

### Dissolution Properties of $M(\text{NTO})_n \cdot m\text{H}_2\text{O}$ in Water

HU Rong-zu, ZHAO Feng-qi, GAO Hong-xu, XING Xiao-ling, MENG Zi-hui

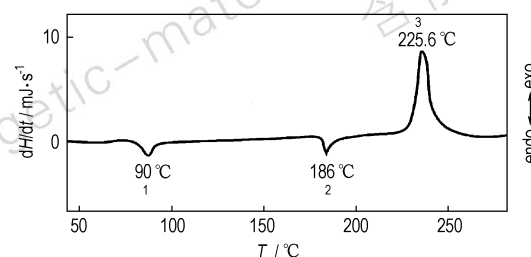
*Chinese Journal of Energetic Materials*, 2011, 19(2): 121–125

With the help of the data of the enthalpies of dissolution in water of 13 metal complexes of NTO cited from references, five empirical formulae describing  $\Delta_{\text{dif}} H_m^\theta$ ,  $[\Delta_{\text{diss}} H_m^\theta (b=0)]$ ,  $\Delta_{\text{diss}} H_{\text{apparent}}$ ,  $\Delta_{\text{diss}} H_{\text{partial}}$  and  $\Delta_{\text{dil}} H_{1,2}$  of the complexes in water were obtained.

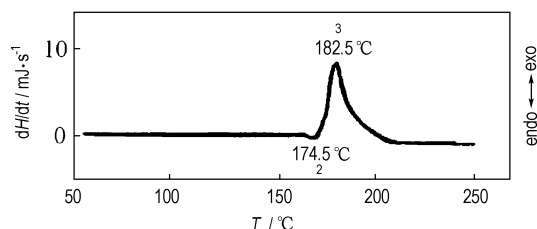
### Thermal Safety of 1, 1'-Dimethyl-5, 5'-azotetrazole and 2, 2'-Dimethyl-5, 5'-azotetrazole

HU Rong-zu, GAO Hong-xu, ZHAO Feng-qi, ZHAO Hong-an, WANG Xi-jun, ZHANG Hai, MA Hai-xia

*Chinese Journal of Energetic Materials*, 2011, 19(2): 126–131



a. 1,1'-DMATZ



b. 2,2'-DMATZ

Thermal safety of 1, 1'-DMATZ and 2, 2'-DMATZ was evaluated by self-accelerating decomposition temperature, critical temperature of thermal explosion, adiabatic time-to-explosion, 50% drop height of impact sensitivity, critical temperature of hot-spot initiation caused by impact, safety degree, critical ambient temperature of thermal explosion, thermal explosion probability, explosion potential and shock sensitivity relative to *m*-dinitrobenzene.

### Analysis of Overall Standard Deviation of Thermal Safety Criteria for Small-scale Energetic Materials

HU Rong-zu, ZHAO Feng-qi, GAO Hong-xu, YI Jian-hua, XU Si-yu

*Chinese Journal of Energetic Materials*, 2011, 19(2): 132–137

Twenty expressions describing the overall standard deviation ( $\sigma$ ) of thermal safety criteria of small-scale energetic materials were presented.

### In-situ Crystallization Coating HMX by Polyurethane

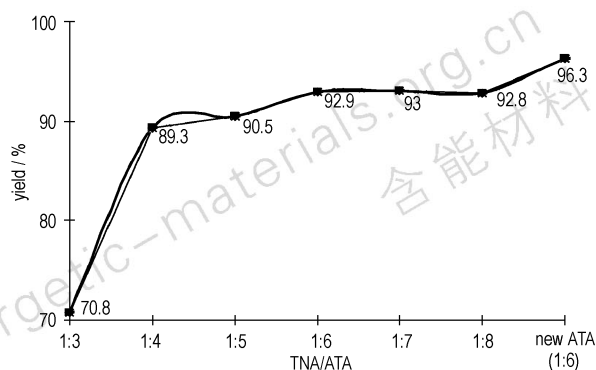
ZENG Gui-yu, NIE Fu-de, LIU Lan, CHEN Jin, HUANG Hui

*Chinese Journal of Energetic Materials*, 2011, 19(2): 138–141

**Table 2** The mechanical sensitivity of HMX samples

sample	preparation method	impact sensitivity/%	friction sensitivity/%
HMX-0800	original HMX	90	70
DSHMX-0811	in-situ crystallization coating sample	12	36
DSHMX-0902	in-situ crystallization coating sample	12	64
HMX-0804	solvent volatilization coating sample	88	80
DSHMX-0904	crystallization coating sample	80	52

### Synthesis of TATB by VNS Method

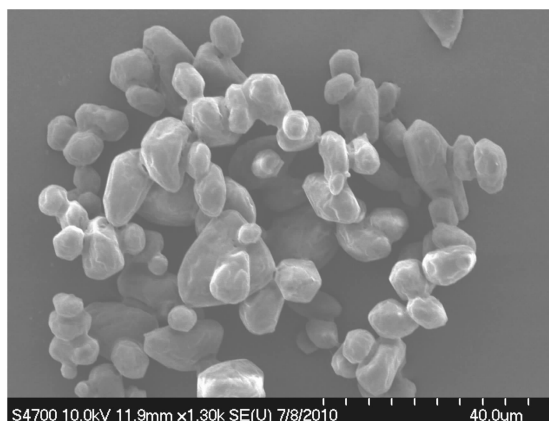


2,4,6-trinitroaniline (TNA) was synthesized by Trinitro-chlorobenzene and aqueous ammonia in alcohol, and then reacted with 4-amino-1,2,4-triazole (ATA) to generate 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) by VNS (Vicarious nucleophilic substitution) reaction.

WANG You-bing, WANG Bo-zhou, YE Zhi-hu, SHANG Yan, QIN Hui, LI Ya-nan

*Chinese Journal of Energetic Materials*, 2011, 19(2): 142–146

### Technology of Ultra-fine RDX Coating with Rapid Expansion of Supercritical Solution Method

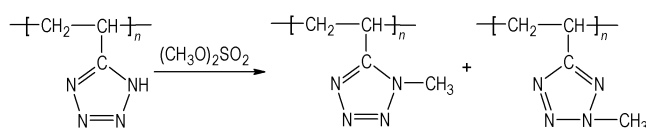


ZHANG Jun, ZHANG Jing-lin, WANG Bao-guo, LIU Shu-hao, ZHANG Tao, ZHOU De-cai

*Chinese Journal of Energetic Materials*, 2011, 19(2): 147–151

The supercritical RESS method technology was used to coating ultra-fine RDX and its impact sensitivity was studied.

### Synthesis and Properties of Poly(N-methyl-5-vinyltetrazole)s

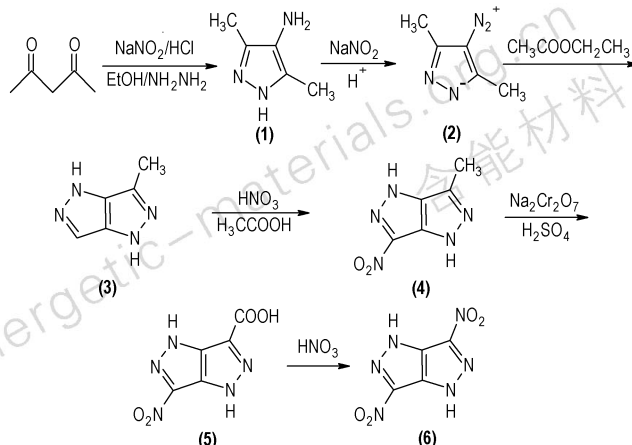


Poly(N-methyl-5-vinyltetrazole)s (PMVT) was synthesized with poly(5-vinyltetrazole) (PVT) and dimethyl sulfate as primary materials with yield of up to 97.36%. The structure of PMVT was identified by IR and NMR. Moreover, the thermodynamic behavior of PMVT was studied by DSC-TG analysis, while the safe performance of PMVT was evaluated by the mechanical sensitivity tests.

HA Heng-xin, CAO Yi-lin, SUN Zhong-xiang, HUANG Hao-nan

*Chinese Journal of Energetic Materials*, 2011, 19(2): 152–155

### Improved Synthesis of 1H, 4H-3, 6-dinitropyrazolo [4,3-C] pyrazole

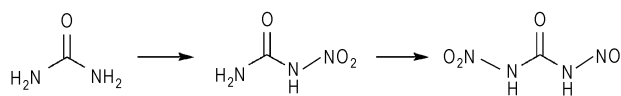


1H, 4H-3, 6-dinitropyrazolo [4, 3-C] pyrazole ( DNPP ) was synthesized from acetylacetone via monocyclization, diazotization, bicyclization, nitration, oxidation, and decarboxylative nitration. The synthesis of 4-amino-3,5-dimethylpyrazole was carried out by one-pot method.

YI Wen-bin, ZHU Chun-lin, WANG Jin-xing, ZHANG Yi, CAI Chun

*Chinese Journal of Energetic Materials*, 2011, 19(2) : 156 –159

### Synthesis, Characterization and Theoretical Research of Thermodynamics on Dinitrourea

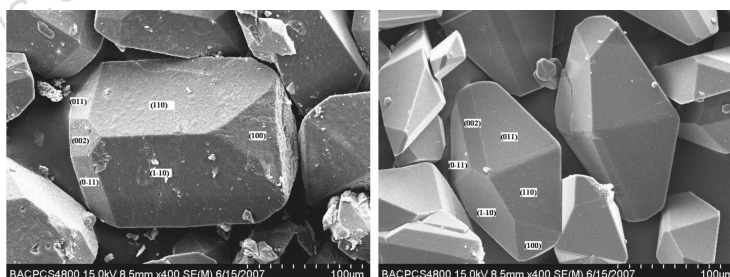


Dinitrourea was synthesized through nitration of urea by 100%  $\text{HNO}_3$  /20% oleum via mononitrourea as an intermediate. The structure of DNU was also estimated by a B3LYP method based on 6-31+G(d,p) basis set and the stable geometric configuration was obtained. The thermodynamic properties of DNU at different temperatures were obtained from vibrational analysis.

YANG Jian-ming, YU Qin-wei, XUE Yun-na, LI Ya-ni, GE Zhong-xue, Lü Jian

*Chinese Journal of Energetic Materials*, 2011, 19(2) : 160 –164

### Effect of Crystal Modifier on Crystal Morphology of $\epsilon$ -HNIW

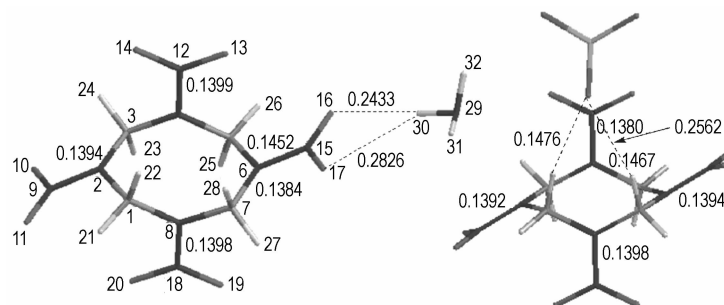


Two different shapes of  $\epsilon$ -HNIW crystals were obtained by respectively using alcohol compound ( $A_1$ ) and carboxylic compound ( $A_2$ ) as crystal modifiers in the ethyl acetate/cyclohexane crystal transition system of HNIW. The effects of the two crystal modifiers on the crystal morphology of  $\epsilon$ -HNIW were comparatively studied and analyzed.

MENG Zheng, WEI Hong-yuan

*Chinese Journal of Energetic Materials*, 2011, 19(2) : 165 –169

### Effects of $\text{NH}_3$ and $\text{ClO}_3$ on Initial Pyrolysis of $\beta$ -HMX

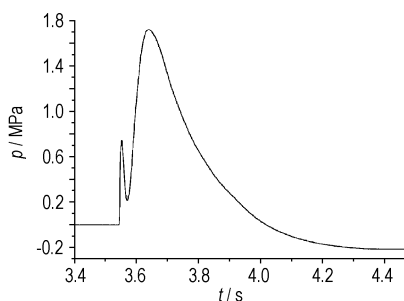


The structures of  $\beta$ -octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine ( $\beta$ -HMX) and its complexes with the pyrolysis products ( $\text{NH}_3$ ,  $\text{ClO}_3$ ) of ammonium perchlorate (AP) were optimized using the density function theory (DFT) at the B3LYP/6-31g(d) level. The bond dissociation energies for N—NO<sub>2</sub> in  $\beta$ -HMX and its complexes at normal, 4 MPa and 6 MPa pressure were obtained.

DING Li, HENG Shu-yun, ZHAI Gao-hong, ZHANG Gao, JIANG Fu-ling, SUO Bing-bing, WEN Zhen-yi

*Chinese Journal of Energetic Materials*, 2011, 19(2): 170–175

### Formula and Performance of a Smokeless Propellant Used in Fireworks



LIU Guo-sheng, GUAN Hua, SONG Dong-ming, LIU Dai-yu

*Chinese Journal of Energetic Materials*, 2011, 19(2): 176–179

A new smokeless propellant was designed and its performance was studied.

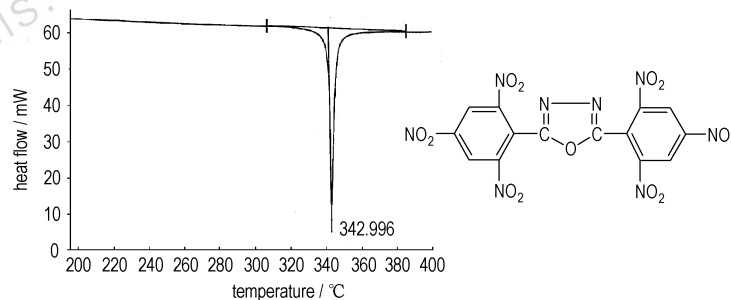
### Processing Technology and Formulation Design of Ignition Composition of Boron/Ultra-fine Potassium Nitrate

QI Hai-tao, ZHANG Jing-lin, PAN Jun-jie, WANG Rui-hao

*Chinese Journal of Energetic Materials*, 2011, 19(2): 180–183

Ultra-fine potassium nitrate was used to prepare new type boron-based igniting compositions, and the optimal formula was determined by experiments. The main performance of B/ultra-fine KNO<sub>3</sub>/binder (50/50/2.5) was also tested respectively.

### Performances of New Heat-resistant Insensitive Booster Explosive 2,5-Dipicryl-1,3,4-oxadiazole

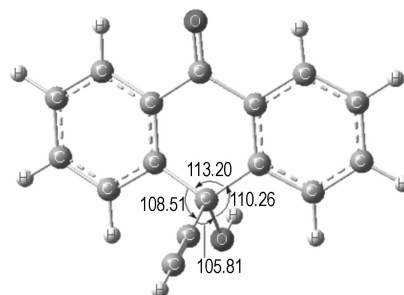


SHENG Di-lun, CHENG Li-kui, YNAG Bing, ZHU Yan-hang, XU Ming-hao

*Chinese Journal of Energetic Materials*, 2011, 19(2): 184–188

2,5-Dipicryl-1,3,4-oxadiazole (DPO) is an excellent booster explosive with good thermal stability and relatively shock wave sensitivity, its physical, chemical and thermal performances are similar to HNS. DPO is capable of passing the safety tests for booster explosive and used for in-line explosive as the permissive booster explosive.

### Theoretical Study on Structure and Fluorescence Properties of 9-Ethynyl-9-hydroxyanthrone

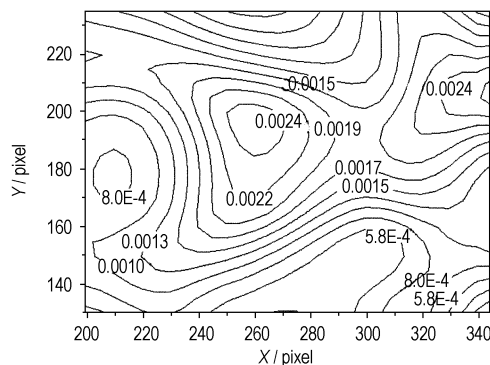


The excitation energy and emission energy of 9-ethynyl-9-hydroxyanthrone were obtained by time-dependent theoretical functional theory (TDDFT) and single-excitation configuration interaction (CIS) approach. The effects of CH<sub>3</sub>OH and TNT on the fluorescence spectrum of 9-ethynyl-9-hydroxyanthrone were achieved by front orbital theory.

XIONG Ying, LIU Yong, LIU Xue-yong, ZHONG Fa-chun, ZHANG Yong, SHU Yuan-jie

*Chinese Journal of Energetic Materials*, 2011, 19(2): 189–193

### Dynamic Tensile Mechanical Properties of Three Types of PBX

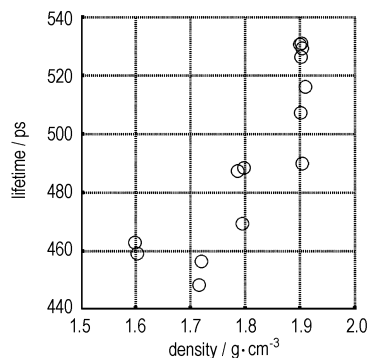


Strain fields of PBXs under indirect dynamic tensile loading were obtained with application of Flattened Brazilian Disc (FBD) and Split Hopkinson Press Bar (SHPB). With combination of stress information from quartz transducers, dynamic tensile mechanical properties of PBXs were discussed.

ZHAO Yu-gang, FU Hua, LI Jun-ling, CHEN Rong, WEN Shang-gang

*Chinese Journal of Energetic Materials*, 2011, 19(2): 194–199

### Study on Positron Lifetime of Nano-void of TATB-based PBX



The positron lifetime study of TATB-based PBX with different press densities shows an increasing dimension but decreasing concentration of nano-void during PBX pressing, which means the nano-void in TATB crystalline increased but nano-void of intergranular interface decreased.

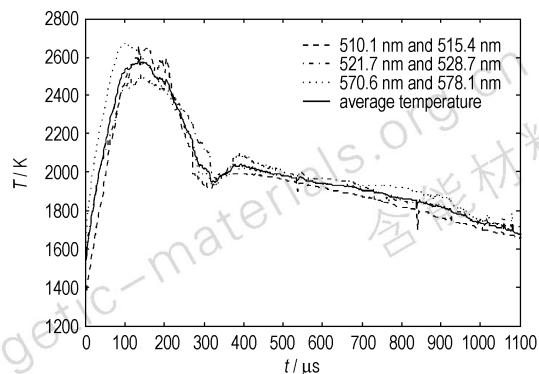
YANG Reng-cai, TIAN Yong, ZHANG Wei-bin, DU Yu

*Chinese Journal of Energetic Materials*, 2011, 19(2): 200–203

### Explosion Temperature of Thermobaric Explosive

ZHONG Qian, WANG Bo-liang, WANG Feng-dan,  
HUI Jun-ming

*Chinese Journal of Energetic Materials*, 2011, 19(2): 204–208

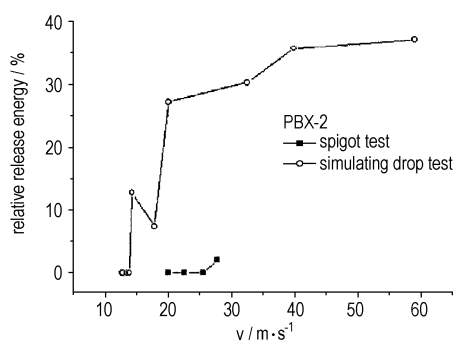


The temperature of thermobaric explosive was measured by multi-wavelength temperature-measuring system. There were two temperature peaks of 2573 K and 2000 K, corresponding to the oxygen-free reaction and oxygen reaction phases of TBE explosion process, respectively.

### Reaction of PBX-2 Explosive under Simulated Drop Impact

DAI Xiao-gan, SHEN Chun-ying, WEN Yu-shi

*Chinese Journal of Energetic Materials*, 2011, 19(2): 209–212

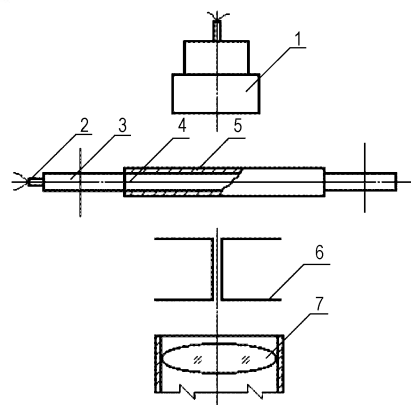


The device to simulate drop test was designed. The reaction degree of PBX-2 was analyzed by the high-speed motion pictures, and changing processes of pressure and acceleration and reaction overpressure were measured.

### JWL Equation of State for RDX-based PBX

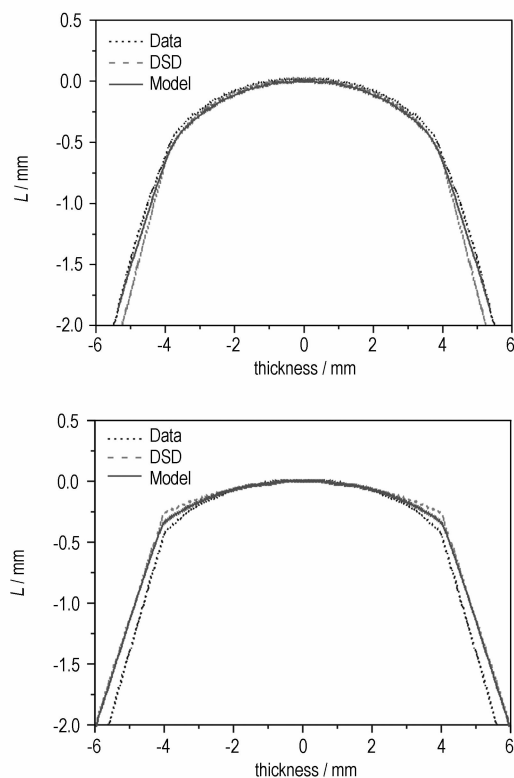
CHEN Qing-chou, JIANG Xiao-hua, LI Min, LU Xiao-jun

*Chinese Journal of Energetic Materials*, 2011, 19(2): 213–216



Cylinder tests with diameter of 10 mm and 25 mm were carried out to identify the power of RDX-based PBX. According to the results of the numerical simulations of cylinder tests, parameters of JWL equation of state (EOS) for RDX-based PBX were calculated and corrected.

### Numerical Simulation of Detonation-confinement Sandwich Test of PBX-9502

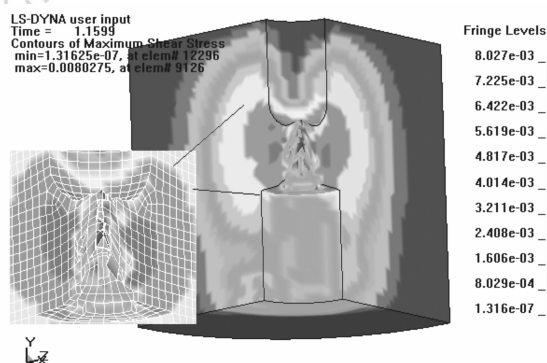


Detonation-confinement Sandwich Test of PBX-9502 was simulated using a simple one-term reaction rate. Simulation result was compared with results of tests and DSD analysis, it can be found that the reaction rate model can be used to model Detonation-confinement Sandwich Test accurately. The results show that shock shapes is dependent on inert material under certain conditions.

CHEN Jun, TIAN Zhan-dong, ZHANG Zhen-yu

*Chinese Journal of Energetic Materials*, 2011, 19(2): 217–220

### Numerical Simulation and Experimental Investigation for Shock Initiation of Bulkhead Initiator

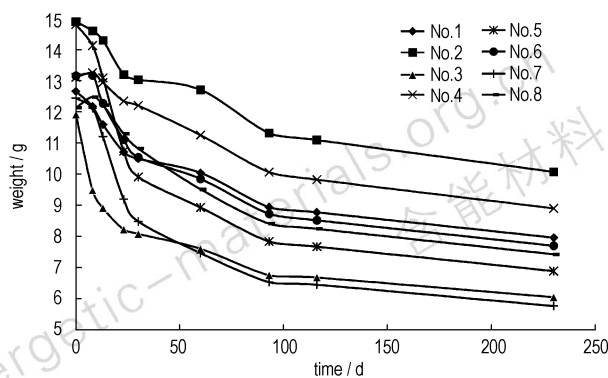


The numerical simulation is introduced into the design of bulkhead initiator for improving the reliability design of the initiating device. The LS-DYNA software is applied to simulate the bulkhead explosion transmission of bulkhead initiator.

YANG Zheng-cai, LIAO Xin, LI Xiao-gang, ZHAO Liang, XU Wei

*Chinese Journal of Energetic Materials*, 2011, 19(2): 221–225

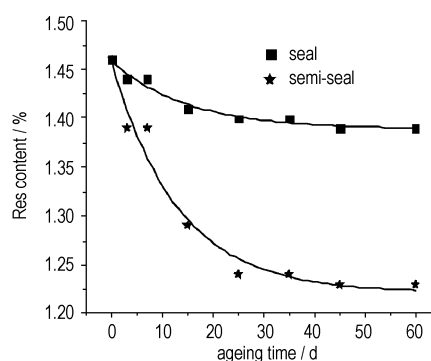
### Storage Performance of HAN Hydrogel



HE Li-ming, XIAO Zhong-liang, LI You-ping, ZHANG Jin-ming  
*Chinese Journal of Energetic Materials*, 2011, 19(2): 226–228

The affects of storage condition and temperature on storage performance of HAN hydrogel were analyzed.

### Influence of Tightness on Storage Stability of GATo-3 Propellant



CHANG Wen-ping, JIANG Jin-yong, LU gui-e, DU Shi-guo,  
 LIAO Jing-lin  
*Chinese Journal of Energetic Materials*, 2011, 19(2): 229–231

The influence of tightness on the storage stability of GATo propellant was studied by ageing test, gas phase chromatography (GC) and microcalorimeter.

### Review on Application of Nano-metal Powders in Explosive and Propellants

XU Hui-xiang, LI Xing-wen, ZHAO Feng-qi, PANG Wei-qiang,  
 JIA Shen-li, MO Hong-jun  
*Chinese Journal of Energetic Materials*, 2011, 19(2): 232–239

The article reviewed the progress in the application of nano-metal powders to propellants, condensed explosives, fuel-air explosives and thermites, summarized a few methods to modify nano-metal powders, and pointed out the important direction of nano-metal powders, such as nano-boron, nano-zirconium and composite nano-aluminium.

### Preparation of Hexanitrobibenyl and Its Sensitivity Performance

HUANG Jing-lun, CHENG Bi-bo, MA Qing, NIE Fu-de  
*Chinese Journal of Energetic Materials*, 2011, 19(2): 240

Hexanitrobibenyl (HNBB) was prepared. The relationship between the pH value of sodium hypochlorous acid solution and the yield of HNBB was detailedly discussed in the coupled reaction. The structure of HNBB was determined by NMR and mass spectra, and main properties was studied.

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