

Combustion Characteristics of XLDB and NEPE Propellants with Catalyst

HOU Zhu-lin, LI Xiao-dong

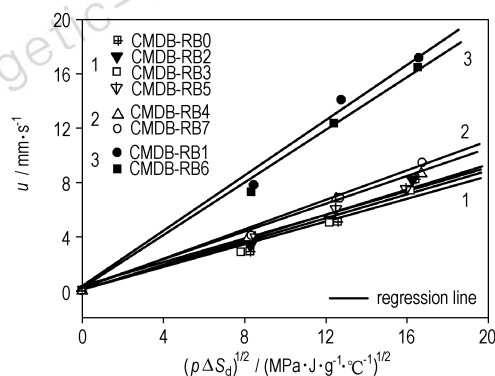
Chinese Journal of Energetic Materials, 2007, 15(4): 297–300

When the contents of lead monosalicylate and copper monosalicylate are 1.5% and 0.5% respectively, pressure exponent of XLDB propellant decreases by 27.1%. When the contents of lead carbonate and carbon black are 2% and 0.5%, respectively, the pressure exponent of NEPE propellant may decrease by 34.7%.

Catalytic Decomposition of RDX-CMDB and its Correlation With Burning Rate

LIU Zi-ru, LIU Yan, ZHAO Feng-qi, ZHANG La-ying,
HENG Shu-yun

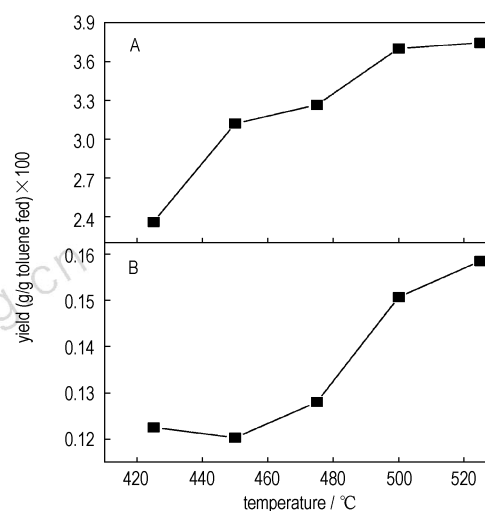
Chinese Journal of Energetic Materials, 2007, 15(4): 301–304



The characteristic value of PDSC is correlated to burning rate of RDX-CMDB by using linear equation. The correlation factor of burning rate with PDSC characteristic value, k_u , is used to study the effect of burning catalysts on burning rate of the propellants.

Effects of Temperature on the Coke and its Precursors Formation During Catalytic Cracking of Toluene over USY

CHEN Gui-mei, LI Zi-mu, ZHANG Xiang-wen, MI Zhen-tao
Chinese Journal of Energetic Materials, 2007, 15(4): 305–309

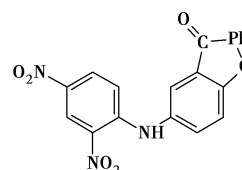


Effects of temperature on coke and its precursors formation were studied during supercritical cracking of toluene over USY catalyst.

Synthesis of Lead 5-(2,4-Dinitroanilino)-salicylate and its Effect on Combustion of Double-base Propellant

SONG Xiu-duo, ZHAO Feng-qi, WANG Jiang-ning,
ZHENG Wei, TIAN Jun

Chinese Journal of Energetic Materials, 2007, 15(4): 310–312



An energetic catalyst was synthesized and its effect on combustion of double-base propellant was discussed.

Synthesis and Properties of 3-Nitratomethyl-3-ethyloxetane and its Homopolymer

MO Hong-chang, GAN Xiao-xian

Chinese Journal of Energetic Materials, 2007, 15(4): 313 – 315

3-Nitratomethyl-3-ethyloxetane and the homopolymer of 3-nitratomethyl-3-ethyloxetane was synthesized. The effect of catalyst and initiator molar ratio and reaction temperature on polymerization was discussed.

Influence of Lead(II) and Copper(II) Salts of NTO on the Combustion Characteristics and Thermal Decomposition of AP-CMDB Propellant

FAN Xue-zhong, LI Ji-zhen, ZHANG La-ying,

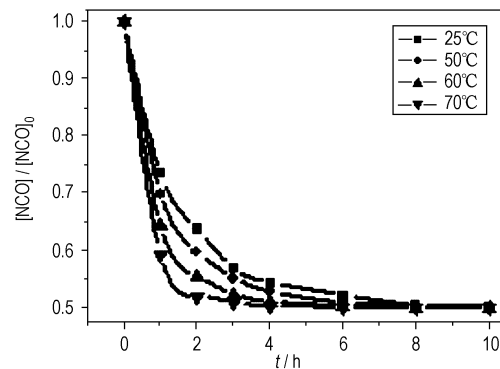
WANG Bo-zhou, LIU Xiao-gang

Chinese Journal of Energetic Materials, 2007, 15(4): 316 – 319

The influence of bis (3-nitro-1, 2, 4-triazole-5-onato) lead (II) ($\text{Pb}(\text{NTO})_2$), tetraaquo-bis(3- nitro-1,2,4-triazole-5-onato) copper(II) ($\text{Cu}(\text{NTO})_2$) and tetraaquo-3-nitro-1,2,4-triazolato -5-onato copper(II) ($\text{Cu}(\text{NTO})$) on the combustion characteristics and the thermal behavior of AP-CMDB propellants were experimentally studied.

Curing Reaction Kinetics of Polyethylene Glycol with Isophorone Diisocyanate and Tolulene Diisocyanates

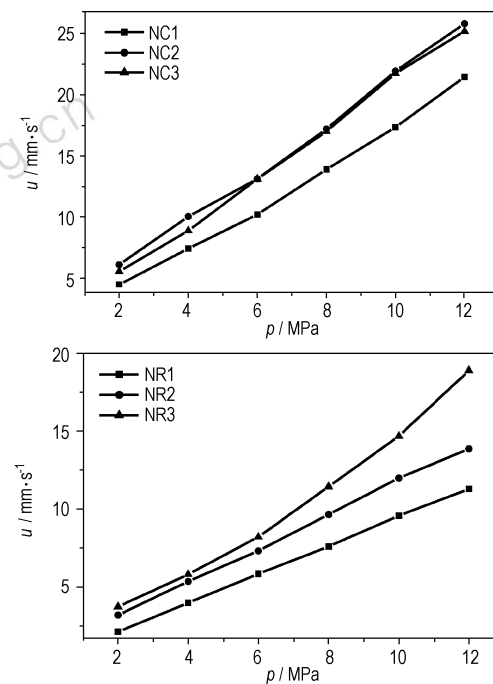
ZHANG Ze-yi, LI Xiao-jiang, WANG Han, LI Feng-sheng
Chinese Journal of Energetic Materials, 2007, 15(4): 320 – 323



The curing reaction kinetics of polyethylene glycol (PEG) with toluene diisocyanate (TDI) were studied by means of chemical titration.

Combustion Property of NEPE Propellant with CL-20

DING Li, ZHAO Feng-qi, LI Shang-wen, XU Hui-xiang,
LI Yong-hong
Chinese Journal of Energetic Materials, 2007, 15(4): 324 – 328



The effect of CL-20, AP, Al power and combustion catalyst on combustion properties (burning rate and pressure exponent) of CL-20-NEPE propellant was studied.

Influences of Lead Salts on Combustion Characteristics of High Energy Smokeless Modified Double-Base Propellant

FU Xiao-long, LI Ji-zhen, LIU Xiao-gang, FAN Xue-zhong, LIU Chun

Chinese Journal of Energetic Materials, 2007, 15(4): 329 – 331

The effects of six lead salts on the combustion characteristics of the high energy smokeless modified double-base propellant (HESMDB) was studied including PCDS, PDS, NIP, lead 3-nitro-1,2,4-triazol-5-one, lead 2,4-dihydroxybenzoate, lead phthalate and lead carbonate.

Aging Properties of NEPE Propellant

ZHAO Yong-jun, ZHANG Wei, ZHANG Xing-gao, ZHU Hui, WANG Chun-hua, FANG Lin-jun

Chinese Journal of Energetic Materials, 2007, 15(4): 332 – 335

The thermal aging properties of nitrate ester polyether (NEPE) propellant including the mass loss percent, the hardness, the gel fraction, the relative cross-linking density, the content of the plasticizers (BTTN and NG) were measured at 60 °C, 70 °C and 80 °C under the thermal air condition.

Damage Behavior of HTPB Propellant

ZHAO Hai-quan, LI Yan-li, ZHAO Ai-zhu, ZUO Guo-ping

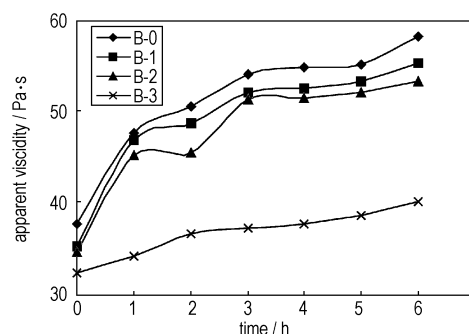
Chinese Journal of Energetic Materials, 2007, 15(4): 336 – 340

The damage and failure behavior of HTPB propellant was studied. The influence of environment and stress on propellant damage was discussed.

Effect of Neutralised Boron Powder on Rheological Characteristic of B/HTPB

XU Hui-xiang, ZHAO Feng-qi, LI Yong-hong

Chinese Journal of Energetic Materials, 2007, 15(4): 341 – 344



In the rheological characteristics test, the apparent viscosity and yield value of the raw boron powder (B-0) with HTPB increases rapidly with mixing time increasing, and gels in 24 hours. B was neutralised respectively with ammonia in gas phase (B-1), in liquid phase (B-2) and with sodium hydroxide solution (B-3). The rheological characteristics of B-1, B-2 and B-3 with HTPB are improved. The apparent viscosity and yield value of B-3/HTPB mixture almost don't increase.

Mechanical Properties of NC/NG/AP/Al Composite Modified Double-Base Propellant

LI Ji-zhen, FAN Xue-zhong, ZHONG Lei, LIU Xiao-gang

Chinese Journal of Energetic Materials, 2007, 15(4): 345 – 348

The effects of the content of NC, the ratio of solid components granularity and the system of solidifying agents on the mechanical properties of NC/NG/AP/Al composite modified double-base (CMDB) propellant were studied.

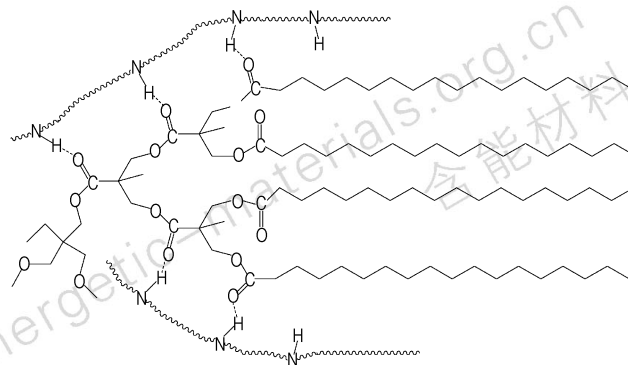
Effects of Chain Extenders and Cross Linkers on Mechanical Characteristics of Binder Film of NEPE Propellant at High Temperature

ZHANG Wei, XIE Wu-xi, FAN Xue-zhong, LI Xu-li, WEI Hong-jian

Chinese Journal of Energetic Materials, 2007, 15(4): 349 – 351

The effects of the aliphatic and low molecular polyether diols (chain extenders) and triols (cross linkers) on the mechanical characteristics of the binder film of the NEPE propellant at the temperature of 50 °C were studied.

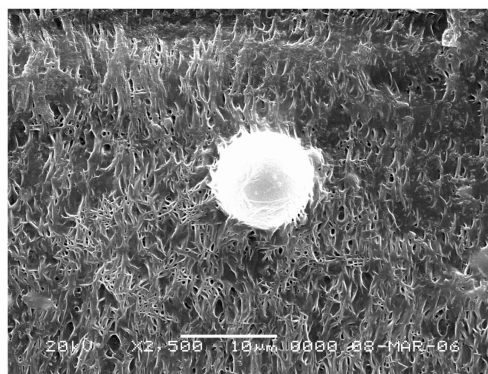
Effects of Hyperbranched Polyester on Mechanical Properties of HTPB Polyurethane Elastomer



(~~~~ and stand for the main chain of PU and H-bond respectively)
The hydrogen bonds between —COO— in hyperbranched polyester and —NH— in polyurethane, increase physical entanglements between the two networks. This is one of reasons why modified hyperbranched polyester added obviously enhances tensile strength and elongation of the HTPB polyurethane elastomer.

SONG Xue-jing, LUO Yun-jun, CHAI Chun-peng
Chinese Journal of Energetic Materials, 2007, 15(4): 352–355

Unilateral Tension Fracture Behavior of PEG/N-100 Matrix



Spherulite of polymer generated after simple tension of PEG/N-100 matrix is observed by SEM. The matrix is of high Young's modulus, great yield stress and elongation percentage of fracture.

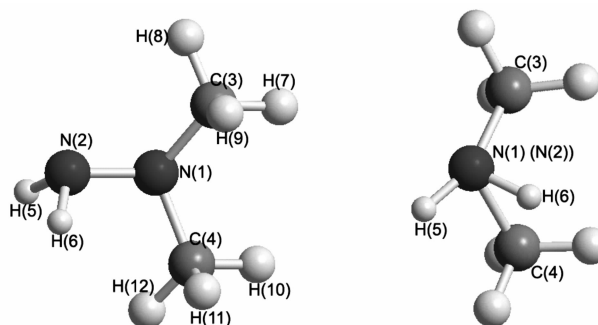
TANG Gen, GUO Xiang, PANG Ai-min, ZHENG Jian
Chinese Journal of Energetic Materials, 2007, 15(4): 356–358

Fracture Behavior of HTPB Composite Propellant in I-II Mixed Mode Crack

ZHANG Ya, QIANG Hong-fu, YANG Yue-cheng
Chinese Journal of Energetic Materials, 2007, 15(4): 359–362

HTPB composite solid propellant containing slant internal cracks under uniaxial tensile load was measured with material testing device WDN-10KN, at the tensile rate of $2 \text{ mm} \cdot \text{min}^{-1}$. The whole progress of crack propagation was recorded.

Calculation of the Molecular Structure of UDMH

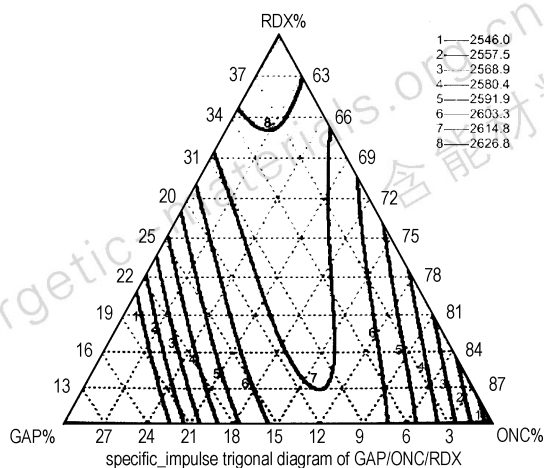


LI Zheng-li, WANG Xuan-jun, ZHANG You-zhi
Chinese Journal of Energetic Materials, 2007, 15(4): 363–366

Energy Characteristics Computation of Propellant Containing Octanitrocubane (ONC)

LIU Jing-ru, LUO Yun-jun, YANG Yin

Chinese Journal of Energetic Materials, 2007, 15(4): 367–369



The energy parameters of the propellant containing octanitrocubane (ONC) were calculated by CAD system of propellant energy calculation. GAP/ONC/RDX smokeless propellant is of a high specific impulse over 2600 N · s/kg in very wide scope.

Molecular Dynamics Simulation of Solubility Parameter of Azide Binders and Nitrate Ester

LI Qian, YAO Wei-shang, TAN Hui-min

Chinese Journal of Energetic Materials, 2007, 15(4): 370–373

According to $\Delta H_{\text{mix}} = V_s (\delta_s - \delta_p)^2 v_p^2$ and $\delta = (\text{CED}/v)^{1/2}$, cohesive energy density and solubility parameter of nitrate ester plasticizers, azide prepolymers and azide thermoplastic elastomers consisted of different soft segment and hard segment were calculated respectively by molecular dynamics simulation method.

Effects of Fast-burning Energetic Compound ACP and Coated ACP on Combustion Properties of High Burning Rate CMDB

RAN Xiu-lun, YANG Rong-jie, ZHANG Xiao-hong

Chinese Journal of Energetic Materials, 2007, 15(4): 374–377

The effects of fast-burning energetic compound ACP and ACP coated with polyurethane adhesive on combustion properties of high burning rate composite modified double base propellant in the pressure region of 11 ~ 20.5 MPa and 3 ~ 9 MPa were comparatively studied and analyzed.

Effect of Coating and Agglomerating on Combustion of Boron

GAO Dong-lei, ZHANG Wei, ZHU Hui, JI Zhuang-zhou

Chinese Journal of Energetic Materials, 2007, 15(4): 378–381

The thermal behavior of different boron particles coated with AP and LiF was investigated. The effects of coating and agglomeration on combustion heat of agglomerated boron were studied. Explosive heat of different boron based fuel-rich propellant was also investigated.

Improvement for AP Coating Superfine Boron Powder

ZHANG Jiao-qiang, PANG Wei-qiang, ZHANG Qiong-fang, SU Li-hong, YAN Hong-xia, KOU Kai-chang, GUO Ji-ying

Chinese Journal of Energetic Materials, 2007, 15(4): 382–386

The superfine boron powder was coated with AP by aggradation method using methanol or acetone as the solvent. The influence of the solvent, vaporized velocity and amido-silicon alkyl on the coated effectiveness of superfine boron powder was studied.

Desensitizing Efficiency of ϵ -HNIW Coated by Demulsification of Aqueous Polyurethane Emulsion

MENG Zheng, OU Yu-xiang, LIU Jin-quan, ZHAO Yi

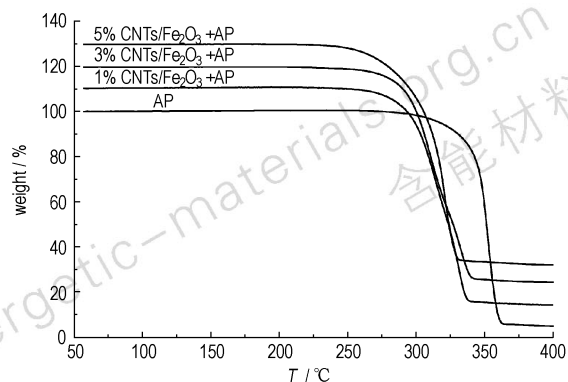
Chinese Journal of Energetic Materials, 2007, 15(4): 387–390

ϵ -HNIW was desensitized through coating with aqueous polyurethane emulsion by demulsification. A number of factors which affect the coating efficiency and the impact sensitivity of coated ϵ -HNIW were investigated.

Preparation of Ferric Oxide Nano-particles on Carbon Nanotubes and its Catalysis on Thermal Decomposition of Oxidizers

LI Xiao-dong, YANG Rong-jie

Chinese Journal of Energetic Materials, 2007, 15(4): 391 – 394

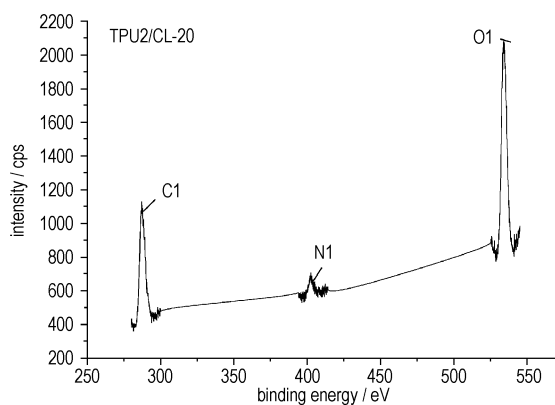


Thermal decomposition temperatures of AP decrease when CNTs/Fe₂O₃ are added to AP.

Influence of Thermoplastic Polyurethane Elastomers (TPU) with Different Fraction of Hard Segments on the Coating of CL-20

YANG Yin, LUO Yun-jun, JIU Yong-bin, DU Mei-na,
GE Zhen, CHAI Chun-peng

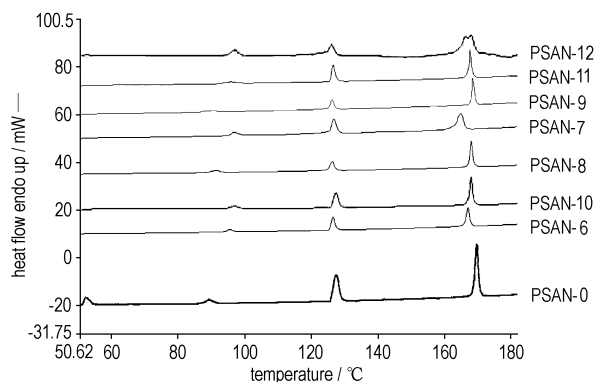
Chinese Journal of Energetic Materials, 2007, 15(4): 395 – 399



A series of thermoplastic polyurethane elastomers (TPU) with different fraction of hard segments based on poly (ethylene-propylene adipate) (PEPA) /ethylene oxide/tetrahydrofuran copolyether (PET) as soft segments were synthesized. The effects of coating on CL-20 by TPUs were studied by impact sensitivity, surface free energy and XPS .

Effect of Inorganic Additives on Phase Transition of Ammonium Nitrate

ZENG Gui-yu, ZHOU Jian-hua, Lü Chun-xu, HUANG Hui
Chinese Journal of Energetic Materials, 2007, 15(4): 400 – 403



The effects of more than 20 kinds of inorganic additives on AN polymorphs were studied through adding different types of inorganic additives in AN samples and using differential scanning calorimetry (DSC) method.

Determination of Novel Liquid Propellant by NMR

WANG Ming-chang, ZHANG Gao, XU Min, QI Zhu-chai,
JIA Lin, JI Yue-ping
Chinese Journal of Energetic Materials, 2007, 15(4): 404 – 406

Structures of organic components in a new liquid propellant were identified by the nuclear magnetic resonance spectroscopy. The content of every component was quantified by the external reference material trans-butenedioic acid, according to the nucleus-carrying mass (NCM) of every component. The result of precision test with NMR is consistent with the result with high performance liquid chromatography.

Research Progress of High Energy Solid Propellant

LUO Yun-jun, LIU Jing-ru
Chinese Journal of Energetic Materials, 2007, 15(4): 407 – 410

The research progress of high energy solid propellants was reviewed. Several methods for developing high energy solid propellants were put forward.

Progress on the Synthesis and Application of High-density Liquid Hydrocarbon Fuels

ZOU Ji-Jun, ZHANG Xiang-wen, WANG Li, MI Zhen-tao
Chinese Journal of Energetic Materials, 2007, 15(4): 411 – 415

The synthesis route and properties of high-density liquid hydrocarbon fuels under utilization and development were summarized from the point view of application.

Review on Green Synthesis of Nitrate Esters

WANG Qing-fa, SHI Fei, MI Zhen-tao, ZHANG Xiang-wen,
WANG Li
Chinese Journal of Energetic Materials, 2007, 15(4): 416 – 420

The green synthesis of nitrate esters using dinitrogen pentoxide (N_2O_5) as nitrating agent was reviewed. The electronic effect and steric effect of substituents on ring-open nitration of propylene oxide compounds were discussed.

Advances in Aluminum/Water Propellant

ZOU Mei-shuai, YANG Rong-jie, GUO Xiao-yan,
CAO Chuan-bao, LI Jian-min
Chinese Journal of Energetic Materials, 2007, 15(4): 421 – 424

Some characteristics and application of Al/ H_2O propellant are discussed.

Research Progress of Glycidyl Azide Polymers Modification

SONG Xiao-qing, ZHOU Ji-yi, WANG Wen-hao,
WANG Jian-wei, BAI Sen-hu
Chinese Journal of Energetic Materials, 2007, 15(4): 425 – 430

The application of GAP in energetic thermoplastic elastomers (ETPE), energetic plasticizers and energetic curing agent were reviewed.

Review on Models of Boron Particles Ignition in Oxidative System

GAO Dong-lei, ZHANG Wei, JI Zhuang-zhou
Chinese Journal of Energetic Materials, 2007, 15(4): 431 – 435

Boron ignition mechanism and corresponding chemical reactions were analysed. Two different boron ignition models were explained and compared.

Progress in Combustion Characteristics of Boron-Based Fuel-Rich Propellant

ZHANG Qiong-fang, CAO Fu-qi, SUN Zhen-hua
Chinese Journal of Energetic Materials, 2007, 15(4): 436 – 440

Several technical means of improving the combustion efficiency were described. The coating of boron, the adjustment of the formula of propellant, the improvement of the gas nozzle etc were introduced.