

Technical Specification Summary

Product Identification:	Black Powder
Chemical Name:	N/A
CAS Number:	N/A
Chemical Formula:	Mixture of potassium nitrate (or sodium nitrate) and charcoal and sulfur
Molecular Weight:	84
Crystal Density:	varies
Bulk Density:	varies
Minimum Shelf Life:	Indefinite (does not decompose)
Melting Point:	273°C (523.4°F)
Purity:	N/A
Typical Particle Size:	Ranges from #4 mesh - #200 mesh
Volume of Gas per Gram of Compound:	271 cc/g
Heat of Combustion:	1425 cal/g
Heat of Explosion:	684 cal/g
Heat of Formation:	N/A
Lead Block Test:	N/A
Impact Test:	32 cm (USBM apparatus)
Temperature of Explosion:	350°C - 427°C (622°F - 801°F)
Ignition Temperature:	200°C - 464°C (392° - 867°F)
Detonation Pressure:	Varies with degree of confinement
Detonation Velocity:	400 m/s @ 1.6 g/cc
Total Energy of Explosion:	Varies with degree of confinement
Friction Sensitivity:	Steel shoe – snaps, fiber shoe – unaffected
Temperature Stability:	Stable
Electrostatic Discharge:	0.8J (confined), > 12.5J (unconfined)
Initiation Sensitivity:	Sensitive to flame, spark, impact, or friction

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Technical Specification Summary

Product Identification:	BRX
Chemical Name:	1,3,5, -Trinitro-2,4,6-Tripicrylbenzene
CAS Number:	
Chemical Formula:	
Molecular Weight:	846.37
Crystal Density:	1.76 g/cc
Bulk Density:	0.5 g/cc
Minimum Shelf Life:	
Melting Point:	~400°C (752°F)
Purity:	99%
Typical Particle Size:	
Volume of Gas per Gram of Compound:	
Heat of Combustion:	
Heat of Explosion:	
Heat of Formation:	
Lead Block Test:	
Impact Test:	88.8 ± 23.4 cm (ERL machine, Type 12 tooling, 2.5 kg wt) 25 cm (USBM Apparatus, 2 kg wt)
Temperature of Explosion:	
Ignition Temperature:	
Detonation Pressure:	250 Kbars
Detonation Velocity:	7500 m/s
Total Energy of Explosion:	
Friction Sensitivity:	1270 ± 120 N (ABL-type apparatus)
Temperature Stability:	260.0°C (500°F) for 1 hour
Electrostatic Discharge:	0.90 ± 0.13 J (approx., according to MIL-STD-1751)
Initiation Sensitivity:	

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Technical Specification Summary

Product Identification:	CP
Chemical Name:	(2-(5-cyanotetrazolato)pentaamine-cobalt(III) perchlorate
CAS Number:	
Chemical Formula:	$\text{COC}_2\text{H}_{15}\text{N}_{10}\text{Cl}_2\text{O}_8$
Molecular Weight:	268.041
Crystal Density:	1.97 g/cc
Bulk Density:	0.94 g/cc
Minimum Shelf Life:	5 years
Melting Point:	n/a
Purity:	98%, remainder is oxide complex
Typical Particle Size:	15 μ
Volume of Gas per Gram of Compound:	0.718 l/g
Heat of Combustion:	
Heat of Explosion:	971 cal/g
Heat of Formation:	-126 Kcal/mole
Lead Block Test:	n/a
Impact Test:	55 - 70 cm (10% level, 20 lots, 2 kg wt)
Temperature of Explosion:	
Ignition Temperature:	290°C (554°F) – DSC test
Detonation Pressure:	150 Kbars @ 1.5 g/cc, 170 Kbars @ 1.65 g/cc
Detonation Velocity:	7460 m/sec (14,632 ft/sec) @ 1.65 g/cc
Total Energy of Explosion:	323,650 ft-lbs/lb
Friction Sensitivity:	\geq 1000 g on Julius Peterson BAM Tester
Temperature Stability:	171°C (340°F) for 200 hours
Loading Tolerance:	\pm 1% up to 250 mg
Initiation Sensitivity:	Hot wire ignition sensitive (will DDT)

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Technical Specification Summary

Product Identification:	CLCP
Chemical Name:	(2-(5-chlorotetrazolato)pentaamine-cobalt(III) perchlorate
CAS Number:	
Chemical Formula:	COCH ₁₅ N ₉ Cl ₃ O ₈
Molecular Weight:	446.481
Crystal Density:	1.97 g/cc
Bulk Density:	0.94 g/cc
Minimum Shelf Life:	5 years
Melting Point:	n/a
Purity:	99%
Typical Particle Size:	15 μ - 100μ
Volume of Gas per Gram of Compound:	0.703 l/g
Heat of Combustion:	(Not easily determined)
Heat of Explosion:	971 cal/g (estimate)
Heat of Formation:	-130 Kcal/mole (estimate)
Lead Block Test:	n/a
Impact Test:	55 - 70 cm (10% level, 20 lots, 2 kg wt)
Temperature of Explosion:	
Ignition Temperature:	290°C (554°F) – DSC test
Detonation Pressure:	150 Kbars @ 1.5 g/cc, 170 Kbars @ 1.65 g/cc (estimate)
Detonation Velocity:	7460 m/sec (14,632 ft/sec) @ 1.65 g/cc (estimate)
Total Energy of Explosion:	Not applicable
Friction Sensitivity:	≥ 1000 g on Julius Peterson BAM Tester
Temperature Stability:	171°C (340°F) for 200 hours
Loading Tolerance:	± 1% up to 250 mg
Initiation Sensitivity:	Hot wire ignition sensitive (will DDT)

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Technical Specification Summary

Product Identification:	HMX
Chemical Name:	Cyclo-1,3,5,7-tetramethylene-2,4,6,8-tetranitramine
CAS Number:	002691-41-0
Chemical Formula:	C ₄ H ₈ N ₈ O ₈
Molecular Weight:	296
Crystal Density:	1.90 g/cc
Bulk Density:	1.0 g/cc
Minimum Shelf Life:	5 years (in assembled devices)
Melting Point:	280°C (536°F)
Purity:	99%
Typical Particle Size:	-100 mesh, US sieve size
Volume of Gas per Gram of Compound:	0.927 l/g
Heat of Combustion:	2362 cal/g
Heat of Explosion:	1356 cal/g
Heat of Formation:	60.5 cal/g
Lead Block Test:	480 cc/10g
Impact Test:	2 kg wt (USBM) – 32 cm (12.6 in)
Temperature of Explosion:	3120°C (5648°F)
Ignition Temperature:	287°C (549°F)
Detonation Pressure:	394 kBars (5,791,800 psi)
Detonation Velocity:	9100 m/sec (29,855 ft/sec) @ 1.89 g/cc
Total Energy of Explosion:	478,000 ft-lbs/lb
Friction Sensitivity:	12 kP (120 N pistil load)
Temperature Stability:	100 hours @ 154°C (309°F)
Electrostatic Discharge:	
Initiation Sensitivity:	No. 6 blasting cap minimum

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Technical Specification Summary

Product Identification:	HNS
Chemical Name:	Hexanitrostilbene
CAS Number:	20062-22-0
Chemical Formula:	C ₁₄ H ₆ N ₆ O ₁₂
Molecular Weight:	450.1
Crystal Density:	1.74 g/cc
Bulk Density:	0.7 g/cc
Minimum Shelf Life:	10 years
Melting Point:	319°C (606.2°F)
Purity:	> 99%
Typical Particle Size:	200 - 500 µ
Volume of Gas per Gram of Compound:	700 cc/g
Heat of Combustion:	-1540.3 Kcal/mole
Heat of Explosion:	1050 Kcal/mole
Heat of Formation:	18.7 Kcal/mole
Lead Block Test:	
Impact Test:	61 cm (BOM machine)
Temperature of Explosion:	
Ignition Temperature:	
Detonation Pressure:	190 Kbars
Detonation Velocity:	7000 m/s
Total Energy of Explosion:	
Friction Sensitivity:	
Temperature Stability:	260°C (500°F) for 1 hour
Electrostatic Discharge:	
Initiation Sensitivity:	

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Technical Specification Summary

Product Identification:	NONA
Chemical Name:	2,2',2''-4,4',4''-6,6',6''-Nonanitroterphenyl
CAS Number:	
Chemical Formula:	C ₁₈ H ₅ N ₉ O ₁₈
Molecular Weight:	635.287
Crystal Density:	1.78 g/cc
Bulk Density:	~ 0.8 g/cc
Minimum Shelf Life:	5 years
Melting Point:	~ 400°C (752°F)
Purity:	99% min by HPLC
Typical Particle Size:	17.4μ (average)
Volume of Gas per Gram of Compound:	800 cc/g
Heat of Combustion:	-1891 Kcal/mole
Heat of Explosion:	839 cal/g
Heat of Formation:	31.6 Kcal/mole
Lead Block Test:	
Impact Test:	25 cm on BOM impact machine
Temperature of Explosion:	
Ignition Temperature:	~ 400°C (752°F)
Detonation Pressure:	7.57 km • sec ⁻¹
Detonation Velocity:	
Total Energy of Explosion:	
Friction Sensitivity:	
Temperature Stability:	260°C/100 hrs (500°F/100 hrs)
Electrostatic Discharge:	
Initiation Sensitivity:	

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Technical Specification Summary

Product Identification:	PYX
Chemical Name:	2,6-Bis(Picrylamino)-3,5-dinitropyridine
CAS Number:	38082-89-2
Chemical Formula:	C ₁₇ H ₇ N ₁₁ O ₁₆
Molecular Weight:	621.3
Crystal Density:	1.77 g/cc
Bulk Density:	0.6 g/cc
Minimum Shelf Life:	5 years (in assembled devices)
Melting Point:	360°C (680°F)
Purity:	99%
Typical Particle Size:	-100 mesh (US sieve size)
Volume of Gas per Gram of Compound:	0.710 l/g
Heat of Combustion:	2312 cal/g
Heat of Explosion:	1299 cal/g
Heat of Formation:	26.7 cal/g
Lead Block Test:	N/A
Impact Test:	2.5 kg wt (type 12 tool) – 64 cm (25.2 in)
Temperature of Explosion:	2144°C (3891.2°F)
Ignition Temperature:	485°C (905°F)
Detonation Pressure:	245 Kbars
Detonation Velocity:	7200 m/sec @ 1.68 g/cc
Total Energy of Explosion:	344,793 ft-lbs/lb
Friction Sensitivity:	Negative @ all angles
Temperature Stability:	100 hrs @ 262°C (503.6°F)
Electrostatic Discharge:	
Initiation Sensitivity:	No. 8 blasting cap (min)

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Technical Specification Summary

Product Identification:	RDX
Chemical Name:	Cyclo-1,3,5-trimethylene-2,4,6-trinitramine
CAS Number:	000121-82-4
Chemical Formula:	C ₃ H ₆ N ₆ O ₆
Molecular Weight:	222.1
Crystal Density:	1.82 g/cc
Bulk Density:	0.95 g/cc
Minimum Shelf Life:	5 years (in assembled devices)
Melting Point:	204°C (400°F)
Purity:	98.7%
Typical Particle Size:	-100 mesh, US sieve size
Volume of Gas per Gram of Compound:	0.9 l/g
Heat of Combustion:	2285 cal/g
Heat of Explosion:	1280 cal/g
Heat of Formation:	66 cal/g
Lead Block Test:	480 cc/10g
Impact Test:	2 kg wt (USBM) – 32 cm (12.6 in)
Temperature of Explosion:	3093°C (5600°F)
Ignition Temperature:	218°C (424°F)
Detonation Pressure:	347 kBars (5,100,900 psi)
Detonation Velocity:	8700 m/sec (28,500 ft/sec) @ 1.76 g/cc
Total Energy of Explosion:	475,000 ft-lbs/lb
Friction Sensitivity:	12 kP (120 N pistil load)
Temperature Stability:	100 hours @ 116°C (239°F)
Electrostatic Discharge:	
Initiation Sensitivity:	No. 6 blasting cap minimum

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Technical Specification Summary

Product Identification:	Tacot
Chemical Name:	Tetradinitrodibenzo-1,3a,4,6a-tetraza-pentalene; tetranitrodibenzo-tetraza-pentalene
CAS Number:	
Chemical Formula:	C ₁₂ H ₄ N ₈ O ₈
Molecular Weight:	388.212
Crystal Density:	1.85 g/cc
Bulk Density:	
Minimum Shelf Life:	5 years
Melting Point:	378°C (712.4°F) (under decomposition)
Purity:	
Typical Particle Size:	
Volume of Gas per Gram of Compound:	1336 cc/g
Heat of Combustion:	3575 cal • g ⁻¹
Heat of Explosion:	980 cal • g ⁻¹
Heat of Formation:	110.2 Kcal • mole ⁻¹
Lead Block Test:	
Impact Test:	7 kp m
Temperature of Explosion:	
Ignition Temperature:	
Detonation Pressure:	263 Kbar
Detonation Velocity:	7250 m/s
Total Energy of Explosion:	
Friction Sensitivity:	
Temperature Stability:	348.8°C (660°F)/10 min, 326.7°C (620°F)/4 hr, 282.2°C (540°F)/2 wk, 276.7°C (530°F)/4 wk
Electrostatic Discharge:	
Initiation Sensitivity:	Min. primer 0.40 grains PbN ₆

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