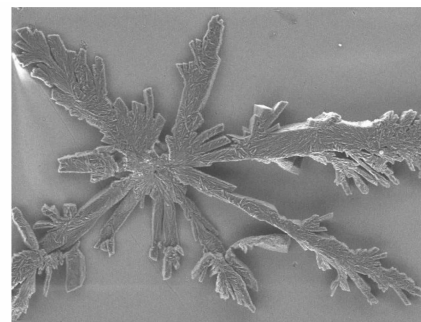


NTO Crystal Growth: From Fractal to Cube-shaped Structure

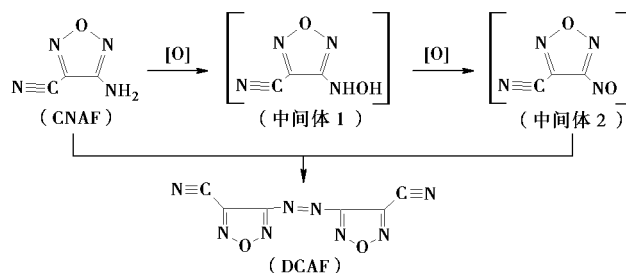


XUE Qi-bin, HUANG Hui, KANG Bin, XU Rui-juan,
GU Bin, XUE Chao

Chinese Journal of Energetic Materials, 2009, 17(4): 381–384

The volatile solvent crystallization of 3-nitro-1,2,4-triazol-5-one (NTO) on glass substrate was studied. The observed phenomena verify that the crystal morphologies change from fractal to cube-shaped structure due to the initial concentration increasing, and it can be explained with diffusion limited aggregation (DLA) theory.

Synthesis and Crystal Structure of 3,3'-Dicyano-4,4'-azofurazan (DCAF)

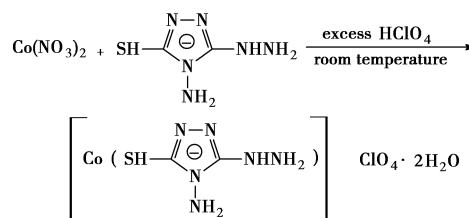


FAN Yan-jie, WANG Bo-zhou, ZHOU Yan-shui,
JIA Si-yuan, HUO Huan

Chinese Journal of Energetic Materials, 2009, 17(4): 385–388

3,3'-Dicyano-4,4'-azofurazan (DCAF) was synthesized from 3-amino-4-aminoxim-1,2,4-triazol-5-one (AAOF) through two-step oxidation and the product was characterized by IR, NMR and elemental analysis. The crucial factors of KMnO_4 oxidation reaction were studied and the optimal reaction conditions were confirmed. The single crystal of DCAF was cultivated for the first time and tested by single-crystal X-ray diffraction.

Synthesis, Characterization and Performance of $[\text{Co}(\text{C}_2\text{H}_6\text{N}_6\text{S})]\text{ClO}_4 \cdot 2\text{H}_2\text{O}$



WANG Yan-lan, SHENG Di-lun, ZHU Ya-hong,
MA Feng-e, CHEN Li-kui, YANG Bin

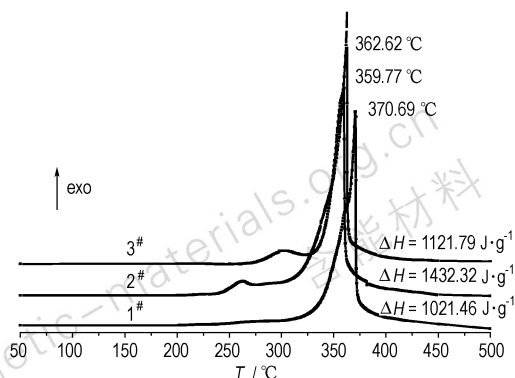
Chinese Journal of Energetic Materials, 2009, 17(4): 389–391

Laser sensitive coordination compound 4-amino-3-hydrazino-5-mercapto-1,2,4-triazole cobalt(II) perchlorate dihydrate (TACo) was synthesized with the yield of 71%. The structure of the obtained compound was identified by IR and elemental analysis. The laser sensitivity and part of the explosive performance were tested.

Refining and Properties of 2,6-Diamino-3,5-dinitropyridine-1-oxide

HE Zhi-wei, CHENG Jian, LIU Zu-liang

Chinese Journal of Energetic Materials, 2009, 17(4): 392–395



The properties of the three 2,6-diamino-3,5-dinitropyridine-1-oxide (ANPyO) samples recrystallized by three different solvents were compared.

Synthesis and Characterization of Glycidyl Nitrate

MO Hong-chang, GAN Xiao-xian, LU Xian-ming,

QIU Shao-jun, LIU Qing

Chinese Journal of Energetic Materials, 2009, 17(4): 396–398

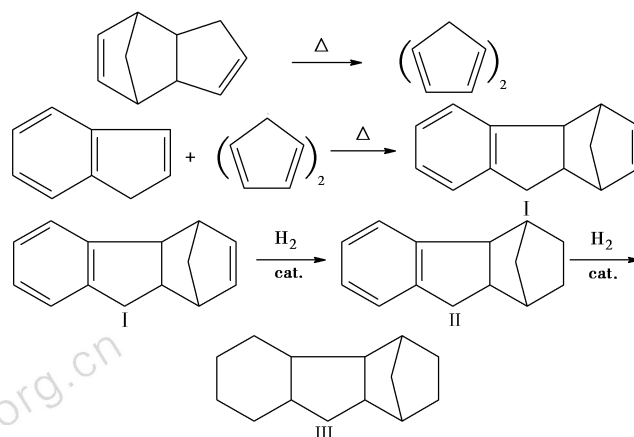
The synthetic route of glycidyl nitrate (GN) was improved. Glycidol was synthesized by the cyclization process from allyl alcohol and *m*-CPBA, then glycidyl nitrate was synthesized with glycidol as raw materials and $\text{HNO}_3/(\text{AcO})_2\text{O}$ as nitrating agent.

Synthesis and Properties of Tetracyclo[7.4.0.0^{2,7}.1^{3,6}]tetradecane as a High Density Hydrocarbon Fuel

DU Yong-mei, LI Chun-ying, YANG Jian-ming,

KANG Jian-pin, LIU Bo, Lü Jian

Chinese Journal of Energetic Materials, 2009, 17(4): 399–403

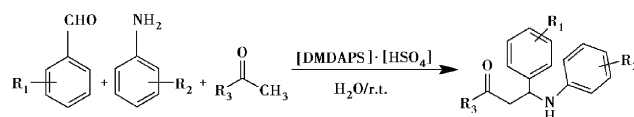


As a high density hydrocarbon fuel, tetracyclo[7.4.0.0^{2,7}.1^{3,6}]tetradecane was synthesized from dicyclopentadiene and indene by D-A reaction and hydrogenation. Properties (including density, volumetric combustion heat, viscosity, flash point, freezing point and thermal decomposition) of tetracyclo[7.4.0.0^{2,7}.1^{3,6}]tetradecane were measured.

Mannich Reaction Catalyzed by Biodegradable Ionic Liquid

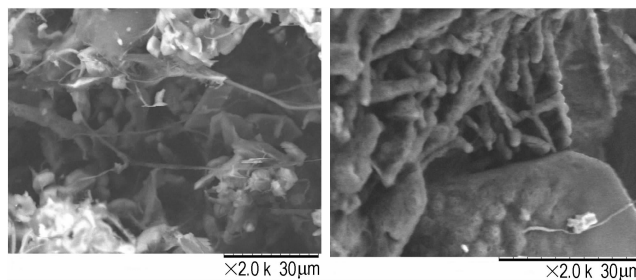
FANG Dong, CAO Shao-ting, FEI Zheng-hao, LIU Zu-liang

Chinese Journal of Energetic Materials, 2009, 17(4): 404–407



The novel task-specific room-temperature ionic liquid 3-(*N,N*-dimethyldodecyl ammonium) propanesulfonic acid hydrogen sulfate [DMDAPS] · [HSO₄] was designed and synthesized as a biodegradable recyclable catalyst for one-pot three-component Mannich reaction in water. Twelve β-amino carbonyl compounds were obtained with yield of 80%–91% under the mild conditions.

Dynamic Enzyme Degradation and Characterization of Bacterial Cellulose/RDX Composite

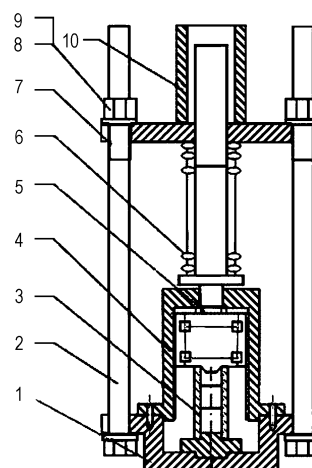


CHEN Yan, DU Yan-fang, LUO Qing-ping, NIE Fu-de,
PEI Chong-hua, LIU Chang-bo

Chinese Journal of Energetic Materials, 2009, 17(4): 408–411

The factors affecting dynamic enzyme degradation of bacterial cellulose/RDX (BC/RDX) composite were investigated and the optimum conditions were obtained by orthogonal experiments. The pre- and post-degradation materials were characterized by SEM, FTIR and XRD.

Temperature-humidity-load Accelerating Age Tests of PBX

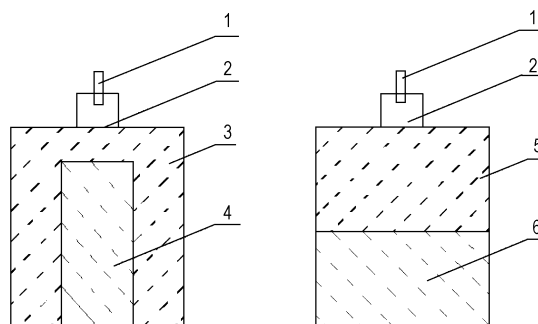


YAN Xi-lin, LI Jing-ming, ZHOU Yang, LI Ming,
ZHOU Xiao-yu

Chinese Journal of Energetic Materials, 2009, 17(4): 412–414

The temperature-humidity environmental tests under 5 MPa axial compression stress were applied to polymer bonded explosive (PBX). Results show that the mechanical properties of the explosive change obviously after the tests.

Characteristic of Energy Output of Underwater Explosion for Dual Explosive Charge



NIU Yu-lei, WANG Xiao-feng, YU Ran

Chinese Journal of Energetic Materials, 2009, 17(4): 415–419

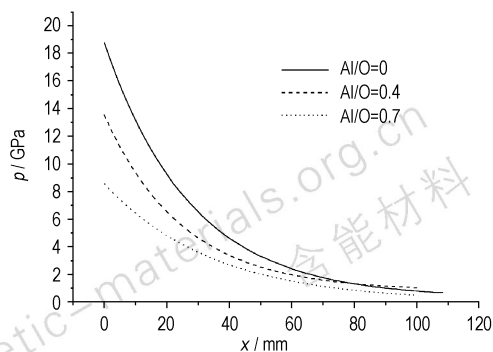
By choosing two types of explosives GH-1 and GUHL-1, and two typical dual charge structures, the test samples were prepared. The characteristics of energy output of underwater explosion for dual explosive charge were studied and compared with that of the single explosive charge.

Effects of Ratios of Aluminum to Oxygen on Shock Wave of Cylindrical Charge at Underwater Explosive

Close-field

ZHAO Ji-bo, LI Jin-he, TAN Duo-wang, SUN Yong-qiang,
ZHANG Guang-sheng

Chinese Journal of Energetic Materials, 2009, 17(4): 420–423

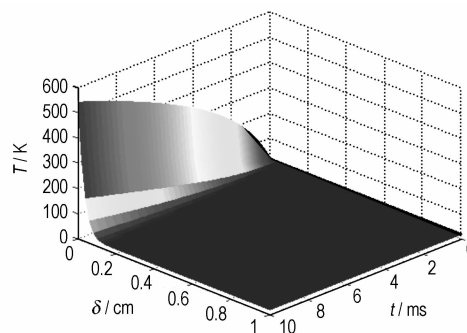


Three kinds of cylindrical charges based on RDX with different ratios of aluminum to oxygen were tested through underwater explosion. Attenuation law of shock wave peak pressure versus transmission distance at close-field underwater explosion was resolved by high-speed scanning. The effects of Al/O ratios on initial shock wave peak pressure and attenuation were analyzed.

Effect of Warhead Rotation on the Launching Safety of Solid-Liquid Mixed Charge

DUAN Yun, ZHANG Qi, LI Wei

Chinese Journal of Energetic Materials, 2009, 17(4): 424–427

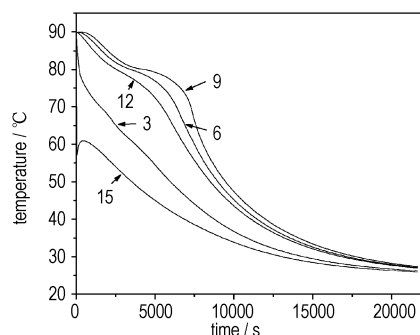


Conservation equation of energy based on the physical property of solid-liquid mixed charge and the heat caused by the friction between shell and charge during launching, was established and calculated by finite difference method to analyze the launching safety of solid-liquid mixed charge.

Numerical Simulation and Experimental Validation of RHT Solidification Process

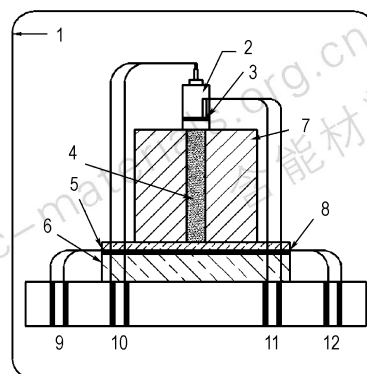
LI Jing-ming, TIAN Yong, ZHANG Ming, GUO Peng-lin,
ZHANG Wei-bin

Chinese Journal of Energetic Materials, 2009, 17(4): 428–430



The temperature fields and shrinkage condition of casting RHT explosive during solidification process were simulated by finite element method. The results show that the simulated results are consistent with the experimental results.

Attenuation Regularity of Detonation Wave of Small Charge in PMMA



XU Xin-chun, JIAO Qing-jie, CAO Xiong, HU Shuang-qi, ZHAO Hai-xia

Chinese Journal of Energetic Materials, 2009, 17(4): 431–435

The output shock wave pressure attenuated by different thicknesses of PMMA gaps of booster JO with small size charge diameter was measured by manganese piezoresistance method. The exponential regularity of the shock wave attenuation coefficient versus the charge diameter in PMMA was obtained by fitting experimental data.

Theoretical Studies on Intermolecular Interactions between Azacalix[6]arene and HMX

ZHANG Wen-yan, CAO Duan-lin, HOU Su-qing, WANG Jing, SHI Yong-wen, LI Ke-san, LIU Mei-feng, GU Yong-long

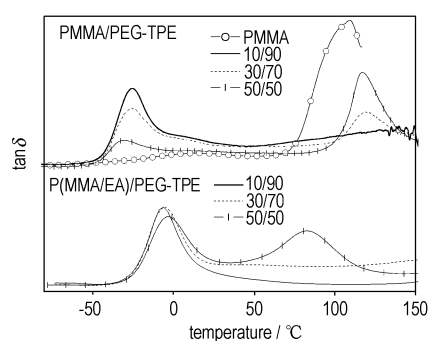
Chinese Journal of Energetic Materials, 2009, 17(4): 436–441

Four optimized structures of azacalix[6]arene host monomers ($M_a - M_d$) and their complexes (a–d) with HMX were obtained at B3LYP/6-31G(d) level. Natural bond orbital (NBO) analysis was performed to reveal the origin of the interaction between hosts and objects. The intermolecular interaction energy was evaluated with basis set superposition error correction (BSSE) and zero point energy correction (ZPEC).

Synthesis of P(MMA/EA)/PEG-TPE Semi-Interpenetrating Polymer Networks

JIAN Xiao-xia, XIAO Le-qin, ZHOU Wei-liang, XU Fu-ming

Chinese Journal of Energetic Materials, 2009, 17(4): 442–445

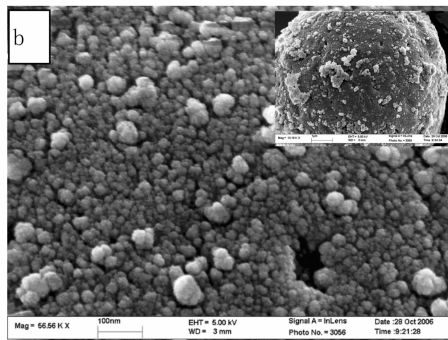


To improve the compatibility of semi-interpenetrating polymer networks (S-IPN) of polymethyl methacrylate (PMMA) and polyethylene glycol thermoplastic elastomer (PEG-TPE), P(MMA/EA)/PEG-TPE semi-interpenetrating polymer networks (S-IPN) were synthesized by PEG-TPE and copolymer of methyl methacrylate and ethyl acrylate, P(MMA/EA). FTIR, ^1H NMR, DMA and SEM were used to characterize their difference.

Preparation of Nanometer NiB/Al Composite and Its Thermal Catalysis Effect on AP Decomposition

YANG Yi, PAN Zhen-hua, LI Li-xia, LI Yu-bing,
CAO Xin-fu

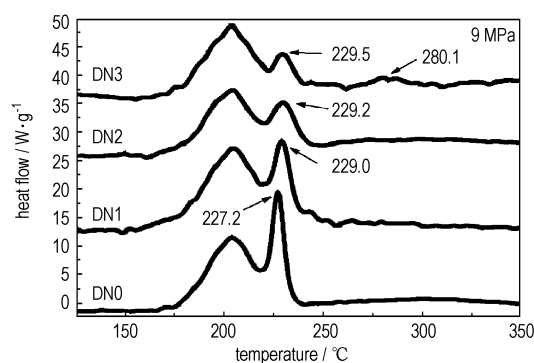
Chinese Journal of Energetic Materials, 2009, 17(4): 446–450



Nanometer NiB amorphous alloy and nanometer NiB/Al composite were prepared by chemical reduction. XRD, TEM and SEM were used to analyze the crystal structure and microstructure of the nanometer catalysts.

Effects of DNP on Thermolysis and Combustion Characteristics of CMDB Propellant

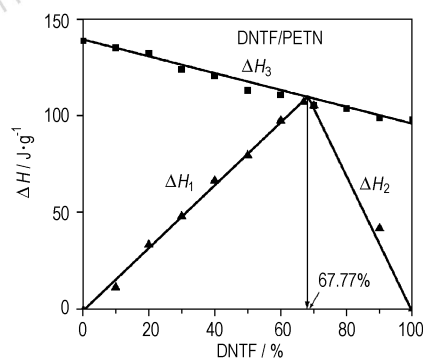
QI Xiao-fei, YAN Qi-long, WANG Han, ZHANG La-ying
Chinese Journal of Energetic Materials, 2009, 17(4): 451–454



The effects of 1, 4-dinitropiperazine (DNP) on the combustion characteristics and thermolysis of CMDB propellants were studied by differential scanning calorimetry (DSC) and burning rate test.

The Binary Phase Diagram and Eutectic System for DNTE/PETN

REN Xiao-ning, HENG Shu-yun, SHAO Ying-hui,
LIU Zi-ru, ZHANG Gao, WANG Xiao-hong, HAN Fang
Chinese Journal of Energetic Materials, 2009, 17(4): 455–458



The liquefying and melting processes of the binary mixed system consisting of a new type of high energy density materials 3, 4-dinitrofurazanuroxan (DNTE) and pentaerythritol (PETN) were studied by pressure differential scanning calorimetry (PDSC). On the basis of PDSC characteristic values of DNTE/PETN systems with various mass ratios, the phase diagrams of liquefying temperature (T) versus composition (X) and apparent fusion heat (H) versus composition (X) were constructed.

The Dynamic Compressive Properties of PTFE/Al

Reactive Materials

ZHAO Peng-duo, LU Fang-yun, LI Jun-ling, CHEN Rong,
XU Song-lin, YANG Shi-qing

Chinese Journal of Energetic Materials, 2009, 17(4): 459–462

The compressive and reacting properties of PTFE/Al reactive materials were studied by the split Hopkinson pressure bars (SHPB) at high strain rate. The effects of Al content on yield stress, fragmented and reactive properties of PTFE/Al reactive materials were analyzed.

Thermal Decomposition Kinetic Behavior of Emulsion Explosives

LUO Ning, LI Xiao-jie, WANG Xiao-hong, CUI Xin

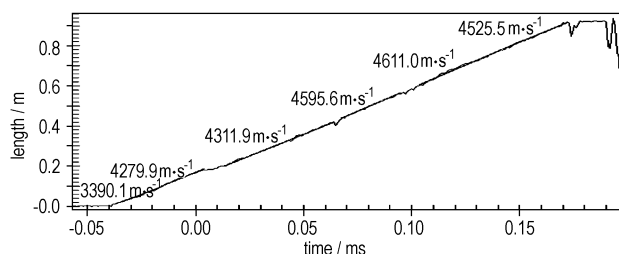
Chinese Journal of Energetic Materials, 2009, 17(4): 463–466

Thermal decomposition characteristics of five emulsion explosives were studied by DSC-TG at the heating rates of 2.0, 2.5, 7.5, 10 $\text{K} \cdot \text{min}^{-1}$, and the thermal decomposition mechanisms were deduced by means of model-free function of Ozawa method and Coats-Redfern method and Šatava-Šesták method.

Measurement of Detonation Velocity of Industrial Explosive Using Continuous Detonation Velocity Method

XU Sen, TANG Shuang-ling, LIU Da-bin

Chinese Journal of Energetic Materials, 2009, 17(4): 467–469

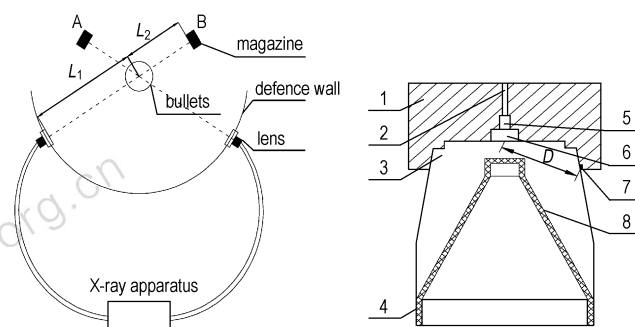


The average detonation velocity and continuous detonation velocity of powdery emulsion explosive and emulsion explosive were measured respectively by electrometric method and continuous velocity probe.

Experimental Investigation of Jet Formation of Cylinder-Cone Shaped Charge

GU Wen-bin, QU Hong-rong, TANG Yong

Chinese Journal of Energetic Materials, 2009, 17(4): 470–474



In order to study jet formation of the cylinder-cone liner, the formation of cylinder-cone shaped charge was studied by using 300 kV pulse X-ray apparatus. The jet formation of shaped charge was analyzed by numerical simulation. Eighteen X-ray photographs were obtained from 9 experiments. The radiographs of the liner collapse were analyzed at different times. Curves of the jet tip velocity and the jet length vs time were obtained.

Optimum Design Method of the Accelerated Storage Life Test for Pyrotechnics Based on Activation Energy

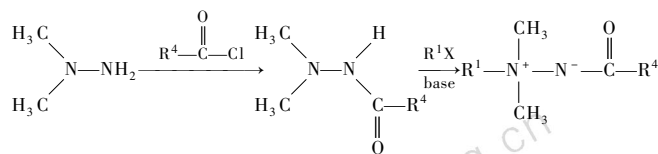
ZHAO Wan, HAN Tian-long

Chinese Journal of Energetic Materials, 2009, 17(4): 475–477

Aiming at the one-off characteristics of pyrotechnics, an optimum design method of the accelerated storage life test was advanced based on its activation energy. The accelerated coefficient formula were deduced on the basis of Arrhenius equation and the activation energy of pyrotechnics was calculated.

Preparation of Low Melting Points Aminimide from Unsymmetrical Dimethylhydrazine

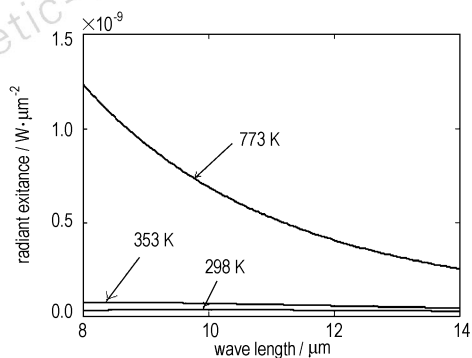
ZHANG You-zhi, LI Zheng-li, WANG Xuan-jun
Chinese Journal of Energetic Materials, 2009, 17(4): 478–481



Eight saturated aliphatic aminimides with low melting points were synthesized by unsymmetrical dimethylhydrazine (UDMH). Their structures, melting points and pyrolysis activities were determined.

Correction and Measurement of Transmittance of Smoke in 8–14 μm Waveband

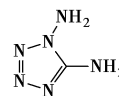
ZHU Chen-guang, Lü Chun-xu, WANG Jun, WEI Feng
Chinese Journal of Energetic Materials, 2009, 17(4): 482–485



To reduce the effects of smoke temperature on the transmittance measurement in 8–14 μm waveband, the transmittances of infrared smoke was analyzed with and without infrared radiation source.

Progress in 1, 5-Diamino-1H-tetrazole and Its Derivatives

QI Shu-yuan, ZHANG Tong-lai, YANG Li,
 ZHANG Jian-guo, ZANG Yan, CUI Yan
Chinese Journal of Energetic Materials, 2009, 17(4): 486–490



The progress in the salts and complexes of 1, 5-diamino-1H-tetrazole (DAT) were described and reviewed. The optimized synthesis processes were emphasized with the precursor of diaminoguanidine chloride as raw materials.

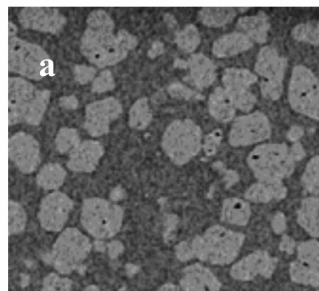
Summarization of Laser Ignition Characteristics of Solid Propellants

HAO Hai-xia, PEI Qing, ZHAO Feng-qi, LI Shang-wen
Chinese Journal of Energetic Materials, 2009, 17(4): 491–498

The brief theory, the characterization and the apparatus of laser ignition of solid propellants at home and abroad were described. And the factors affecting the laser ignition of propellants such as the laser energy, the components and contents of propellants and the circumstances including pressure and temperature, were discussed.

Structure Characterization and Performance Estimate for Thermal Solidified RDX Explosive by μCT

ZHANG Wei-bin, HUANG Hui, TIAN Yong,
 ZONG He-hou, DAI Bin, GUAN Li-feng
Chinese Journal of Energetic Materials, 2009, 17(4): 499–500



The inner structure characteristic of RDX base thermal solidified explosive was studied by μCT technology and its performance was estimated.