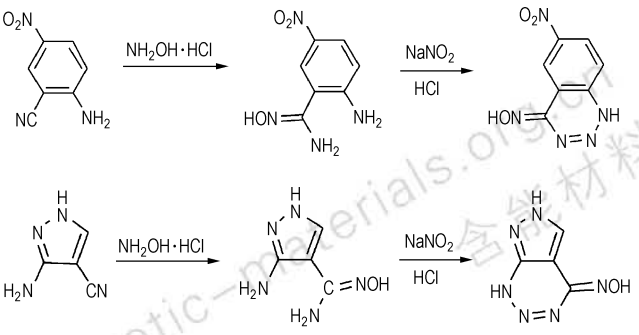


HOU Ke-hui, LIU Zu-liang, ZHANG Hua-yan, CHENG Jian

Chinese Journal of Energetic Materials, 2013, 21(1): 16 -18

Ammonium 2,4,5-trinitroimidazole was synthesized using 4-nitroimidazole as primary material, followed by iodinaton, nitralysis and salt with ammonia in yield of 33.3%. Thermal behavior of ammonium 2,4,5-trinitro-imidazole was studied by DSC and TG.

Synthesis and Reaction Mechanism of 1,2,3-Triazine Compound



LI Ya-nan, CHANG Hai-bo, WANG Bo-zhou, WANG You-bing, YANG Wei, LIAN Peng, LI Hui, ZHANG Zhi-zhong

Chinese Journal of Energetic Materials,2013,21(1): 19 -24

Two novel 1,2,3-triazine compounds-6-nitrobenzene[3,4-e]-1,2,3-triazine-4(1H)-oxime and pyrazole[3,4-e]-1,2,3-triazine-4(1H)-oxime were prepared.

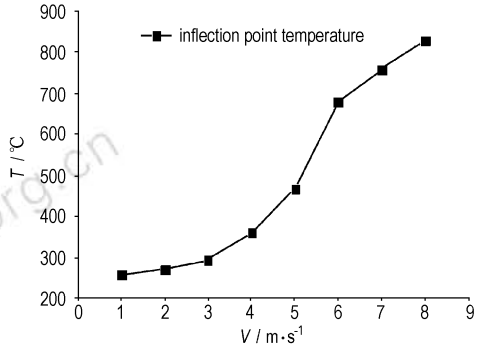
Pressured Solidification Process of Melt-cast Explosive

HUANG Yong, ZHENG Bao-hui, XIE Zhi-yi, WANG Dong-lei

Chinese Journal of Energetic Materials,2013,21(1): 25 -29

The solidification process, change of temperature field and cooling velocity of RDX/TNT 60/40 and $Ba(NO_3)_2$/microcrystalline wax 60/40 were studied under adscititious pressure and atmospheric pressure respectively.

Numerical Simulation of Drop Weight Impact Ignition on Composite Explosive

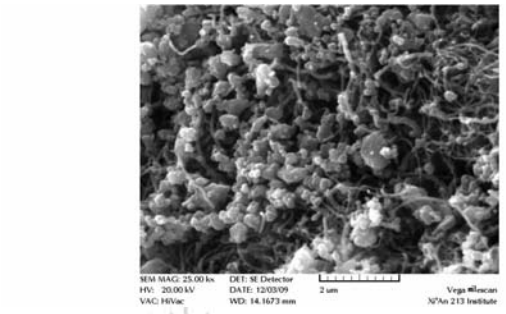


YUAN Jun-ming, LIU Yu-cun, CAO wen-jun

Chinese Journal of Energetic Materials,2013,21(1): 30 -34

The ignition characteristics and the law of hot-spot formation on comp. B explosive subjected to drop weight impact have been investigated using nonlinear dynamics finite element software ANSYS/LS_DYNA. The finite element model used to simulate impact sensitivities was built using comp. B explosives as a caculation example. Information is obtained on the explosive impact ignition.

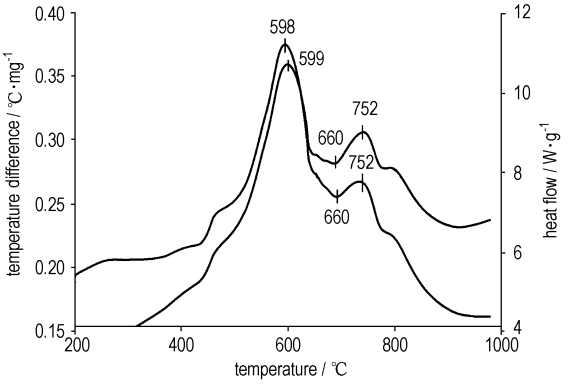
Effects of Carbon Nanotubes and Carbon Black on Sensitivity Performances of BNCP



The thermal behavior and sensitivity to laser, impact, friction, flame, and electrostatic spark of tetraamnine bis(5-nitrotetrazolato) cobalt(Ⅲ) perchlorate (BNCP) doped with carbon nanotubes and carbon black were studied by DSC, laser sensitivity test and standardization methods GJB 5891.22,24,25,27 –2006.

CHEN Li-kui, SHENG Di-lun, YANG Bin,
ZHU Ya-hong, XU Min-Hao, PU Yan-li, LI Zhao-Xin
***Chinese Journal of Energetic Materials*,2013,21(1): 35 –38**

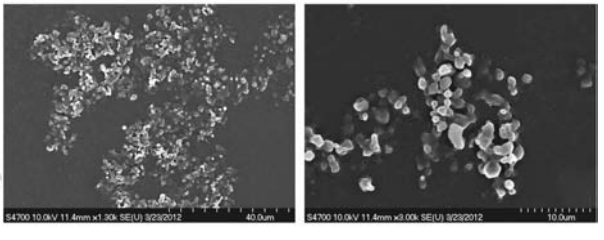
Synthesis and Characterization of Al/CuO Nanothermite



The thermal behavior of the reaction of Al/CuO nanothermite was studied by means of DTA /DSC.

SONG Xue, WANG Jun, YANG Guang-cheng, NIE Fu-de
***Chinese Journal of Energetic Materials*,2013,21(1): 39 –43**

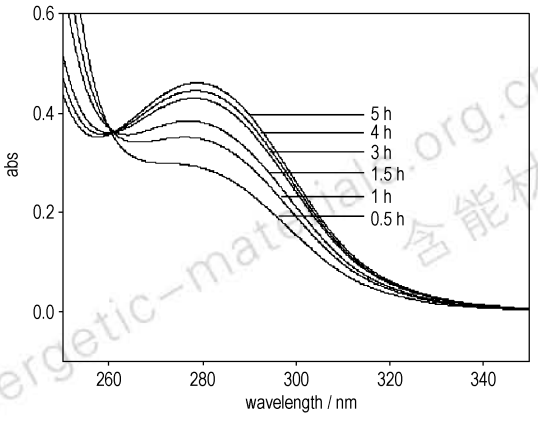
Experimental Study on Effect of Modifier PVP on Crystal Growth of HMX



PVP-HMX particles were prepared by spraying-recrystal method, and characterized by SEM and FT-IR. The effect of different addition of PVP on HMX crystal growth was studied by heat drying. The impact sensitivity of PVP-HMX was tested.

ZHANG Xiao-lian, ZHANG Jing-lin, WANG Jin-ying
***Chinese Journal of Energetic Materials*,2013,21(1): 44 –48**

Reaction Kinetics of Synthesizing 2-Azido-*N*, *N*-dimethylethylamine Hydrochloride in Aqueous Solution

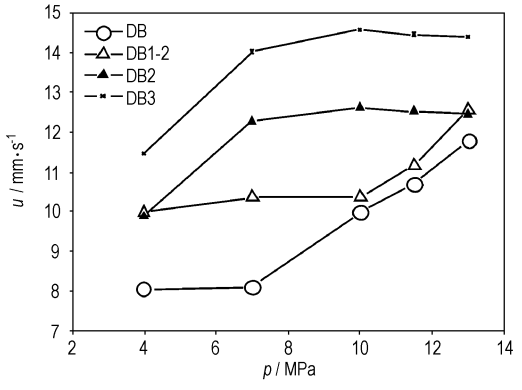


SUN Tian-tian, LI Gang

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **49 – 52**

The reaction kinetics of 2-azido-*N*, *N*-dimethylethylamine hydrochloride with sodium azide in aqueous solution was studied using ultraviolet absorption spectrometry.

Application of ZrO_2 and ZrB_2 in Screw Extrusion Double-based Propellants



CHEN Zhu, ZHANG Pei, ZHANG Xiao-hong, CHEN Xue-li, WANG Ying, CAO Lei, FAN Ming-hui

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **53 – 56**

The effects of ZrO_2 and ZrB_2 on combustion performances of screw extrusion double-based (DB) propellant were studied. Their action mechanisms were explored by steady combustion photos and the temperature distribution of combustion zone.

Effect of LiF Coating on the Thermal Oxidation Characteristics for Boron Powder

CHEN Tao, ZHANG Xian-rui, WANG Yuan-yuan, HUANG Ling, XIAO Jin-wu

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **57 – 60**

The thermal oxidation characteristics of amorphous boron and boron coated with LiF in a temperature range from room temperature to 1000 ℃ were studied by DSC-TG. The effect of LiF coating on improvement of the thermal oxidation characteristics of amorphous boron was obvious.

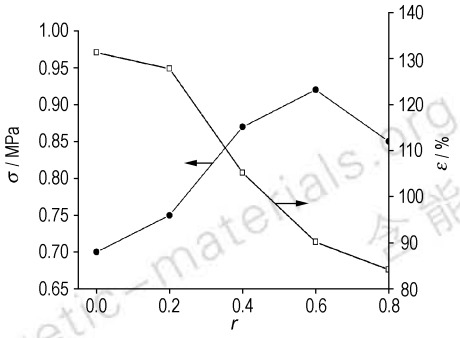
Effect of Al on Sensitivity of NEPE Propellant

CHENG Xin-li, ZHAO Xiao-bin, LI Jun

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **61 – 63**

The effects of the content and particle size of Al powder in formulation on the impact sensitivity, friction sensitivity and electrostatic spark sensitivity of NEPE propellant were studied by specifictions of standardization methods QJ3039 – 1998, QJ2913 – 1997 and QJ1469 – 1998.

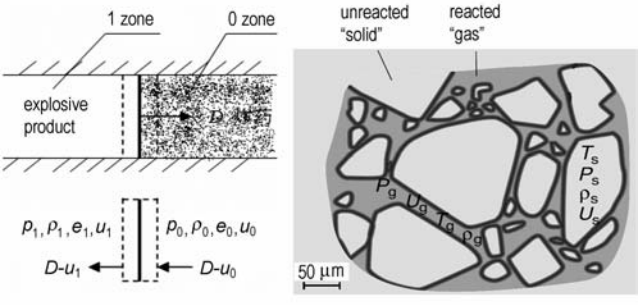
Performances of the Binder Film of BAMO-r-GAP Copolymer/N100/IPDI Curing System



The binder film of BAMO-r-GAP copolymer/N100/IPDI system was synthesized using BAMO-r-GAP copolymer as pre-polymer, N100 and IPDI as curing agent and BDO as chain extended agent. The FT-IR, DSC and TG-DTG were used to characterize the binder film and the mechanical properties was also tested.

ZHAO Yi-bo, LUO Yun-jun, ZHANG Chi
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **64 –67**

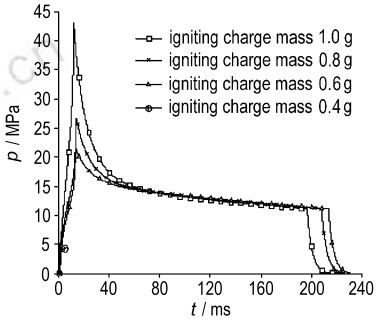
Application of Generalized C-J Condition at Detonation of Aluminized Explosives



Assumed that the metal particles have no reaction at the front of detonation, and have the same pressure and velocity with the detonation products, using the continuum model and the general C-J relation, the full equations were obtained.

WANG Ting-hui, DUAN Zhu-ping,
SU Jian-jun, TIAN Qing-zheng
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **68 –74**

Effects of Ignition Process on the Internal Ballistics of Small-size Solid Rocket Motor



The model for interior ballistic calculation including ignition process of small-size solid rocket motor and verification plan were set up. The numerical calculations interior ballistic performance with 1.0 g, 0.8 g, 0.6 g and 0.4 g igniter masses were carried out.

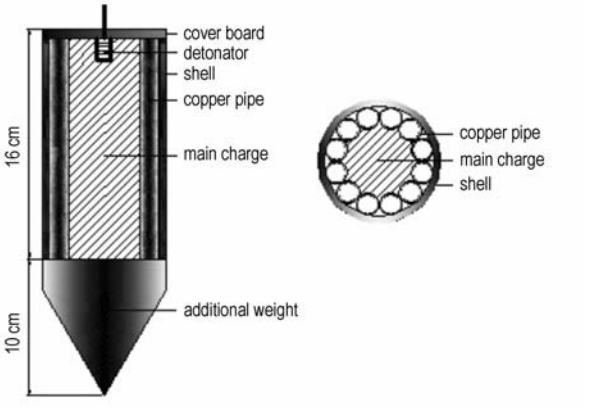
LIU Yun, WANG Hao, TAO Ru-yi, ZHU De-long
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **75 –79**

Orthogonal Design Configuration Parameters of Dual Mode Warheads

Using LS-DYNA numerical simulation and orthogonal optimizing design method, dual mode warhead with arc-cone liner was optimized. The effects of dual mode warhead structure parameters (curvature radius, cone angle, thickness of arc-cone liner and the height of the explosive charge) were analyzed, and the arc part-cone part-ratio on the formation of explosively formed penetrator (EFP) and jetting projectile charge (JPC) were discussed.

CHEN Kui, LI Wei-bing, WANG Xiao-ming,
HAN Yu, PENG Zheng-wu
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **80 – 84**

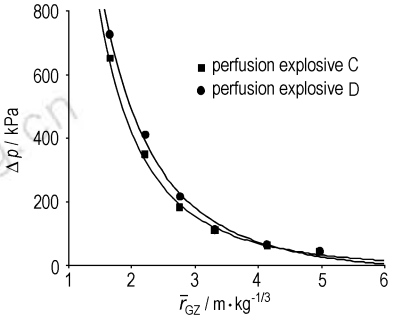
Application of the Multi-directional Linear Cumulative Cutter



In order to solve the drill-jamming accidents, a kind of multi-directional linear cumulative cutter was designed, and its explosion principle and moving process were studied by numerical simulation and experimental methods. Finally, this technology was applied to an engineering practice.

XIA Hong-bing, LI Lei, MA Hong-hao,
SHEN Zhao-wu, HUANG Shi-hua
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **85 – 91**

Detonation Performance of Perfusion Explosive Containing SF-3 Double-based Propellants Energetic Materials



A novel perfusion explosive was prepared through the perfusion molding process. The shock wave overpressure and release energy of the perfusion explosives were measured by the air explosion and underwater blast, respectively.

WANG Peng, WEI Xiao-an, HE Wei-dong
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **92 – 96**

Uncertainty Analysis of Heat Loss Rate by Constant Volume Burner Method

HU Song-qi, LIU Kai, WANG Peng-fei,
XU Qiu-li, ZHOU Yan-xing

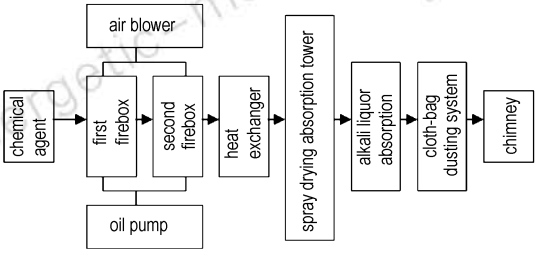
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **97 –102**

Heat loss of the constant volume burner is one of the most important factors affecting the test accuracy of burning rate. Heat loss rate equation was derived to study the various factors on the rate of heat loss. The assessment method of the heat loss rate measured result uncertainty has been established, and the results uncertainty also has been obtained.

Principle and Optimized Parameters for Destroying CS by an Incinerator

WANG Xuan-yu, WANG Li-na

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **103 –107**



The principle for destroying *o*-chlorobenzylidene malononitrile(CS) by Incineration was analyzed and the reaction products of the incineration were determined. The optimized parameters for destroying CS by a set of incineration equipment were determined by experiments.

Review on Energetic Eutectic

CHEN Ling, SHU Yuan-jie, XU Rui-juan,
XU Tao, WANG Xin-feng

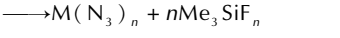
Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **108 –115**

This paper summarized and compared the previous researches of low melt point explosives and ethylenediamine dinitrate/ammonium nitrate (EA), ethylenediamine dinitrate/ammonium nitrate/potassium nitrate (EAK), nitroguanidine/ethylenediamine dinitrate /ammonium nitrate/potassium nitrate(NEAK) and methyl nitroguanidine (MeNQ)-based intermolecular eutectic mixtures, and it reveals that theory investigation of the formulation is the direction for future development.

Review on Synthesis of Polyazides

DING Ke-wei, LI Tao-qi, GE Zhong-xue, LIU Qing

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **116 –120**

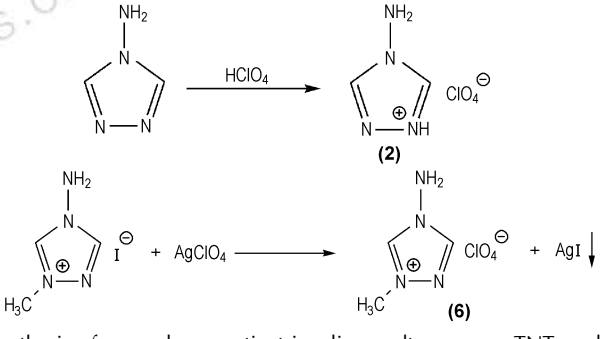


The developments of synthesis of polyazides, polyazido anions and acid-base complexes were reviewed with 25 references.

Progress in Synthesis and Performance of Energetic Triazolium Salts as TNT Replacements

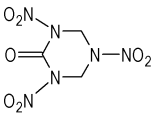
HUA Wen-long, YE Zhi-wen

Chinese Journal of Energetic Materials, **2013**, **21**(**1**): **121 –125**



Synthesis of several energetic triazolium salts as new TNT replacements is systematically reviewed. The performance of 4-amino-1,2,4-triazolium perchlorate(4-ATP), 1-methyl-4-amino-1,2,4-triazolium perchlorate (MATP) and 1-amino-3-methyl-1,2,3-triazolium nitrate(1-AMTN) are better than TNT, so they are better for melt-cast explosives carriers instead of TNT.

Progresss in Synthesis of 2,4,6-Trinitro-2,4,6-triazacyclohexanone

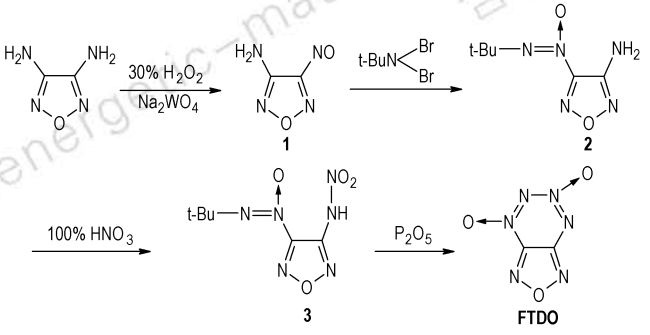


MA Cong-ming, LIU Zu-liang, YAO Qi-zheng

Chinese Journal of Energetic Materials,2013,21(1): 126 -130

The research situations and progress on the synthesis of Keto-RDX were summarized, analysized and reviewed with 22 references.

A Novel Synthesis Route of [1,2,5]Oxadiazolo[3,4-e][1,2,3,4]tetrazine-4,6-Di-*N*-oxide

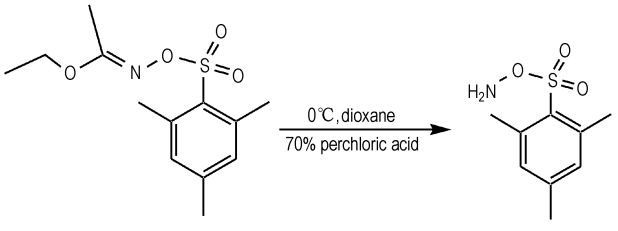


WANG Bo-zhou, LI Xiang-zhi, LI Hui, HUO Huan, ZHOU Yan-shui, FAN Xue-zhong, LI Ji-zhen

Chinese Journal of Energetic Materials,2013,21(1): 131 -132

Using 3,4-diaminofurazan as a primary material, a new energetic material [1,2,5]oxadiazolo[3,4-e][1,2,3,4]tetrazine-4,6-di-*N*-oxide(FTDO) was synthesized via the reaction of oxidation, condensation, nitrification and cyclization with a total yield of 30.89%, FTDO and its intermediates were characterized by NMR, IR, MS and elemental analysis.

Synthesis and Property of 2,4,6-Tri-methylbenzenesulfonic Hydroxylamine



MA Qing, WANG Jun, ZHANG Xiao-yu, SHU Yuan-jie

Chinese Journal of Energetic Materials,2013,21(1): 133 -134

A new energetic compound 2,4,6-trimethylbenzenesulfonic hydroxylamine(MSH) was synthesized and characterized, which also is an important *N*-aminating agent, and its explosive properties such as thermal stability and mechanical sensitivity were measured.

Executive editor: WANG Yan-xiu; JIANG Mei Computer typesetter: LI Shao-hui