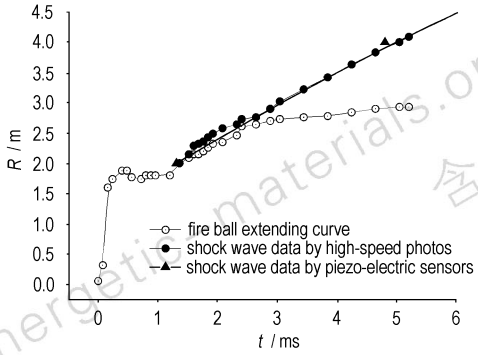
Characteristic of the Thermobaric Explosive Contained Aluminum Powders



PEI Ming-jing, MAO Gen-wang, HU Hua-quan, CHEN Li-qiang

Chinese Journal of Energetic Materials, 2007, 15(5): 441 – 446

A thermobaric explosive containing aluminum powder was studied. The thermobaric explosives burned in air can produce fireball and shockwave. The releasing energy of fireball enhanced the shockwave continually. At the initial shockwave spread in company with the fireball's expanding. Lately the shockwave was separated from the fireball.

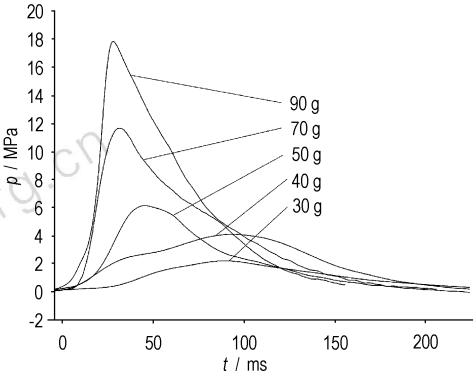
Effect of Total Energy of Center Explosive Charge on Fuel Dispersal Characteristic Feature

ZHANG Qi, QIN Bin, BAI Chun-hua, GUO Yan-yi, LIU Qing-ming, LIANG Hui-min

Chinese Journal of Energetic Materials, 2007, 15(5): 447 – 450

Fuel/air cloud dispersal processes of four kinds of center high explosive charges were introduced in this paper.

High-speed Liquid Jet Driven by Burned Gas of Gas Generating Compositions

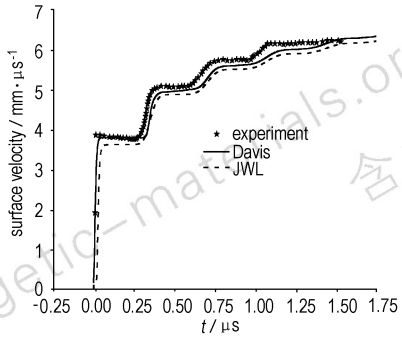


ZHAO Lin-shuang, DU Zhi-ming

Chinese Journal of Energetic Materials, 2007, 15(5): 451 – 454

The liquid spray experiment show that the increase in the charge quantity will increase not only the initial velocity of jet but also the amount of the liquid. When charge quantity of gas generator is more than 50 g, the preferable atomizing effect of jet can be found.

Equation of State for PBX-9502 in the Condition of Strong Detonation

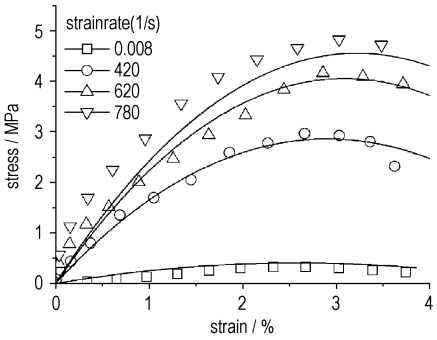


SUN Hai-quan, HONG Tao

Chinese Journal of Energetic Materials, 2007, 15(5): 455 – 459

Davis and JWL EOS are used to calculate the strong detonation and the spherical convergent detonation of PBX-9502 respectively.

Mechanical Behavior and Constitutive Model of Pressed Aluminized Explosive

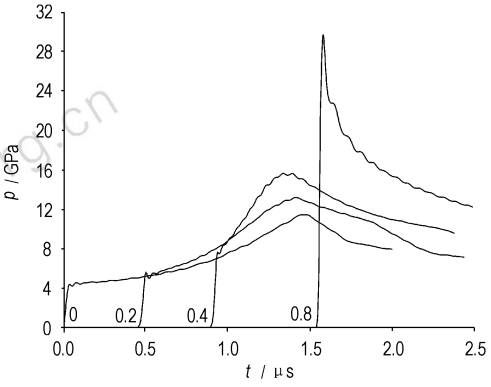


CHEN Rong, LU Fang-yun, LIN Yu-liang, WANG Rui-feng

Chinese Journal of Energetic Materials, 2007, 15(5): 460 – 463

The failure stresses of the aluminized explosive become higher if the original density or loading strain rates rise. A constitutive relation has been established base on the experimental curves.

A Mesomechanic Model of Shock Initiation in PBX-9404 Explosive

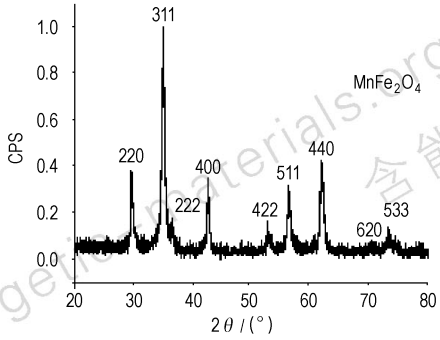


TIAN Zhan-dong, ZHANG Zhen-yu

Chinese Journal of Energetic Materials, 2007, 15(5): 464 – 467

A mesomechanic reaction model of heterogeneous explosives under shock wave is established. Then the model is implemented in one-dimensional reactive hydrodynamic program SSS to simulate the shock initiation of PBX-9404.

Application of Emulsion Explosive in Detonation Synthesis of Nano-oxide Particles



LI Xiao-jie, WANG Xiao-hong, XIE Xing-hua, ZHANG Yue-ju, QU Yan-dong, SUN Gui-lei

Chinese Journal of Energetic Materials, 2007, 15(5): 468 −470

A new type emulsion explosive for synthesis of nano-$MnFe_2O_4$ powders by detonation method was prepared. Nano-$MnFe_2O_4$ powders were successfully synthesized and pure nano-$MnFe_2O_4$ powders were obtained after the original detonation products were simply thermal treated.

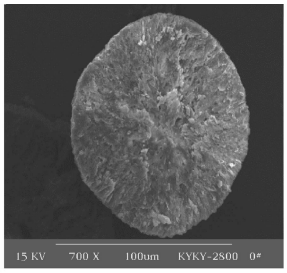
Experiment and Numerical Simulation of Plane Wave Lens

HAN Yong, WEI Zhi-yong, HUANG Yi-min, LU Bin, JIANG Xiao-hua

Chinese Journal of Energetic Materials, 2007, 15(5): 471 −473

Physical picture of detonation and shock wave propagation in the plane wave lens was gained by the experiment and calculation.

Intrinsic Textures of Explosive Particles Determined by Sliced Crystals Preparation-Section SEM Methods

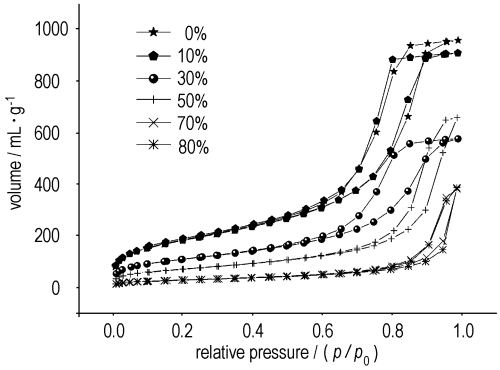


YU Wei-fei, HUANG Hui, SHANG Yao, LI Wei, CHENG Ke-mei, NIE Fu-de, ZENG Gui-yu, HUANG Ming

Chinese Journal of Energetic Materials, 2007, 15(5): 474 −477

Several explosive crystals were sliced into pieces and their section images were obtained from SEM. The corresponding microstructure information were employed in the explanation of crystals growth pattern and crystallinity etc.

Pore Structure of RDX/RF Nanostructured Composite Energetic Materials

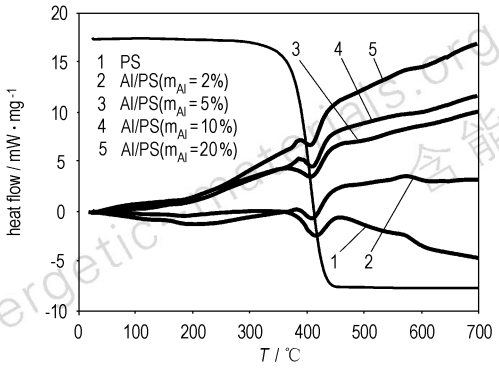


GUO Qiu-xia, NIE Fu-de, YANG Guang-cheng, LI Jin-shan, CHU Shi-jin

Chinese Journal of Energetic Materials, 2007, 15(5): 478 −481

Hexahydro-1,3,5-trinitro-1,3,5-triazine/resorcinol-formaldehyde (RDX/RF) nanostructure composite energetic material was prepared, the pore structures of RF aerogel and RDX/RF were characterized.

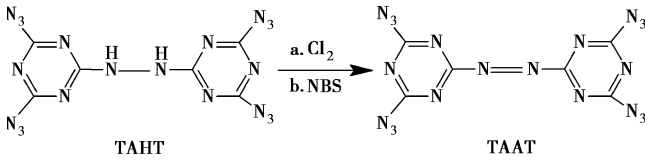
Content and Activity Analysis of Aluminum Powder in Nano-aluminum/PS Microcapsules



ZHANG Kai, FAN Jing-hui, HUANG Yu-hong, TAN Yun
Chinese Journal of Energetic Materials, 2007, 15(5): 482 – 484

Nano-aluminum/polystyrene (PS) microcapsules with different aluminum content were prepared, At the same time, nano-aluminium powder reacted with oxygen and released a large quantity of heat. With the amount of aluminium powder increased, the heat increased.

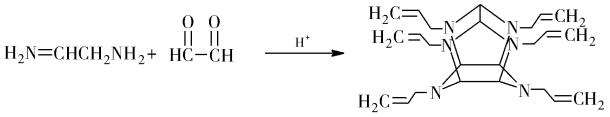
Synthesis of High-Nitrogen Compound of 4, 4′, 6, 6′-Tetra(azido)azo-1,3,5-triazine



LI Xiao-tong, PANG Si-ping, YU Yong-zhong, LUO Yun-jun
Chinese Journal of Energetic Materials, 2007, 15(5): 485 – 489

4,4′,6,6′-Tetra(azido)azo-1,3,5-triazine (TAAT) was synthesized and characterized by DSC, IR, NMR and elemental analysis. Each reaction process, especially the oxide reaction is described in details.

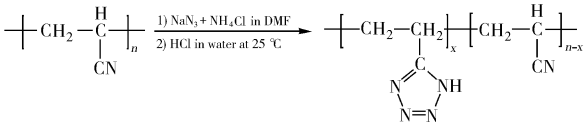
Synthesis of Hexaallylhexaazaisowurtzitane



LI Xin-le, SUN Cheng-hui, ZHAO Xin-qi, SONG Jian-wei
Chinese Journal of Energetic Materials, 2007, 15(5): 490 – 491

Hexaallylhexaazaisowurtzitane was synthesized by condensation reaction of allylamine with aqueous glyoxal as an easier way.

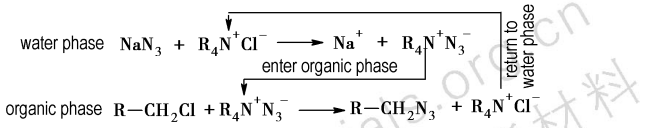
Synthesis and Properties of Poly(5-vinyltetrazole)



HA Heng-xin, CAO Yi-lin, SUN Zhong-xiang
Chinese Journal of Energetic Materials, 2007, 15(5): 492 – 495

Poly(5-vinyltetrazole) (PVT) was synthesized through the tetrazole-cyclization reaction of polyacrylonitrile with sodium azide and ammonium chloride. The structure of PVT were identified by NMR, IR and element analysis, its properties were studied by XRD, DSC-TG and sensitivity testing.

Aplication of Phase-transfer Catalysts in the Synthesis of GAP

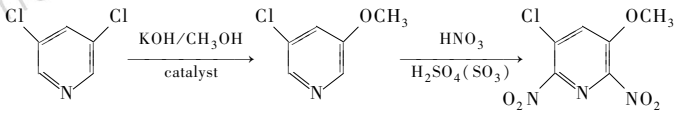


CAO Yi-lin, WEI wei, JIN Hai-bo, DENG Qi-ling

Chinese Journal of Energetic Materials, 2007, 15(5): 496 −499

With trimethyl, 4-dodecylbenezyl ammonium chloride and 18-crown-6 as phase-transfer catalysts, GAP binder were synthesized by azidation of PECH in PEG or H_2O. The mechanism of phase-transfer catalyze azidation of PECH were studied.

Synthesis of 3-Methoxy-5-chloro-2,6-dinitropyridine



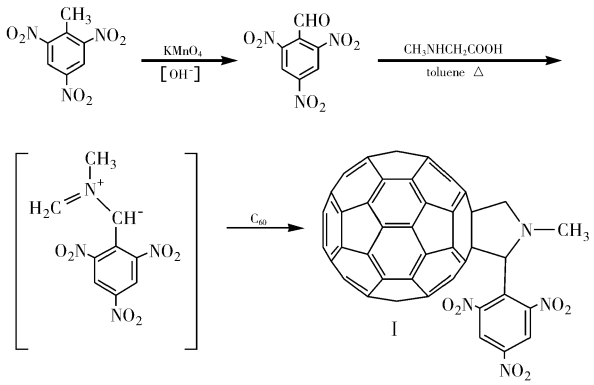
Ⅰ Ⅱ Ⅲ

CHEN Jun, LI Quan-liang, WANG Jian-long

Chinese Journal of Energetic Materials, 2007, 15(5): 500 −501

3-methoxy-5-chloro-2,6-dinitropyridine(Ⅲ) was synthesized from 3,5-dichloropyridine by substitution and nitration.

Synthesis and Thermal Properties of *N*-Methyl-2-(2,4,6-trinitrophenyl) Fullerenopyrrolidine

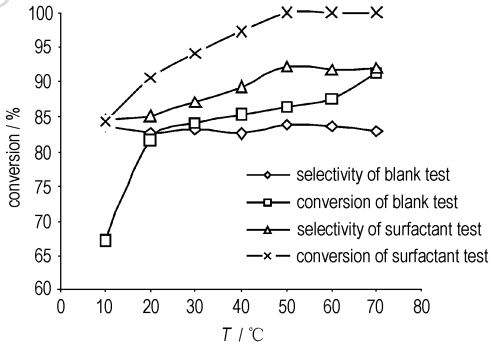


PENG Ru-fang, JIN Bo, HU Xiao, SHU Yuan-jie, CHU Shi-jin

Chinese Journal of Energetic Materials, 2007, 15(5): 502 −504

N-methyl-(2,4,6-trinitrophenyl) fullerenopyrrolidine (MTNPF) was synthesized with fullerene, sarcosine, and 2,4,6-trinitrobenzaldehyde as primary substances, and the thermal stability of MTNPF was studied by TG-DSC.

Surfactant-Catalyzed *m*-xylene Nitration

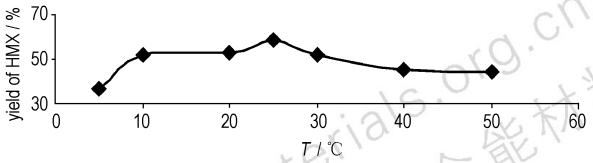


SONG Yan-min, LU Ming

Chinese Journal of Energetic Materials, 2007, 15(5): 505 −508

Surfactant improves the selectivity and the conversion of the nitration of *m*-xylene. Under optimized reaction conditions, high ratio (92.2 : 7.8) of 2,4-dimethylnitrobenzene to 2,6-dimethylnitrobenzene could be obtained with 100% conversion.

Synthesis Craft of HMX from 1,5-Methylene-3,7-dintrio-1,3,5,7-tetraazacyclooctane

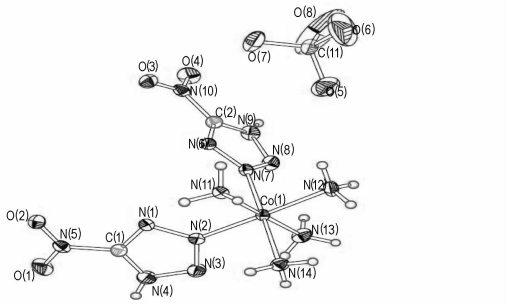


LI Quan-liang, CHEN Jun, WANG Jian-long

Chinese Journal of Energetic Materials, 2007, 15(5): 509 – 510

The factors such as temperature, MgO and NH_4NO_3 affecting the yield of HMX was studied in the process of nitrifying DPT, and the optimal craft was obtained.

Crystal Structure of Initiating Explosive BNCP



SHENG Di-lun, MA Feng-e, ZHANG Yu-feng, ZHU Ya-hong, CHEN Li-kui, YANG Bin

Chinese Journal of Energetic Materials, 2007, 15(5): 511 – 514

The single crystal of tetraamminebis(5-nitrotetrazolato) cobalt (Ⅲ) perchlorate (BNCP) was prepared and characterized. Its crystal structure was determined by a X-ray single crystal diffractometer.

Study on Thermal Decomposition Kinetics of Hexanitrohexaazaisowurtzitane by Gasometric Method

HE Shao-rong, ZHANG Lin-jun, HENG Shu-yun, LIU Zi-ru, SHI Zhen-hao

Chinese Journal of Energetic Materials, 2007, 15(5): 515 – 518

The thermal decomposition process of hexanitrohexaazaisowurtzitane (HNIW, CL-20) under the conditions of vacuum was investigated by a new gasometric instrument for testing material thermal stability – LAWA.

The Hydrous Enthalpy of NTO^-

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

Chinese Journal of Energetic Materials, 2007, 15(5): 519 – 520

$$\Delta_h H_m^\theta(NTO^-) = [\Delta_h H_m^\theta(M^{n+} + NTO^-) - \Delta_h H_m^\theta(M^{n+})]/n$$

The method of estimating hydrous enthalpy of NTO^- was presented.

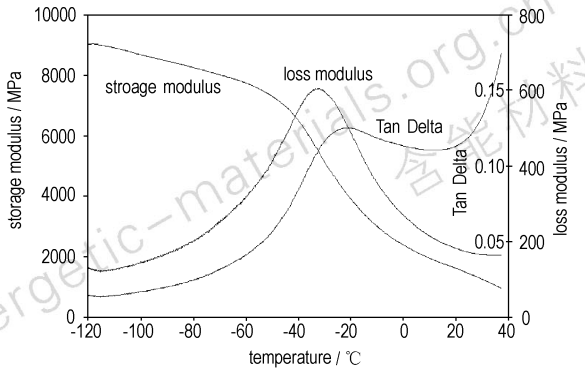
Thermochemistry and Thermodynamics of Solution of Styphnic Acid in DMF at 298.15 K

CAO Yun-ling, YANG Li, ZHANG Tong-lai, ZHANG Jian-guo

Chinese Journal of Energetic Materials, 2007, 15(5): 521 – 523

The enthalpies of solution for 2,4,6-trinitroresorcinol (TNR) in DMF at 298.15 K was measured by using a SETARAM C80 Ⅱ calorimeter, The empirical formula of enthalpies of solution ($\Delta_{sol}H$) was simulated to be $\Delta_{sol}H = -14.392 - 988.6b + 34.992b^{1/2}$.

Deformation Analysis of Free Loading Propellant in Storage



YU Yang, FAN Hong-yu, WANG Ning-fei, ZHANG Ping

Chinese Journal of Energetic Materials, 2007, 15(5): 524 – 529

Three-dimentional viscoelastic large deformation incremental constitutive equation was derived based on Total Lagrangian method. Combined with material property testing of CMDB by DMA, deformation, equivalent von mises stress and strain of free loading propellant in storage were analyzed.

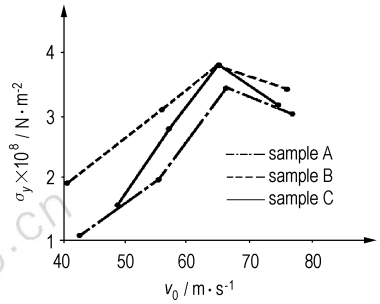
X-Ray Fluorescence Spectroscopic Analysis of Recovered Propellants after Interrupted-Burning Ignited by Plasma

XIAO Zheng-gang, YING San-jiu, XU Fu-ming, HOU Bao-guo

Chinese Journal of Energetic Materials, 2007, 15(5): 530 – 533

Cu is deposited on the grain surfaces of extinguished TEGN 19/19 propellants after plasma ignition, compared with conventional ignition. The relative intensity of Cu increased to about 20% of Pb contents in propellant composition.

Mechanical Properties of Single Base Propellant Under Strong Dynamic Load

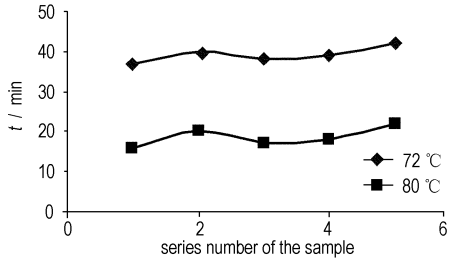


HUANG Qiang, GUO Dong-qiao, BIAN Guang-rong, GENG Guang-long

Chinese Journal of Energetic Materials, 2007, 15(5): 534 – 536

The striking of single base propellant (SBP) grain on bullet bottom at high speed was simulated by experiment. The DYS of SBP was calcuated by using Talor theory.

Abel Stability Test of Mixed Nitric Ester at Different Temperatures



FAN Juan, HUANG Ying, JIA Xiao-feng

Chinese Journal of Energetic Materials, 2007, 15(5): 537 – 539

The influence of temperature on the Abel stability test result were studied using the mixed nitric ester of nitroglycerine and the relevant energetic binder as samples.

Initial Flow Ability of Smoke Cloud Forming

ZHU Chen-guang, PAN Gong-pei, GUAN Hua, CHEN Xin
Chinese Journal of Energetic Materials, 2007, 15(5): 540 -543

Based on the differential equations of the Plandtl boundary layer, flow model of the boundary layer and formation model of smoke cloud by blasting were established. The flow smoke cloud is mainly turbulent, and expanding velocity of the smoke cloud is attenuated by air drag.

Output of Electric Detonator Charged with HNIW

XIE Rui-zhen, CHEN Zhen, JIN Zhen-shu, LU Bin
Chinese Journal of Energetic Materials, 2007, 15(5): 544 -546

The output of electric detonator charged with hexanitrohexaazaisowurtzane (HNIW) was measured on the basis of GJB5309.1 ~ 38.

Dynamic Metering Technique of Pulverized Explosive

HAN Min-yuan, JIA Xin-juan
Chinese Journal of Energetic Materials, 2007, 15(5): 547 -550

The application of dynamic metering technique of pulverized materials in propellant and explosive production process is introduced, and the basic composition of system and working principles are illustrated.

Overview on Theoretical Prediction of 3, 6-Bis-(3, 5-dinitro-1, 2, 4-triazolyl)-1, 2, 4, 5-tetrazine as a High Performance Explosive

Mohammad Hossein Keshavarz
Chinese Journal of Energetic Materials, 2007, 15(5): 551 -554

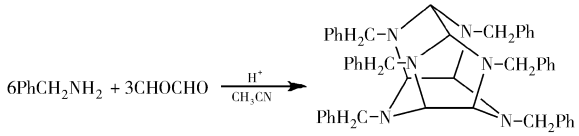
The properties of 3, 6-bis-(3, 5-dinitro-1, 2, 4-triazolyl)-1, 2, 4, 5-triazine (BDTT) was reviewed. It was a novel energetic heterocyclic compound, but it has not been synthesized yet.

Progress in Materials and Processing Technology of Powder Liners

WANG Yi, JIANG Wei, LIU Hong-ying, CHEN Wei-fan, AN Chong-wei, SONG Xiao-lan, LI Feng-sheng
Chinese Journal of Energetic Materials, 2007, 15(5): 555 -559

Investigation of materials and processing technology of powde liners have become a focus in the field of international impact engineering. The effects of metal materials such as W, Co, Ni, Bi, Ta, etc on the density, molding, energy, and penetration performance of Cu powder liners are emphatically discussed.

One-pot Synthesis of Hexabenzylhexaazaisowurtzitane (HBIW)



WANG Hong-ping, SUN Cheng-hui, SONG Jian-wei, ZHAO Xin-qi
Chinese Journal of Energetic Materials, 2007, 15(5): 560

HBIW, the starting material for preparing CL-20, can be synthesized by using 95% DMF aqueous as reaction solvent instead of acetonitrile or ethanol. The precipitated crude from the reaction medium could not be separated and was recrystallized by heating the reaction mixture till dissolving and then cooling in situ. The HBIW obtained by the one-pot technology is qualified for the next-step hydrogenolysis.

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