

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

RM Number: 8107
RM Name: Additives in Smokeless Powder
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Reference Material (RM) is intended to support analytical measurements of nitroglycerin, diphenylamine, *N*-nitroso-diphenylamine, and ethyl centralite, including qualitative additive identification and quantitative compositional measurements. RM 8107 is a smokeless powder of the type used as the propellant in small arms ammunition. A unit of RM 8107 consists of one bottle containing 5 g of smokeless powder.

Company Information

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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard: Explosives	Division 1.3
Health Hazard: Acute Toxicity, Oral	Category 4
Eye Damage/Irritation	Category 2A
Skin Sensitization	Category 1A
Reproductive Toxicity	Category 1B
STOT, Repeated Exposure	Category 2

Label Elements

Symbol



Signal Word

DANGER

Hazard Statement(s)

H203	Explosive; fire, blast or projection hazard.
H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H317	May cause an allergic skin reaction.
H360	May damage fertility or the unborn child.
H373	May cause damage to organs (circulatory system, blood, kidneys, liver) through prolonged or repeated exposure.

Precautionary Statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat, sparks, open flames, and hot surfaces. - No smoking.
P250	Do not subject to grinding, shock, or friction.
P264	Wash hands thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing must not be allowed out of the workplace.
P280	Wear protective gloves, protective clothing and eye protection.
P301+P312	If swallowed: Call a doctor if you feel unwell.
P330	Rinse mouth.
P302+P352	If on skin: Wash with plenty of water.
P362+P364	Wash contaminated clothing before reuse.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333+P337++P313	If skin or eye irritation persists: Get medical attention.
P308+P313	If exposed or concerned: Get medical attention.
P370+P380	In case of fire: evacuate area.
P372	Explosion risk in case of fire.
P373	Do NOT fight fire when fire reaches explosives.
P401	Store contents and container according to local regulations.
P405	Store locked up.
P501	Dispose of contents and container according to local regulations.

Hazards Not Otherwise Classified: Not applicable.

Ingredients(s) with Unknown Acute Toxicity: Not applicable.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Ball powder, propellant

Other Designations: Ball-type smokeless powder; powder, smokeless; smokeless propellant; WC; SPI; WCUNI; M38; M47.

Components are listed in compliance with OSHA's 29 CFR 1910.1200; for the actual values see the NIST Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Ball powder, propellant	129037-80-5	not applicable	100
<i>Individual Component(s)</i>			
Nitrocellulose	9004-70-0	not applicable	>50
Nitroglycerin	55-63-0	200-240-8	13
Dibutyl phthalate	84-74-2	201-557-4	0 to 10
Polyester adipate	not applicable	not applicable	0 to 10
Ethyl centralite (diethyldiphenylurea)	85-98-3	201-645-2	4
Rosin	8050-09-7	not applicable	0 to 5
Akardite II	13114-72-2	236-039-7	0 to 3
Potassium nitrate	7757-79-1	231-818-8	0 to 3
Potassium sulfate	7778-80-5	231-915-5	0 to 2
Ethyl acetate	141-78-6	205-500-4	0 to 1.5
Diphenylamine	122-39-4	204-539-4	0.8
N-Nitrosodiphenylamine	86-30-6	201-663-0	0.3
Tin dioxide	18282-10-5	242-159-0	0 to 1.5
Calcium carbonate	1317-65-3	215-279-6	0 to 1
Graphite	7782-42-5	231-955-3	0 to 1

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing, or oxygen by qualified personnel. Get immediate medical attention.

Skin Contact: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing before reuse.

Eye Contact: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion: If a large amount is swallowed, get medical attention.

Most Important Symptoms/Effects, Acute and Delayed: Eye irritation and skin sensitization.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Severe fire and explosion hazard. This material is considered a Class B explosive under OSHA 1910.109(a)(3)(ii) and 1.3C under US DOT 49 CFR 173.51. Avoid sparks, flame, heat, friction or impact. Dust/air mixtures may ignite or explode. May explode if exposed to shock, friction or heating. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media:

Suitable: Flood with a large volume of water.

Unsuitable: Do not use water jet as an extinguisher, as this may spread fire.

Specific Hazards Arising from the Chemical: Toxic vapors/gases may be formed during a fire and miscellaneous decomposition products.

Special Protective Equipment and Precautions for Fire-Fighters: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 2

Fire = 4

Reactivity = 4

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Immediately contact emergency personnel. Keep unnecessary personnel away. Eliminate all ignition sources. Wear appropriate protective equipment and non-flammable or flame retardant clothing during clean-up. Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

Methods and Materials for Containment and Clean up: Avoid generating dust. Do not touch spilled material. Notify safety personnel of spills. Collect spilled material in appropriate container for disposal. Isolate hazard area and deny entry.

7. HANDLING AND STORAGE

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances (see Section 10, "Stability and Reactivity").

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits ^(a)			
Components	OSHA (PEL)	ACGIH (TLV)	NIOSH (REL)
Ball powder, propellant	NOEL	NOEL	NOEL
<i>Individual components of ball powder, propellant in RM 8107 with occupational exposure limits.</i>			
Nitroglycerin	Ceiling: 0.2 ppm (2 mg/m ³) Prevent or reduce skin absorption.	TWA: 0.05 ppm Skin potential significant contribution to overall exposure by the cutaneous route.	TWA: 0.1 mg/m ³ Potential for dermal absorption. IDLH: 75 mg/m ³
Dibutyl phthalate	TWA: 5 mg/m ³	TWA: 5 mg/m ³	TWA: 5 mg/m ³ IDLH: 4000 mg/m ³
Ethyl acetate	TWA: 400 ppm (1400 mg/m ³)	TWA: 400 ppm	TWA: 400 ppm (1400 mg/m ³) IDLH: 2000 ppm [10 % LEL]
Diphenylamine	NOEL	TWA: 10 mg/m ³	TWA 10 mg/m ³
Tin dioxide	NOEL	TWA: 2 mg/m ³ as Sn (related to Tin oxide)	TWA: 2 mg/m ³ as Sn
Calcium carbonate	TWA: 15 mg/m ³ (total) TWA: 5 mg/m ³ (resp)	NOEL	TWA: 10 mg/m ³ (total) TWA: 5 mg/m ³ (resp)
Graphite	TWA: 15 mg/m ³ (synthetic) total dust TWA: 5 mg/m ³ (synthetic) respirable fraction TWA: 15 mppcf (natural)	TWA: 2 mg/m ³ (all forms except graphite fibers) respirable fraction	TWA: 2.5 mg/m ³ (natural) respirable dust IDLH: 1250 mg/m ³

^(a) NOEL: No occupational exposure limits established.

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye/Face Protection: Wear splash resistant safety goggles with a face shield. An eyewash station should be readily available near areas of use.

Skin and Body Protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical-resistant gloves should be worn at all times when handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Descriptive Properties	Ball powder, propellant
Appearance (physical state, color, etc.)	granular grey to black colored powder
Molecular Formula	varies
Molar Mass (g/mol)	varies
Odor	odorless
Odor threshold (mg/m ³)	not available
pH	not available
Evaporation rate	not available
Melting point/freezing point	not available
Relative Density	bulk density, 0.5 g/mL to 1 g/mL
Vapor Pressure	<1 mmHg
Vapor Density (air = 1)	not available
Viscosity	not available
Solubility(ies)	negligible
Partition coefficient (n-octanol/water)	not available
Thermal Stability Properties	
Autoignition Temperature	190 °C to 200 °C (374 °F to 392 °F)
Thermal Decomposition	above 50 °C (122 °F)
Initial boiling point and boiling range	not available
Explosive Limits, LEL (Volume %)	not available
Explosive Limits, UEL (Volume %)	not available
Flash Point	not available
Flammability (solid, gas)	not available

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: ☒ Stable ☐ Unstable

Possible Hazardous Reactions: Hazardous polymerization does not occur.

Conditions to Avoid: Avoid contact with incompatible materials. Direct sunlight, artificial ultraviolet light, flame, and heat.

Incompatible Materials: Strong acids, alkalis, oxidizers, and amines.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition will produce carbon monoxide, carbon dioxide, and oxides of nitrogen. Decomposition becomes measurable above 50 °C (122 °F)

Hazardous Polymerization: ☐ Will Occur ☒ Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: ☒ Inhalation ☒ Skin ☒ Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Eye irritation, skin sensitization, and toxic if inhaled.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Dust may irritate respiratory system.

Skin Contact: Skin contact may result in irritation.

Eye Contact: May causes eye irritation.

Ingestion: Irritation to the gastrointestinal tract. The nitroglycerin contained in this material may cause severe headache, drop in blood pressure, mental confusion, nausea, and vomiting.

Numerical Measures of Toxicity

Acute Toxicity: Category 4, Oral

Components	Acute Toxicity
Ball powder	Rat, Oral LD50: >5 g/kg Rabbit, Dermal LD50: >2 g/kg
<i>Individual components of ball powder, propellant in RM 8107 with acute toxicity information available are listed.</i>	
Nitrocellulose	Rat, Oral LD50: >5 g/kg
Nitroglycerin	Rat, Oral LD50: 150 mg/kg Rabbit, Dermal LD50: >280 mg/kg <i>Category 2, Inhalation: Mixture is not classified based on nitroglycerin's low vapor pressure. Explosive; fire, blast will result if excessive heat is applied.</i>
Dibutyl phthalate	Rat, Inhalation LC50: 4250 mg/m ³ Rat, Oral LD50: 7499 mg/kg Rabbit, Dermal LD50: >20 mL/kg
Ethyl centralite	Rat, Oral LD50: 2750 mg/kg
Rosin	Rat, Inhalation LC50: 110 mg/m ³ Rat, Oral LD50: 7600 mg/kg
Potassium nitrate	Rat, Oral LD50: 3015 mg/kg
Potassium sulfate	Rat, Oral LD50: 6600 mg/kg
N-Nitrosodiphenylamine	Rat, Oral LD50: 1825 mg/kg Oral Rabbit, Dermal LD50: >7940 mg/kg
Ethyl acetate	Rat, Inhalation LC50: >6000 ppm (6h); 200 gm/m ³ ; 1600 ppm (8 h) Rat, Oral LD50: 5620 mg/kg Rabbit, Dermal LD50: >20 mL/kg
Diphenylamine	Rat, Oral LD50: 1120 mg/kg Rabbit, Dermal LD50: >5000 mg/kg
Tin dioxide	Rat, Oral LD50: 700 mg/kg

Skin Corrosion/Irritation: Not classified.

Nitroglycerin: Rabbit Eyes: 0.1 mL

Serious Eye Damage/Irritation: Category 2A

Nitroglycerin: Rabbit Skin: 500 mg (24 h) mild; 0.5 mL (mild)

Respiratory Sensitization: Not classified; no data available.

Skin Sensitization: Category 1A.

Germ Cell Mutagenicity: Not classified; no data available.

Carcinogenicity: Not classified.

Listed as a Carcinogen/Potential Carcinogen _____ Yes _____ ☒ No

Ball powder is not listed by NTP, IARC or OSHA as carcinogen/potential carcinogen.

Reproductive Toxicity: Category 1B, may damage fertility or the unborn child.

Specific Target Organ Toxicity, Single Exposure: Not classified; no data available.

Specific Target Organ Toxicity, Repeated Exposure: Category 2; may cause damage to the circulatory system, blood, kidneys and liver through prolonged or repeated exposure.

Aspiration Hazard: No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: Individual components with ecotoxicity data are listed.

Components	Ecotoxicity Data
Nitroglycerin	Fish: Bluegill (<i>Lepomis macrochirus</i>) LC50 [static]: 1.28 mg/L (96 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50 [static]: 46 mg/L to 55 mg/L (48 h)
Dibutyl phthalate	Fish: Fathead minnow (<i>Pimephales promelas</i>) LC50 [flowthrough]: 0.71 mg/L to 1.2 mg/L (96 h) Algae: Pond scum (<i>Desmodesmus subspicatus</i>) EC50: 1.2 mg/L (72 h)
Ethyl centralite	Fish: Rainbow trout (<i>Oncorhynchus mykiss</i>) LC50 [semi-static]: 5.8 mg/L (96 h) Algae: <i>Pseudokirchneriella subcapitata</i> EC50: >433 mg/L (96 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50: 5.46 mg/L to 9.83 mg/L (48 h)
Rosin	Algae: Pond scum (<i>Desmodesmus subspicatus</i>) EC50: 400 mg/L (72 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50: 3.8 mg/L to 5.4 mg/L (48 h)
Ethyl acetate	Fish: Fathead minnow (<i>Pimephales promelas</i>) LC50 [flowthrough]: 220 mg/L to 250 mg/L (96 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50: 560 mg/L [static] (48 h)
Potassium sulfate	Fish: Bluegill (<i>Lepomis macrochirus</i>) LC50: 653 mg/L (95 h) Algae: Pond scum (<i>Desmodesmus subspicatus</i>) EC50: 2900 mg/L (72 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50: 890 mg/L (48 h)
Diphenylamine	Fish: Fathead minnow (<i>Pimephales promelas</i>) LC50 [flowthrough]: 3.47 mg/L to 4.14 mg/L (96 h) Algae: <i>Scenedesmus subspicatus</i> EC50: 1.5 mg/L (72 h) Invertebrate: Water flea (<i>Daphnia magna</i>) EC50: 1.69 mg/L to 2.46 mg/L (48 h)

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of waste in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: NA3178, Smokeless powder for small arms (100 lbs or less), Hazard Class 4.1, Packing Group I (domestic shipments only). This material is forbidden by Air.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4): Nitroglycerin: 10 lbs (4.54 kg) final RQ.

Dibutyl phthalate: (10 lbs); N-Nitrosodiphenylamine: (100 lbs); Ethyl acetate: (5000 lbs)

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): 1 % de minimis concentration for nitroglycerin, dibutyl phthalate, and diphenyl amine.

OSHA Process Safety (29 CFR 1910.119): Nitrocellulose: 25 lbs TQ (concentration >12.6 % nitrogen).

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH: Yes

CHRONIC HEALTH: Yes

FIRE: Yes

REACTIVE: Yes

PRESSURE: No

State Regulations: Not listed under California Proposition 65.

U.S. TSCA Inventory: Nitrocellulose, nitroglycerin, dibutyl phthalate, ethyl centralite, rosin, Akardite II, potassium nitrate, potassium sulfate, ethyl acetate, diphenylamine, n-nitrosodiphenylamine, tin dioxide, calcium carbonate, and graphite are listed.

TSCA 12(b), Export Notification: Not listed.

Canadian Regulations: WHMIS Information is not provided for this material.

16. OTHER INFORMATION

Issue Date: 19 August 2015

Sources: ChemAdvisor, Inc., SDS *Ethyl Centralite*, 20 March 2015.
ChemAdvisor, Inc., SDS *Nitrocellulose, Dry*, 20 March 2015.
ChemAdvisor, Inc., SDS *Nitroglycerin*, 20 March 2015.
ChemAdvisor, Inc., SDS *Dibutyl Phthalate*, 20 March 2015.
ChemAdvisor, Inc., SDS *Ethyl Centralite*, 20 March 2015.
ChemAdvisor, Inc., SDS *Rosin*, 20 March 2015.
ChemAdvisor, Inc., SDS *Potassium Nitrate*, 20 March 2015.
ChemAdvisor, Inc., SDS *Potassium Sulfate*, 20 March 2015.
ChemAdvisor, Inc., SDS *Ethyl Acetate*, 20 March 2015.
ChemAdvisor, Inc., SDS *Diphenylamine*, 20 March 2015.
ChemAdvisor, Inc., SDS *N-Nitrosodiphenylamine*, 20 March 2015.
ChemAdvisor, Inc., SDS *Tin Dioxide*, 20 March 2015.
ChemAdvisor, Inc., SDS *Calcium Carbonate*, 20 March 2015.
ChemAdvisor, Inc., SDS *Graphite*, 20 March 2015.
St. Marks Powder, Inc., Vendor SDS, *BALL POWDER® Propellant*, 06 June 2015.
ChemIDplus Advanced, National Library of Medicine's TOXNET system, *BALL Powder* CAS No. 129037-80-5; available at <http://chem.sis.nlm.nih.gov/chemidplus/> (accessed Aug 2015).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NRC	Nuclear Regulatory Commission
ALI	Annual Limit on Intake	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
EC50	Effective Concentration, 50 %	RM	Reference Material
EINECS	European Inventory of Existing Commercial Chemical Substances	RQ	Reportable Quantity
EPCRA	Emergency Planning and Community Right-to-Know Act	RTECS	Registry of Toxic Effects of Chemical Substances
IARC	International Agency for Research on Cancer	SARA	Superfund Amendments and Reauthorization Act
IATA	International Air Transportation Agency	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration, 50 %	STEL	Short Term Exposure Limit
LD50	Lethal Dose, 50 %	STOT	Specific Target Organ Toxicity
LEL	Lower Explosive Limit	TLm	Threshold Limit, median
MSDS	Material Safety Data Sheet	TLV	Threshold Limit Value
NFPA	National Fire Protection Association	TPQ	Threshold Planning Quantity
NIOSH	National Institute for Occupational Safety and Health	TSCA	Toxic Substances Control Act
NIST	National Institute of Standards and Technology	TWA	Time Weighted Average
n.o.s.	Not Otherwise Specified	UEL	Upper Explosive Limit
		WHMIS	Workplace Hazardous Materials Information System

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The values for this material are given in the NIST Report of Investigation.

Users of this RM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at <http://www.nist.gov/srm>.