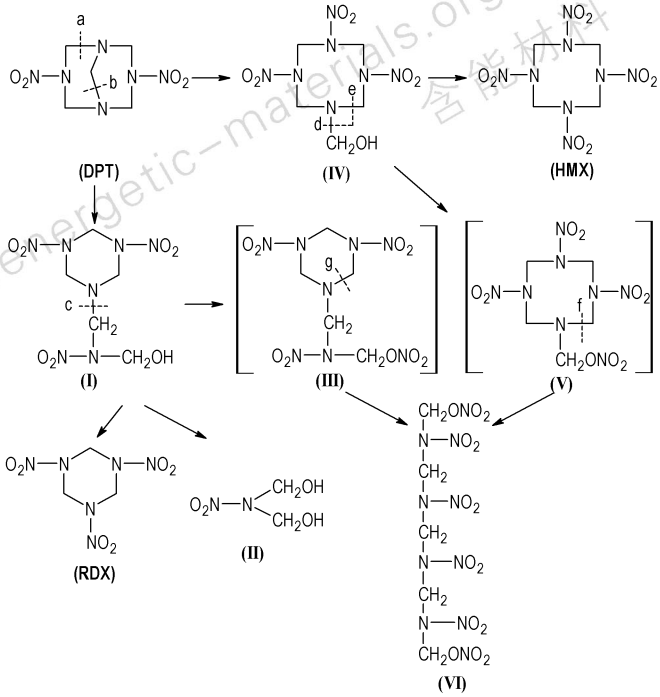
Synthetic Improvement of FOX-7 with Organic Acid

DING Hou-meng, YE Zhi-wen, Lü Chun-xu

Chinese Journal of Energetic Materials,2012,20(1):1 -4

1,1-Diamino-2,2-dinitroethylene (FOX-7) was prepared from acetamidine hydrochloride and malonate by condensation, nitration and hydrolysis. The structure of FOX-7 was characterized by IR, MS, NMR.

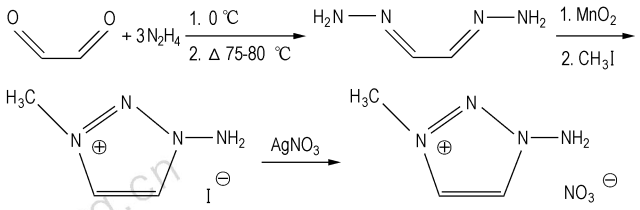
Mechanisms and By-products of Nitrolysis of 3,7-dinitro-1,3,5.7-tetrazabicyclo[3.3.1]nonane



HE Zhi-yong, LUO Jun, Lü Chun-xu,
WANG Ping, XU rong, LI Jin-shan

Chinese Journal of Energetic Materials,2012,20(1):5 -8

Synthesis and Characterization of 1-Amino-3-methyl-1,2,3-triazolium Nitrate

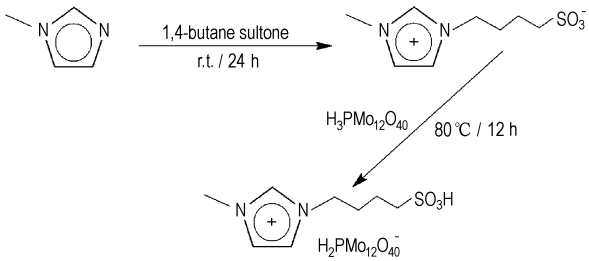


LI Lin, YE Zhi-wen, Lü Chun-xu

Chinese Journal of Energetic Materials,2012,20(1):9 -12

1-Amino-3-methyl-1,2,3-triazolium nitrate(1-AMTN) was synthesized using glyoxal and hydrazine hydrate as starting materials in three steps, including addition-elimination, cyclization, methylation and replacement reaction.

Toluene Nitration Catalyzed by Keggin Heteropolyacid Anionic Brønsted Acid Salt

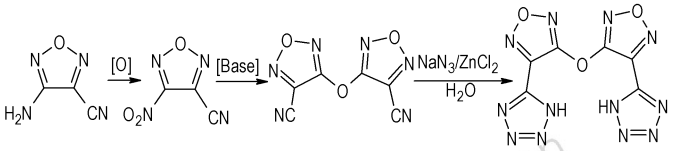


QI Xiu-fang, CHENG Guang-bin, Lü Chun-xu

Chinese Journal of Energetic Materials,2012,20(1):13 -17

A novel Keggin heteropolyacid anionic Brønsted acid salt $[(CH_2)_4SO_3HMim]H_2PMo_{12}O_{40}$ was synthesized and used as efficient catalyst in toluene nitration in HNO_3(67%).

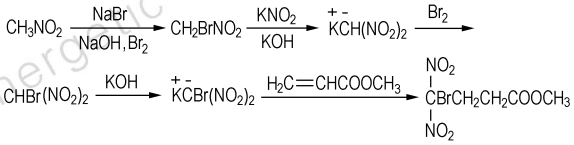
Synthesis and Characterization of 3,3′-Bis(tetrazol-5-yl)difurazanyl Ether



LI Hui, WANG Bo-zhou, YU Qian-qian,
LI Ya-nan, SHANG Yan
Chinese Journal of Energetic Materials,2012,20(1):18-21

3,3′-Bis(tetrazol-5-yl)difurazanyl ether was synthesized by a three-step reaction, and the aim compound and all the intermediates were characterized by IR, ^{13}C NMR, MS and elemental analysis.

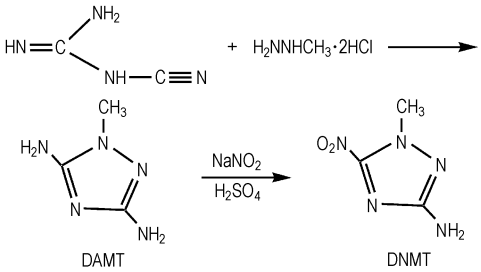
Synthesis of Methyl-4-bromo-4, 4-dinitrobutyrate by Phase Transfer Catalysis



XIAO Ling-na, JIN Bo, PENG Ru-fang, SHI Wen-xiu,
CHU Shi-jin, DONG Hai-shan
Chinese Journal of Energetic Materials,2012,20(1):22-25

Methyl-4-bromo-4,4-dinitrobutanoate was synthesized by Michael addition reaction of bromodinitromethane and methacrylate.

New Synthetic Process of 1-Methyl-3-amino-5-nitro-1,2,4-triazole



ZHOU Qun, WANG Bo-zhou, JIA Si-yuan
Chinese Journal of Energetic Materials,2012,20(1):26-29

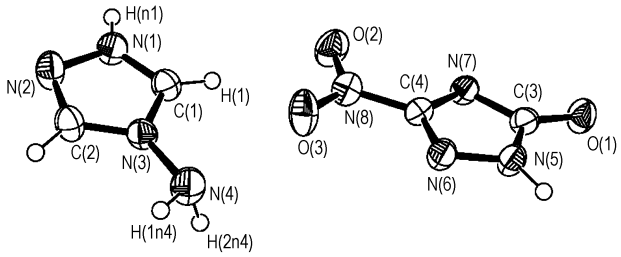
1-Methyl-3-amino-5-nitro-1,2,4-triazole (DNMT), was synthesized using a new synthetic process from hydrazine dihydrochloride and methyl hydrazine as starting material with overall yield of 62.3% and purity of 99.4%.

Crystallization Mechanism of ε-HNIW in Ethyl Acetate/*n*-Heptane Solution

LI Hong-zhen, ZHOU Xiao-qing, WANG Shu-cun,
XU Rong, HUANG Ming, WANG Lin
Chinese Journal of Energetic Materials,2012,20(1):30-34

ε-HNIW crystallization process in ethyl acetate and *n*-heptane was investigated. It is revealed that crystallization mechanism of ε-HNIW is kinetic-controlled and thermodynamic-controlled when *n*-heptane addition rate is above 100 mL·s^{-1} and below 20 mL·s^{-1}, respectively. And the former crystallization process of HNIW existed $\beta \rightarrow \varepsilon$ phase transition and the latter formed only ε-HNIW phase.

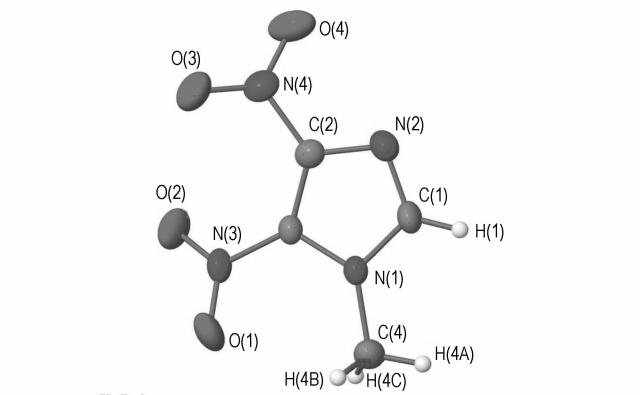
Crystal Structure and Properties of 4-Amino-1,2,4-triazole NTO Salt



XU Rong, DONG Hai-shan, SUN Jie
Chinese Journal of Energetic Materials,2012,20(1):35-39

A new energetic salt 4-amino-1,2,4-triazole NTO salt was prepared and characterized by X-ray diffraction ometer, and its sensitivity and thermal properties were obtained.

Cystal Structure and Sensitivity of 1-Methy-4,5-dinitroimidazole

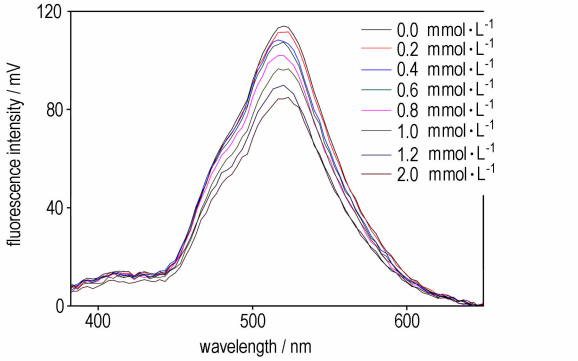


WANG Xiao-jun, LU Zhi-yan, WANG Jian-long,
SHANG Feng-qin, ZHANG Guang-yuan,
YANG Yan-peng, QIN Liang

Chinese Journal of Energetic Materials,2012,20(1):40 -43

The single crystal of 4,5-MDNI was cultivated by slow evaporation method. Its crystal structure and sensitivities to impact and fraction were studied by a X-ray diffractometer and standardization methods GJB772A -97 -602.2 and GJB772A -97 -602.1.

Fluorescence Quenching Studies of Ethyl 2-(chloromethyl)-4-phenyl-quinoline-3-carboxylate in the Presence of Nitro-explosives



HE Na, ZHONG Fa-chun, SHU Yuan-jie,
ZHANG Yong, SUI He-liang, HAO Xiao-fei

Chinese Journal of Energetic Materials,2012,20(1):44 -48

The fluorescence properties of ethyl 2-(chloromethyl)-4-phenylquinoline-3-carboxylate (ECMPQC) when different concentration of TNT were added to at room temperature were investigated. The solvent effects on the fluorescence properties of ECMPQCwere also studied.

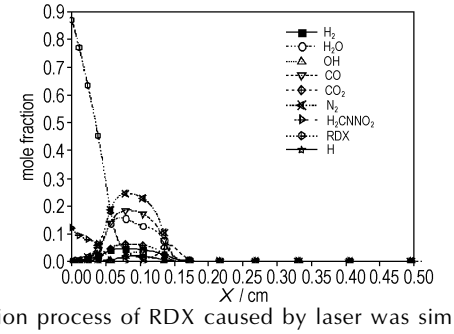
Properties of Thermoplastic Polyurethane Elastomers Extended with BDO and DBM

ZHANG Wen-yu, LI Jin-qing, LUO Yun-jun,
LI Xiao-meng, JIU Yong-bin

Chinese Journal of Energetic Materials,2012,20(1):49 -52

A series of thermoplastic polyurethane elastomers extened with mixed diols were synthesized. The structures and properties of the elastomers were characterized through the methods of FTIR,GPC,DSC and tensile test techniques,and the application of TPUEs in modified double base propellant was discussed.

Numerical Analysis of Laser Ignition Characteristics of RDX

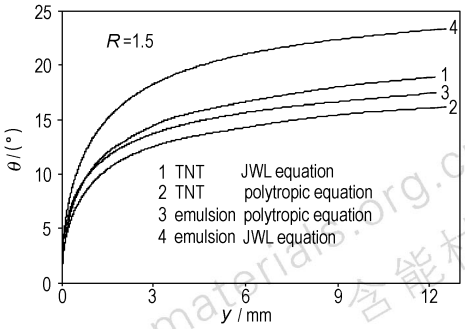


TIAN Zhan-dong, LU Fang-yun, ZHANG Zhen-yu,
ZHAO Jian-heng, TAN Fu-li

Chinese Journal of Energetic Materials,2012,20(1):53 -56

The ignition process of RDX caused by laser was simulated.

Movement of Flyer Plate in Difference Method of Characteristics Curve Under Sliding Detonation

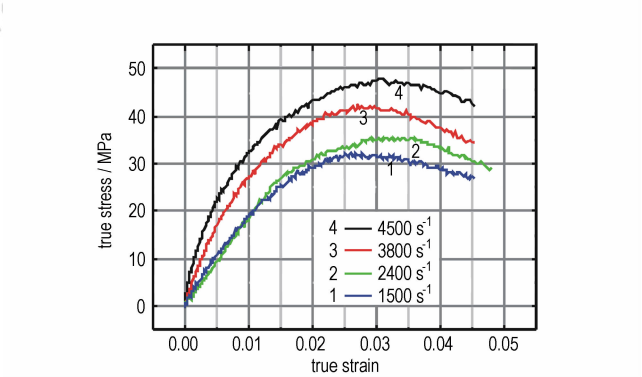


ZHAO Chun-feng, LI Xiao-jie, YU Na

Chinese Journal of Energetic Materials,2012,20(1):57-61

The movement of flyer plate was investigated with characteristic curve method in sliding detonation.

Analysis on Dynamic Properties of Typical Boosters Based on Hopkinson Bars

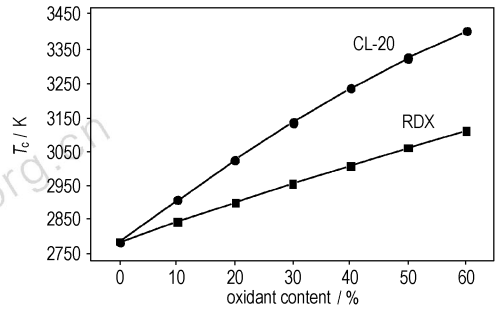


ZHANG Zi-min, XU Bi-ying, JIA Jian-xin,
Lü Yong-zhu, LI Gong-fa

Chinese Journal of Energetic Materials,2012,20(1):62-66

Stress-strain curves of three typical booster explosives were obtained by using the split Hopkinson pressure bars technique and the dynamic performance were analysed.

Calculation and Analysis on Energy Characteristics of Composite Modified Double-based Propellant Containing CL-20



JIN Xi, WANG Jiang-ning, SONG Xiu-duo, XIE Bo

Chinese Journal of Energetic Materials,2012,20(1):67-70

The effect of oxidizers content on the specific impulse, combustion temperature, oxygen balance and average molecular weight of combustion gas of CMDB propellant containing CL-20 was studied by REAL software.

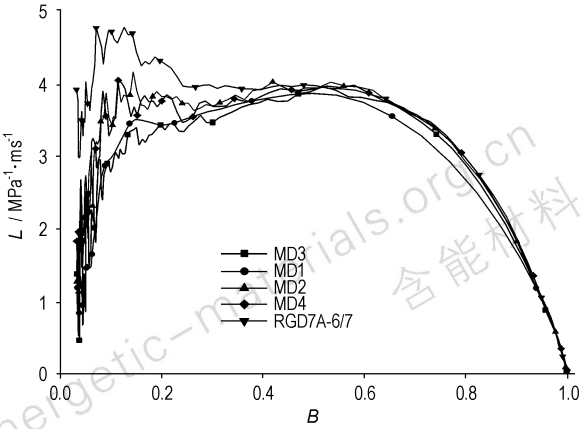
Rheological Properties of Cast Smokeless CMDB Propellants

YU Hong-jian, FAN Xue-zhong, FU Xiao-long,
TENG Xue-feng, MENG Ling-ling,
ZHANG Wei, XIE Wu-xi

Chinese Journal of Energetic Materials,2012,20(1):71-75

The rheological properties of cast CMDB propellants including the viscosity η and the rheological kinetic ΔE_η were studied by HAAKE rotational viscometer.

Burning Performance of Grain-molded Propellant



YAO Yue-juan, LIU Shao-wu, WANG Qiong-lin,
ZHANG Yuan-bo, WEI Lun, WANG Feng,
LIU Bo, HAN Bing
Chinese Journal of Energetic Materials,**2012**,**20**(**1**): **76 -79**

The characteristics of *p-t* and *L-B* curves for grain-molded gun propellant with different densities and different surface treatment of based-propellant were analyzed.

Research of Reducing the Muzzle Flame by Flame Inhibitor

LIU Bo, ZHENG Shuang, LIU Shao-wu, WANG Feng,
ZHANG Yuan-bo, HAN Bing, YAO Yue-juan
Chinese Journal of Energetic Materials,**2012**,**20**(**1**): **80 -82**

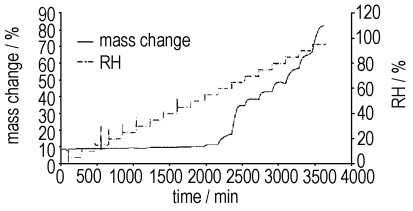
Four kinds of flame inhibitors with different structure and functionalities were selected and the samples of powder charge were made by using different adding patterns. The muzzle flames were tested with B-shutter photography method and the effects of flame inhibitor on muzzle flame were experimentally studied.

Dissolution Properties of Trinitrophloroglucinol Dissolved in Deionized Water

ZHANG Guo-ying, YANG Li, ZHOU Zun-ning,
ZHANG Tong-lai, TIAN Yong-rui,
WANG Sheng-sheng
Chinese Journal of Energetic Materials,**2012**,**20**(**1**): **83 -85**

Based on thermodynamics equation the experimental data are fitted by a linear least squares method, the kinetic formula of trinitrophloroglucinol (TNPG) dissolved in H_2O is obtained. From the parameters of the kinetic formula, the rate constant of reaction (k) and the reaction order (n) can be calculated: $n=0.78377$, $k=1.80\times10^{-3}$ s^{-1}.

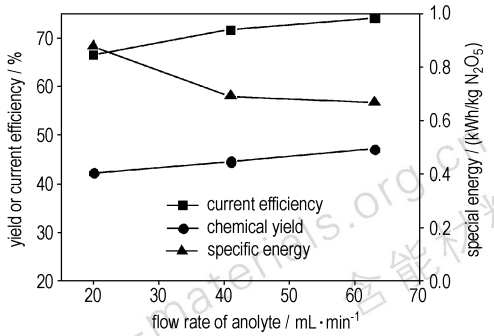
Hygroscopicity of ADN with Dynamic Method



WANG Jing-na, ZHANG Gao, YAN Rui,
HU Lan, ZHANG Ting
Chinese Journal of Energetic Materials,**2012**,**20**(**1**): **86 -89**

The hygroscopicity of ADN was studied by a rapid dynamic analytical method.

Influence of Technological Parameters on Electro-oxidation of Tetroxide Dinitrogen to Form Pentoxide Dinitrogen



WANG Qing-fa, SUN Xiao-ming, ZHANG Yi-fu, CHEN Zhi-qiang, WANG Li

Chinese Journal of Energetic Materials, **2012, 20(1): 90 –93**

Dinitrogen pentoxide was prepared by the electro-oxidation of tetroxide dinitrogen in anhydrous nitric acid on the RuO_2-IrO_2/Ti anode.

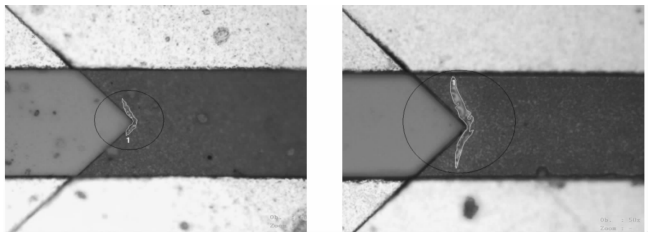
Determination of Aluminium Powder Activation in Aluminized Explosives by Spectrometry

HU Lan, WANG Jing-na, XIONG Xian-feng, YAN Rui, ZHANG Ting, GAO Lang-hua, LI Xiao-yu

Chinese Journal of Energetic Materials, **2012, 20(1): 94 –98**

Active aluminum content in aluminized explosives was determined by spectrometry. Compared with GJB1738 – 1993, the relative deviation is less than 4%.

Ignition Characteristics of Non-electrostatic Discharge and Electrostatic Discharge on Semiconductor Bridge

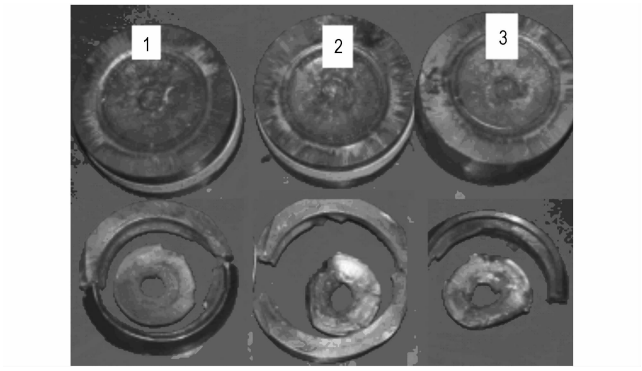


GUO Xiao-rong, ZHU Shun-guan, ZHANG Lin, MA Peng, CHEN Fei, WANG Da-wei

Chinese Journal of Energetic Materials, **2012, 20(1): 99 –104**

Compared with the bare bridge, the film of semiconductor bridge (SCB) which suffered electrostatic discharge (ESD) was damaged, and the ablation areas of bridge were enlarged along with the discharging voltage, indicating that ESD made the bridge more sensitive.

Performance of an in-line Explosive Trains

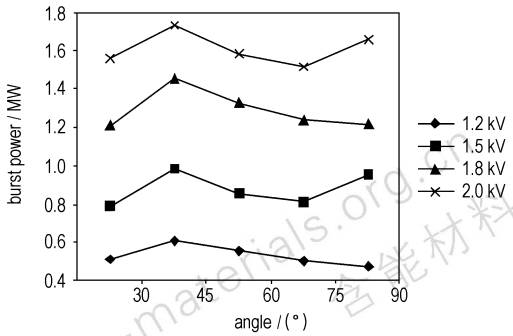


JIN Li, YANG Zhen-ying, ZHANG Yu-ruo, GAO Yan, WANG Fang, LIU Wen-hao

Chinese Journal of Energetic Materials, **2012, 20(1): 105 –108**

An experiment device of in-line explosive trains (slapper detonator—HNS-Ⅱ—JHB-1) was designed. Its explosive performance was studied.

Optimal Design of Foil Bridge Included Angle of Exploding Foil Initiator



ZHOU Mi, QIAN Yong, LIU Yan, HAN Ke-hua,
MENG Qing-ying, QIN Guo-sheng
Chinese Journal of Energetic Materials, **2012**, **20**(**1**): **109 -112**

In order to study the influence of foil bridge included angle on the energy efficiency of exploding foil initiator, five exploding foil bridge of included angle as 30°, 45°, 60°, 75° and 90° were designed and fabricated by an ion etching method.

Reliability Assessment of Cartridge of Ejector Based on Mixed Beta Distribution

ZHANG Tian-fei, DONG Hai-ping, CAI Rui-jiao, HAO Zhi
Chinese Journal of Energetic Materials, **2012**, **20**(**1**): **113 -116**

$$R_{BL} = [1 - \gamma + \gamma \times R_L^{n+1}]^{\frac{1}{n+1}}$$

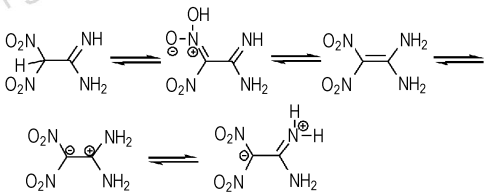
A Bayesian reliability assessment method for cartridge of ejector was proposed.

Failure Modes of Electric Squib and Its Effect Factor

TU Xiao-zhen, WEI Xing-wen, WANG Pei,
ZHOU Xiao-yu, WANG Xi
Chinese Journal of Energetic Materials, **2012**, **20**(**1**): **117 -119**

Different conditions of accelerated life test and the laboratory technique simulating the failure reappearance were adopted to study the failure modes of electric squib and its effect factor.

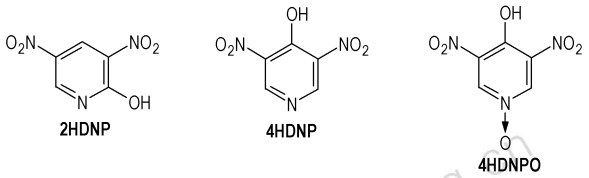
A Review on Reactivity of 1,1-Diamino-2,2-dinitroethene (FOX-7)



CHEN Yong-shun, XU Kang-zhen, WANG Min,
HUANG Jie, MA Hai-xia, SONG Ji-rong, ZHAO Feng-qi
Chinese Journal of Energetic Materials, **2012**, **20**(**1**): **120 -125**

Based on the special "push-pull" nitro-enmaine of 1,1-diamino-2,2-dinitroethene (FOX-7), the reported chemical reactions of FOX-7 were summarized. Reactivity of C-C double bond, amino group and nitro group of FOX-7 were analyzed, and reaction routes and mechanisms were also discussed.

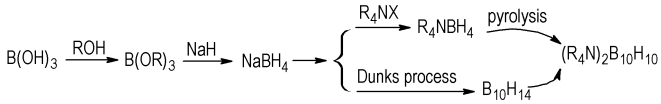
A Review on 3,5-Dinitrohydroxylpyridines and Their Salts



ZHANG Guo-fang, YA-sen · Mu-sa,
ZHAO Feng-qi, FAN Xue-zhong
Chinese Journal of Energetic Materials,2012,20(1):126 -131

This review gives a detailed summary of 3,5-dinitrohydroxylpyridine derivatives and their salts concerning their syntheses, crystal structures, thermochemical properties and thermokinetic behaviors as well as their applications in RDX-CMDB propellants.

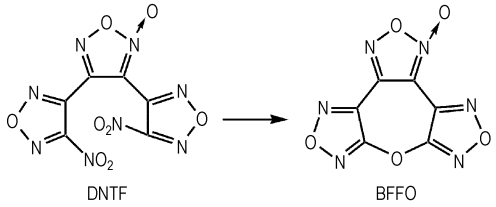
A Review of Boron Hydrides Used in High Burning Rate Propellant



WANG Wei-qiang, XUE Yun-na, YANG Jian-ming,
LI Ya-ni, YU Qin-wei, MEI Su-ning, Lü Jian
Chinese Journal of Energetic Materials,2012,20(1):132 -136

The synthesis of boron hydrides were briefly reviewed, and its latest study as solid propellant burning rate catalyst were summarized.

Synthesis of Bifurazano[3,4-b:3′,4′-f]furoxano[3″,4″-d]oxacyclohetpatriene



ZHOU Yan-shui, WANG Bo-zhou, WANG Xi-jie,
ZHOU Cheng, HUO Huan, ZHANG Ye-gao, LIU Peng
Chinese Journal of Energetic Materials,2012,20(1):137 -138

The molecular structure and synthetic route of a novel energetic materials bifurazano[3,4-b:3′,4′-f]furoxano[3″,4″-d]oxacyclohetpatriene (BFFO) were designed for the first time. BFFO was synthesized using 3,4-bis(4′-nitrofurazano-3′-yl)furoxan (DNTF) as a starting materials through intermolecular etherification with a yield of 50.1% and the purity of 99.6% (HPLC).

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