Nonlinear Optimum Design Method for High Energy Insensitive PBXs(Ⅱ)

$$\min\{P_m(x_i)\} \qquad m=1,2,\cdots k;\ i=1,2\cdots n \tag{1}$$

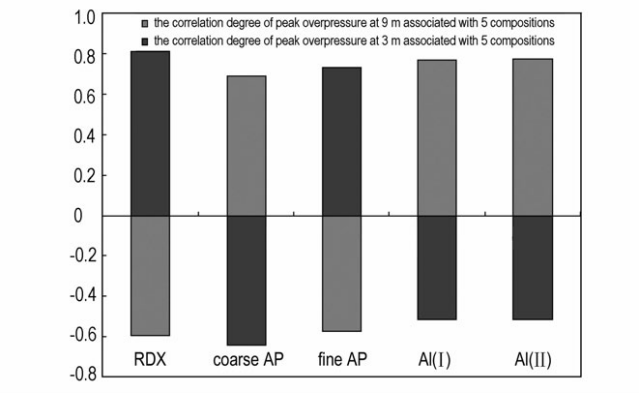
$$s.t.\begin{cases} H_{50}(x_i)\geqslant H_g & i=1,2\cdots n \\ \text{or}\quad G_{50}(x_i)\leqslant G_g & i=1,2\cdots n \\ E_L\leqslant E(x_i)\leqslant E_H & i=1,2\cdots n \\ \Sigma x_i=100 & i=1,2\cdots n \\ a_i\leqslant x_i\leqslant b_i & i=1,2\cdots n \end{cases} \tag{2}$$

HUANG Heng-jian, HUANG Hui, NIE Fu-de, LIU Shi-jun, ZHAN Chun-hong

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **141 -145**

A general mathematical model of multi-objective nonlinear optimization design for high energy insensitive PBX formulations was proposed.

Application of Grey Correlation Analysis in the Formulation Design of Thermobaric Explosive



The method of grey correlation analysis was used to investigate the influence of 5 raw materials and their contents on blast performances. The high explosive and fine particles of AP are in favor of the overpressure at 3 m, but weaken the overpressure at 9 m. Whereas the metal powder with two particles size and the coarse particles of AP have the inverse influence on overpressure at both distances.

HUANG Ju, WANG Bo-liang, ZHONG Qian, HUI Jun-ming

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **146 -150**

Two New Synthesis Method of 3,4-Diaminofurazan

Table 4 Effect of reaction conditions on yield catalyzed by micelle

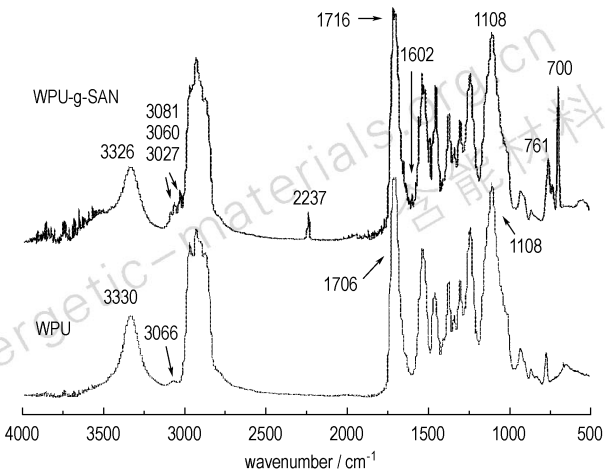
entry	temperature/℃	pressure/MPa	time/h	m(DAG) : m(KOH) : m(H_2O) : m(cat.)	yield/%
1	80	0.1	10	1 : 1.3 : 7.1 : 0.02	44.7
2	90	0.1	10	1 : 1.3 : 7.1 : 0.02	45.0
3	100	0.1	10	1 : 1.3 : 7.1 : 0.02	45.6
4	110	0.1	10	1 : 1.3 : 7.1 : 0.02	46.0
5	100	0.1	10	1 : 1.0 : 8.5 : 0.02	30.0
6	80	0.13	6	1 : 1.3 : 7.1 : 0.02	42.7
7	80	0.13	10	1 : 1.3 : 7.1 : 0.02	39.6
8	100	0.15	10	1 : 1.3 : 7.1 : 0.02	38.1
9	120	0.45	10	1 : 1.3 : 7.1 : 0.02	30.0

LI Chun-ying, MA Yang-bo, XUE Yun-na, YANG Jian-ming, WANG Bo-zhou

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **151 -154**

3,4-Diaminofurazan was prepared from 3,4-diaminoglyoxime catalyzed by supported solid alkali or micelle, and the optimal parameteres was obtained.

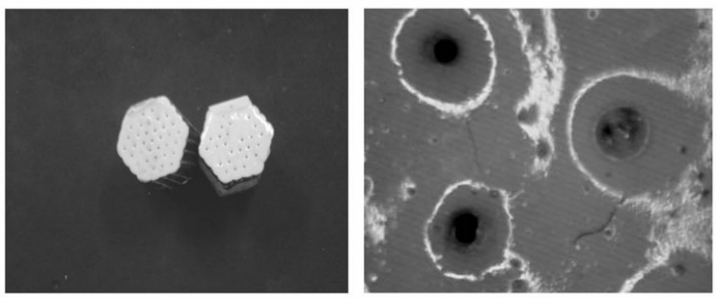
Preparation of WPU-g-SAN and Its Coating on HNIW



Waterborne polyurethane (WPU) and waterborne polyurethane-grafted-styrene and acrylonitrile composite (WPU-g-SAN) were synthesized by seeded emulsion polymerization in situ. HNIW was coated with the WPU-g-SAN. The impact sensitivity of HNIW and HNIW coated was tested.

LIAO Su-ran, LUO Yun-jun, SUN Jie, TAN Hui-min
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **155 -160**

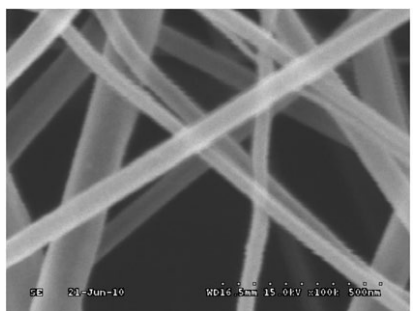
Preliminary Study of Multiperforated Granular End-surface-coated Propellant by Epoxy Resin Composite Materials



End surface of multiperforated propellant were coated by epoxy resin composite material. On the basis of research on the relationship between opening ratio and the composition of epoxy resin composite material, the opening ratio is up to 99% as the mass ratio of epoxy resin composite material are 60% resin, 40% mixed fire retardant, added 10% diluting agent.

YANG Chun-hai, HE Wei-dong, DU Ping, WANG Ze-shan
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **161 -166**

Preparation and Characterization of Nitrocellulose Nano-fibers



The nitrocellulose nano-fibers with diameter of 80 nm electrospined under the optimized conditions and the decomposition heat between traditional nitrocellulose and the nano-fibers was compare.

XIA Min, LUO Yun-jun, HUA Yi-long
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **167 -171**

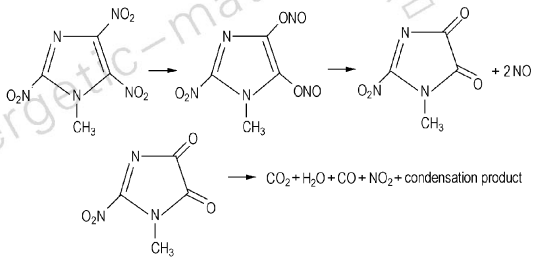
Synthesis and Characterization of Copolyether of 3-Nitratomethyl-3-methyloxetane and Tetrahydrofuran

MO Hong-chang, LU Xian-ming, LI Na, XING Ying, HAN Tao, LI Lei, ZHANG Zhi-gang

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **172 –175**

The energetic copolyether of 3-nitratomethyl-3-methyloxetane and tetrahydrofuran was synthesized by using $BF_3 \cdot Et_2O$ and 1,4-butanediol as an initiator system for the cationic ring-opening polymerization, with which the molecular weight could be controlled. The copolymer were characterized.

Thermal Decomposition Kinetics and Mechanism of 1-Methyl-2,4,5-trinitroimidazole

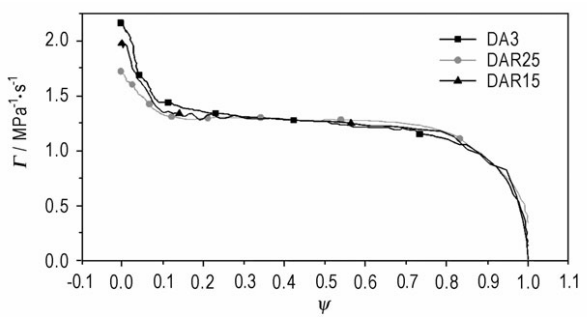


YANG Wei, WANG Bo-zhou, JI Yue-ping, REN Xiao-ning, CHEN Zhi-qun

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **176 –179**

In-situ FTIR was employed to study the characteristics of thermal decomposition of 1-methyl-2,4,5-trinitroimidazole(MTNI). The main products of thermal decomposition obtained by TG-MS were NO_2, CO, CO_2 and H_2O. Thermal decomposition mechanism of MTNI was deduced.

Thermal Decomposition and Combustion Performance of Azidonitramine Gun Propellant Containing RDX

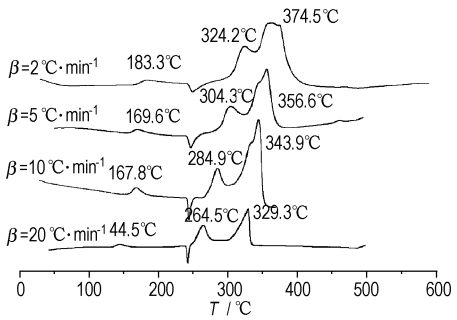


YANG Jian-xing, JIA Yong-jie, LIU Yi, LI Nai-qin, BAI wei, ZHANG Bu-yun

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **180 –183**

The thermal decomposition and combustion performance of two kinds of azidonitramine gun propellants were studied by high-pressure DSC (PDSC) and a closed-bomb test and compared with those of the homogeneous azidonitramine gun propellant.

Effect of Catocene on Thermal Decomposition Kinetics of Ammonium Perchlorate

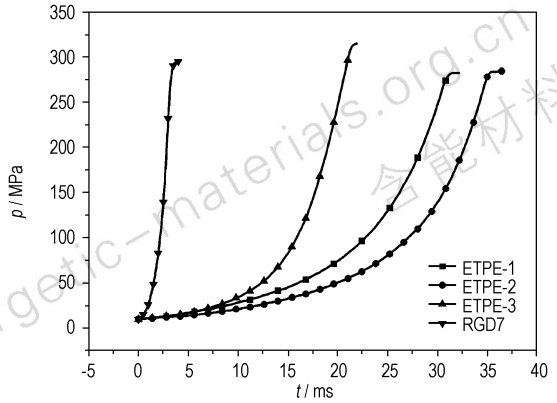


LI Yan-rong, ZHAO Xiao-bing, WANG Ning, LUO Lan

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **184 –187**

By using the DSC technique, the thermal decompostion characteristics and kinetics parameters of AP and AP/Catocene are obtained: peak temperature(T_i), apparent activation energy (E_{ai}), index factor ($\ln A_i$). By using the thermal decompostion data and Stava-Sestak method, the thermal decompostion mechanisms of AP and AP/Catocene were obtained: $[-\ln(1-\alpha)]^4$, $[-\ln(1-\alpha)]^{1/2}$.

Combustion Properties and Thermal Behavior of ETPE gun propellant and RGD7 Nitramine Gun Propellant

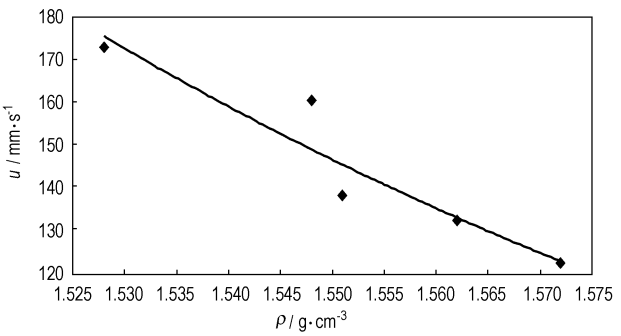


The combustion properties and thermal behaviors of energetic thermoplastic elastomer (ETPE) gun propellant and RGD7 nitramine gun propellant were studied by the closed bomb test, DSC and SEM.

ZHAO Ying, LIU Yi ,YANG Li-xia, ZHANG Zou-zou

Chinese Journal of Energetic Materials,2012,20(2): 188 -192

Effect of Density and Impact Intensity on Combustion Performance of ETPE Gun Propellants

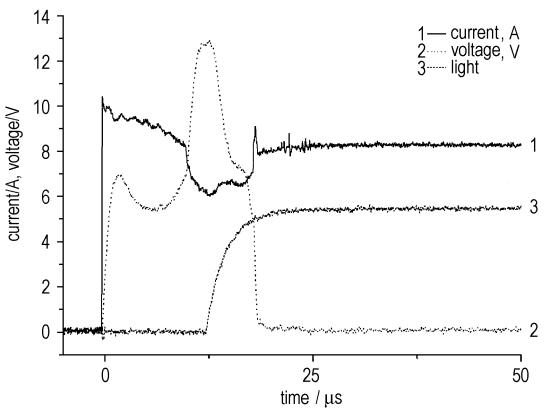


The effects of density and impact intensity on combustion properties of energetic thermoplastic elastomer (ETPE) gun propellants were studied by the closed bomb test, high pressure flameout, SEM and physicochemical performance test.

ZHANG Zou-zou, ZHAO Hong-li, LIU yi, LIU Lai-dong, JIN Jian-wei, ZHANG Heng, ZHAO Ying

Chinese Journal of Energetic Materials,2012,20(2): 193 -197

Ignition Character of the Common and Superfine Lead Azide by Semiconductor Bridge



The signal of voltage, current and light required to ignite the common and superfine lead azide (LA) was studied by semiconductor bridge (SCB).

MA Peng, ZHANG Lin, ZHU Shun-guan, CHEN Hou-he

Chinese Journal of Energetic Materials,2012,20(2): 198 -201

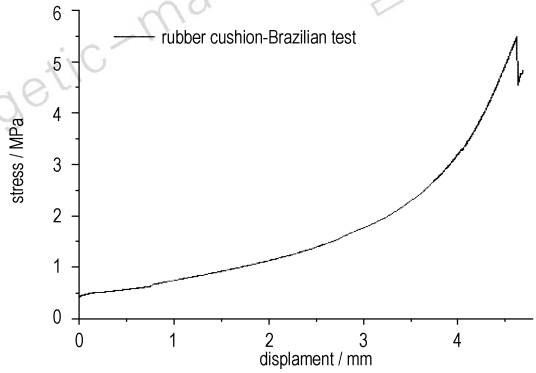
Calculation of Equilibrium Composition of Combustion Products of Gunpowder Based on Random Direction Method Initialization

JIAN Xiao-xia, LIU Qing-shang, ZOU Wei-wei, XIAO Le-qin, ZUO Hai-li

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **202 –204**

A Gibbs free energy method improved via initiating initial values by computer with random direction method was presented to calculate the equilibrium composition of combustion products.

Different Loading Methods in Brazilian Test for PBX

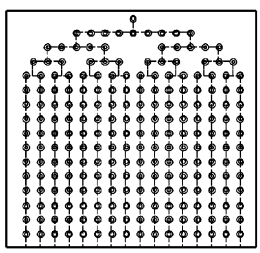


PANG Hai-yan, LI Ming, WEN Mao-ping, LAN Lin-gang, JING Shi-ming

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **205 –209**

The stress-displacement curve for Rubber cushion-Brazilian test is valid recorded load-displacement curve and the failure of sample by Rubber cushion-Brazilian test is failure initially at the center of sample.

Isopressing Charging Technology for Logical Network Initiator

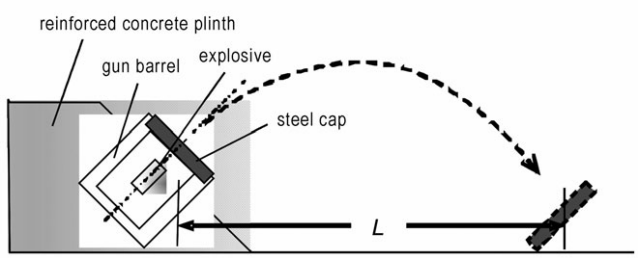


The isopressing charging technology with multi-runners device of logical network initiator was studied, and the charging process conditions were determined accordingly. The influences of different groove dimensions and different degrees of corner turning on detonation velocity were investigated, and the minimum groove sizes for propagation of explosion were investigated.

YUAN Qi-chun, LAN Qiong, HUANG Heng-jian, DENG Xiao-ming

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **210 –213**

Power Test of Non-capsensitivity Industrial Explosive by Ballistic Projectile Method

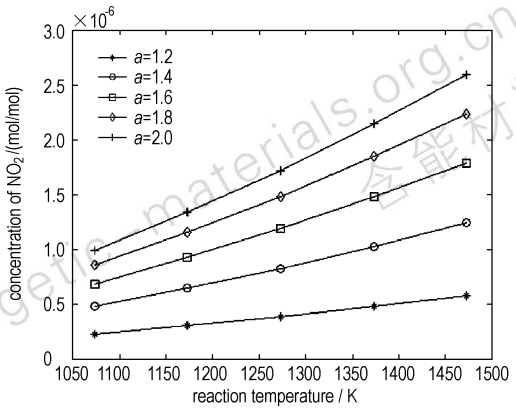


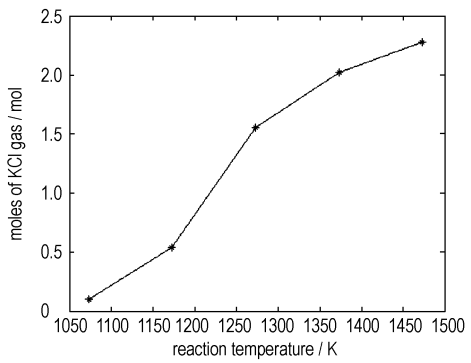
The feasibility of ballistic projectile method used in the power test of non-capsensitivity industrial explosive was studied. And the sensitivity of the ballistic projectile method to the change of the components of non-capsensitivity industrial explosive was verified.

ZHENG Si-you, XIA Bin, LU Li-yuan

Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **214 –217**

Calculation on Parameters of Burning Destory for Tear Bomb



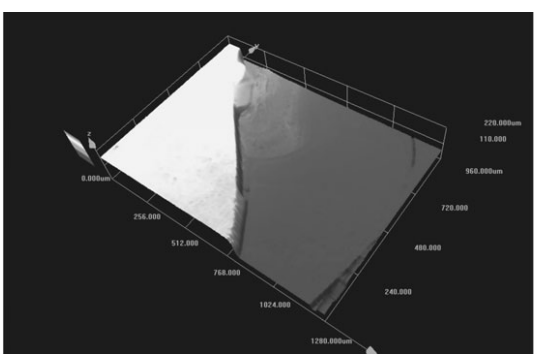


In order to destroy the waste tear gas(bomb) safely and effectively, to calculate the balance production from the combustion of the tear gas at diffierent temperatures and excess air rate. The variable concentration of the correlative resultant of the gas was analyzed, the most proper temperature and excess air rate which were required by the safe and eddective incineration of the tear bomb were educed. And it is very valuable for the design of the incinerator.

Lü Qi-hua, LIU Lu-sheng, LIU Yi-su

***Chinese Journal of Energetic Materials*,2012,20(2): 218 -222**

Stability of Porous Silicon with Silane Coupling Agent

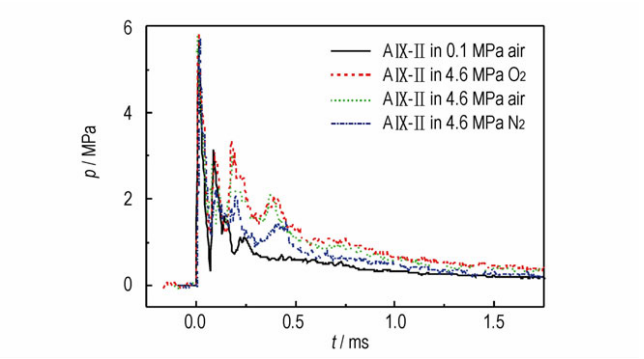


The surface of porous silicon membrane was modified by suitable coupling agents (KH550, KH560 and KH570). The infra-red spectrum (IR spectrum) of samples was tested by FTIR technology.

WANG Shou-xu, SHEN Rui-qi, YE Ying-hua, HU Yan

***Chinese Journal of Energetic Materials*,2012,20(2): 223 -228**

Measurement of Afterburning Effect of Aluminized Explosives by Underwater Explosion Method

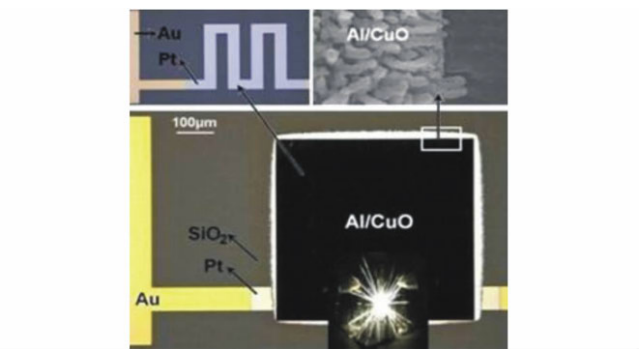


CAO Wei, HE Zhong-qi, CHEN Wang-hua, PENG Jin-hua

Chinese Journal of Energetic Materials,2012,20(2): 229 -233

The afterburning effect of aluminized explosives was studied by underwater explosion method, and a double-layer test device designed for enhancing the afterburning effect of under-oxidized explosives was used.

Review on Energetic Thin Films for MEMS



WANG Shu-jian, PENG Hong-zheng, ZHANG Wen-chao, MA Li-yuan

Chinese Journal of Energetic Materials,2012,20(2): 234 -239

The developments of energetic thin films for micro-electro-mechanical system (MEMS) devices were overviewed. The process of three kinds of energetic thin films and their energy output characteristic were discussed.

Application Progress of Ionic Liquid in Energetic Materials

ZHANG Guang-quan

Chinese Journal of Energetic Materials,2012,20(2): 240 -247

Application of ionic liquid in nitration of aromatic compound for syntheses of energetic material was overviewed.

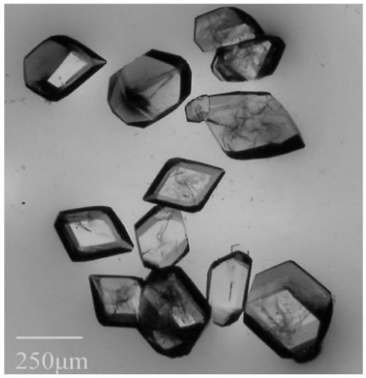
Review on Polymorphic Transformation in CL-20 Recrystallization

XU Jin-jiang, SUN Jie, ZHOU Ke-en, LI Hong-zhen, SHU Yuan-jie

Chinese Journal of Energetic Materials,2012,20(2): 248 -255

The phenomenon of polymorphic transformation in CL-20 recrystallization was introduced. It can be explained by Ostwald's rule of stages and may provide some academic guide for restraining the progress of polymorphic transformation to obtain the pure polymorphic crystal of α-, β-, γ-, ε-CL-20.

Preparation and Theoretical Properties of CL-20/TNT Cocrystal Explosive



YANG Zong-wei, HUANG Hui, LI Hong-zhen,
ZHOU Xiao-qing, LI Jin-shan, NIE Fu-de
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **256 –257**

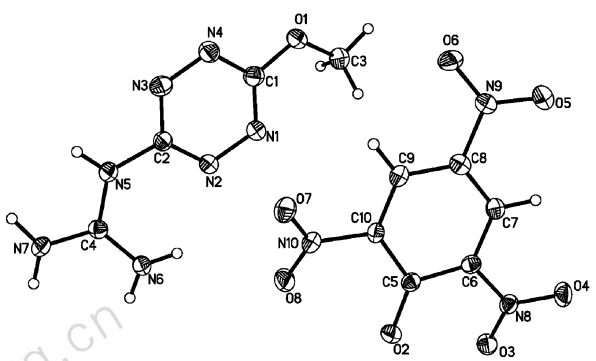
The CL-20/TNT cocrystal explosive in a 1 : 1 molar ration was prepared by using solution cocrystallization and its crystal density and detonation properties were calculated.

Synthesis of Trifurazanooxacyclohetpatriene

WANG Xi-jie, WANG Bo-zhou, JIA Si-yuan, ZHOU Yan-shui,
BI Fu-qiang, NING Yan-li
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **258 –259**

Using 3,4- bis(3′-nitrofurazano-4′-yl) furazan (BNTF) as a starting material, a novel energetic material trifurazanooxacyclohetpatriene was designed and synthesized by intermolecular etherification with a yield of 55.2 % and the purity of 99.3% (HPLC).

Molecular Structure of a Novel Nitrogen-rich Energetic Salt of (MGTZ)(PA)



LIANG Yan-hui, ZHANG Jian-guo, XIE Shao-hua,
FENG Jin-ling, ZHANG Tong-lai, SHU Yuan-jie
Chinese Journal of Energetic Materials, **2012**, **20**(**2**): **260 –261**

A novel nitrogen-rich energetic salt of 3-guanidino-6-methoxy-*s*-tetrazine picrate (MGTZ)(PA) was synthesized by reacting 3-methoxy-6-guanidine-*s*-tetrazine (MGTZ) with picric acid (PA). The crystal structure was obtained and determined by single-crystal X-ray diffraction.

Executive editor: WANG Yan-xiu JIANG Mei; Computer typesetter: ZHANG Gui-hong