

MATERIAL SAFETY DATA SHEET

Page 1 of 5

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION					
PRODUCT NAME: Estes Pro Series II Model Rocket Motors					
PRODUCT NUMBER:					
TRADE NAME: Estes Pro Series II Model Rocket Motors					
GENERAL USE: Model Rocket Propulsion					
CHEMICAL FAMILY: Insensitive Explosive (Class 1.4)					
PRODUCT DESCRIPTION: Plastic black cylinders with little odor.					
MANUFACTURED FOR: Estes-Cox Corp. d/b/a Estes Industries			DATE PREPARED: November 14, 2011		
ADDRESS (NUMBER, STREET, P.O. BOX) 1295 H Street, PO Box 227			SUPERSEDES: New Issue		
(CITY, STATE AND ZIP CODE) Penrose, CO 81240			TELEPHONE NUMBER FOR GENERAL INFORMATION 719-372-6666		
COUNTRY USA			CHEMTEL 24-HOUR EMERGENCY TELEPHONE NUMBER <div style="display: flex; justify-content: space-between;"> ChemTel 1-800-255-3924 01-313-248-0585 </div> <div style="display: flex; justify-content: space-between;"> North America Toll Free International </div>		
SECTION 2: HAZARDS IDENTIFICATION					
EMERGENCY OVERVIEW WARNING! THIS DEVICE CONTAINS A FAST BURNING CHARGE. KEEP AWAY FROM FIRE AND HEAT SOURCES. SEVERE MECHANICAL IMPACT MAY DEFORM PRODUCT. Individual cartridges may ignite if the unit is exposed to extreme heat as seen with fire conditions. Metal oxides and chlorides, oxides of nitrogen, carbon, and hydrogen chloride may be formed. Keep out of the reach of young children and pets. Adult supervision is strongly encouraged when product is used. Product contents are harmful by ingestion. Ignition of product when confined may lead to pressure rupture. Use only in the appropriate manner as directed by supplier.					
POTENTIAL HEALTH EFFECTS					
INHALATION: Normal handling of the unused product poses no exposure hazards. When the product is used, particles and vapors may be generated which may cause temporary slight irritation to the respiratory tract; this is a rare occurrence when the product is used as directed.					
SKIN: Unlikely to cause irritation to skin. Particles from ignited product may cause thermal burns.					
EYES: Unlikely to cause irritation to eyes; In unusual cases, particulates from used product may cause irritation.					
INGESTION: Ingestion of product is highly unlikely. Components of product are harmful and will cause irritation to gastro-intestinal tract					
CARCINOGENICITY: Hexavalent Chromium is present in trace amounts. (IARC Group I, California Proposition 65, NTP)					
SECTION 3: HAZARDOUS INGREDIENTS					
Hazardous Components	% (wt)	CAS #	EINECS #	EU Hazard Symbol(s)	EU RISK PHRASES (Full Text Sections 15 & 16)
Ammonium Perchlorate	NR	7780-98-9	232-235-1	E, O+	R2, R9
Aluminum Metal	NR	7429-90-5	231-072-3	F	R16, R17
Magnesium Metal	NR	7439-96-4	231-104-6	F	R16, R17
Zinc Metal	NR	7440-66-6	231-175-3	N+	R50/53
Copper Chromite	NR	12018-10-9	234-634-6	O, Xn, Xi	R8, R20/22, R36/37/38
Potassium nitrate	NR	7757-79-1	231-818-8	O, Xi	R8, R36/37/38
Sulfur	NR	7704-34-9	231-722-6	F, Xi	R11, R36/37/38
Charcoal	NR	16291-86-6	240-383-3	None	None
Graphite	NR	7782-42-5	231-855-3	None	None
<small>NOTES: This Material Safety Data Sheet is prepared to comply with the United States Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200), the Canadian Workplace Hazardous Materials Information System (WHMIS), and European Union Directives. Hazard symbols and risk phrases are based on maximum listed concentration of each hazardous ingredient. Unlisted ingredients are not "hazardous" per the OSHA Hazard Communication Standard (29 CFR 1910.1200), the Canadian Workplace Hazardous Materials Information System (WHMIS) or the European (GHS) directives and are considered trade secrets under US Federal Law (28CFR and 40CFR), Canadian Law (Health Canada Legislation), and European Union Directives.</small>					

MATERIAL SAFETY DATA SHEET

Page 2 of 5

PRODUCT NAME:	Estes Pro Series II Model Rocket Motors
PRODUCT NUMBER:	
SECTION 4 - FIRST AID MEASURES	
INHALATION: If symptoms of lung irritation occur (coughing, wheezing or breathing difficulty), remove from exposure area to fresh air immediately. Get medical attention in the unusual event of severe distress.	
EYES: Remove contact lenses, then wash for 15 minutes with clean potable water lifting upper and lower lids occasionally. Seek medical attention if irritation persists.	
SKIN: Wash with plenty of soap and water. Seek medical attention if delayed dermatitis develops (a rare condition).	
INGESTION: Contact medical authorities immediately. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs naturally, have victim lean forward to avoid aspiration of regurgitant. Give 1-2 glasses of water to victim if victim is conscious and able to swallow and seek immediate medical assistance. Never give anything by mouth to an unconscious person. Notes to Physician: This product contains nitrates and perchlorates, as well as copper and chromium salts. This combination poses potential toxicity for a variety of organs; the kidneys, thyroid, liver, and hematopoietic systems are especially vulnerable in acute poisonings. The use of gastric lavage and/or dialysis may be of value, especially as these substances are bound within a polymer.	
SECTION 5 - FIRE FIGHTING MEASURES	
GENERAL HAZARDS: Flammability Classification: (defined by 29 CFR 1910.1200) Class 1.4 Explosive. Can rapidly burn and/or rupture containers under fire conditions. Individual devices will randomly burn and/or deflagrate. Product will not mass explode if multiple devices are involved. Burning material may produce toxic and irritating vapors. See Emergency Response Guidebook for further information. Mechanical impacts or electrical discharges are unlikely to cause product to ignite.	
EXTINGUISHING MEDIA: Where large quantities are affected, flood area with water; if fire is already consuming product, incident command should base fire-fighting decisions on capabilities and total quantity of product. If no water is available, carbon dioxide, dry chemical or earth may be used.	
FIRE FIGHTING PROCEDURES: In case of fire, use normal fire fighting equipment. Protection concerns must also address the potential of the physical characteristic of this product as a deflagrator. Quarantine area for fires involving large quantities of product.	
UNUSUAL FIRE AND EXPLOSION HAZARDS: If fire reaches a large quantity of product, consider a withdrawal of personnel to a safe distance. Evacuate all persons, including emergency responders from the area for at least 500 feet (1/10 mile) in all directions.	
HAZARDOUS COMBUSTION PRODUCTS: Carbon Monoxide, Carbon Dioxide, Nitrogen Oxides, Hydrogen Chloride, Metal Oxides, Metal Chlorides	
SECTION 6 - ACCIDENTAL RELEASE MEASURES	
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Model rocket motors are devices in a solid state. Simply pick up and place in containers approved for storage and transport. Wipe up any dust with a wet cloth. IF PRODUCT IS DAMAGED, DO NOT USE PRODUCT; DISCARD IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS. SEE SECTION 13.	
SECTION 7 - HANDLING AND STORAGE	
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: HANDLING: Product may burn/rupture if exposed to extreme heat. Do not smoke while handling product. DO NOT ATTEMPT TO DISMANTLE PRODUCT!! Do not eat or drink while handling this product. STORAGE: Avoid storage near extreme heat, ignition sources or open flame. Store at 32° - 140° F (0°-60° C). Store away from living quarters. Do not store with foodstuffs. Do not store with flammable liquids or other incompatible materials (see Section 10). CONDITIONS TO AVOID: Heat/flame/sparks, Severe mechanical impact (which may deform product, rendering it unsafe for use).	








MATERIAL SAFETY DATA SHEET

Page 3 of 5

PRODUCT NAME: Estes Pro Series II Model Rocket Motors	
PRODUCT NUMBER:	
SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION	
Hazardous Components	CAS #
Aluminum Metal	7429-90-5
Copper Chromite	12018-10-9
Sulfur	7704-34-9
Graphite	7782-42-5
Zinc	7440-66-6
ACGIH Exposure Limits 1 mg/m3 NE 15 mg/m3 2 mg/m3 0.1 mg/m3 respirable, 2 mg/m3 inhalable per DFG (Germany)	
OSHA Exposure Limits 5 mg/m3 5 mg/m3 as Chromium 15 mg/m3 2.5 mg/m3 (respirable dust)	
Note: Components not listed have no Exposure Limits published by ACGIH and/or OSHA.	
PERSONAL PROTECTION	
RESPIRATORY PROTECTION:	
A vapor respirator may be advisable or required under emergency conditions.	
PROTECTIVE GLOVES:	
None generally required.	
EYE PROTECTION:	
Always follow the National Association of Rocketry (NAR) Model Rocketry Safety Code and all applicable laws and regulations.	
OTHER PROTECTIVE CLOTHING OR EQUIPMENT:	
Not required when product is used as directed by manufacturer.	
WORK / HYGIENIC PRACTICES:	
Avoid breathing fumes from ignition. Do not smoke while handling product; eating and drinking are also to be avoided.	
SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES	
DESCRIPTION:	CONDITIONS TO AVOID:
Little or No Odor - See Note for Appearance.	Not applicable.
pH	SPECIFIC GRAVITY (WATER = 1)
Not applicable.	Not applicable.
MELTING POINT	SOLUBILITY IN WATER
Not applicable.	Insoluble - some components are soluble in water.
FLASH POINT	VISCOSITY
Not applicable. Explosive if confined under fire conditions.	Not applicable.
FLAMMABLE LIMITS	VAPOR DENSITY (AIR = 1)
LEL: None UEL: None	Not applicable.
AUTOIGNITION TEMPERATURE	EVAPORATION RATE (WATER = 1)
NR	Not applicable.
VOLATILE ORGANIC COMPOUND (VOC) INFORMATION	
Not applicable.	
NOTES: Appearance and Odor: Plastic black cylinders with little odor.	
SECTION 10 - STABILITY AND REACTIVITY	
STABILITY:	CONDITIONS TO AVOID:
Stable under normal temperatures and pressure.	Extreme heat; extreme mechanical impacts.
INCOMPATIBILITY (MATERIALS TO AVOID):	
Acids, Toxic substances, Class A, K & L explosives, Strong oxidizers.	
HAZARDOUS DECOMPOSITION OR BYPRODUCTS:	
Carbon Monoxide, Carbon Dioxide, Nitrogen Oxides, Hydrogen Chloride, Metal Oxides, Metal Chlorides under fire conditions only.	
HAZARDOUS POLYMERIZATION:	CONDITIONS TO AVOID:
Will not occur.	None related to polymerization.
SECTION 11 - TOXICOLOGICAL INFORMATION	
Complete Product:	
Oral LD₅₀	Product contents are harmful; ingestion of used product is highly unlikely.
Dermal LD₅₀	Product is unlikely to cause skin irritation. Ignited particles may cause thermal burns.
Inhalation LC₅₀	Unused product is harmless. Vapors/particles from deployed product may be irritating or harmful.
Irritation	Not a skin or eye irritant in unused form. Particulates and vapors from ignited product are possibly irritating to eyes and respiratory system in unusual cases.




MATERIAL SAFETY DATA SHEET

Page 4 of 5

PRODUCT NAME: Estes Pro Series II Model Rocket Motors			
PRODUCT NUMBER:			
SECTION 11 - TOXICOLOGICAL INFORMATION - Continued			
Product Components			
Hazardous Component	CAS #	LD50 of Ingredient (Oral, Rat - unless otherwise specified)	LC50 of Ingredient (Inhalation, Rat - unless otherwise specified)
Ammonium Perchlorate	7790-98-9	4200 mg/kg	Not Established
Sulfur	7704-34-9	> 8437 mg/kg	Not Established
Note: Components not listed have no LD50 or LC50 data published			
SECTION 12 - ECOLOGICAL INFORMATION			
No data is available on this product, but both unused and spent motor casings may be harmful if ingested by animals. Collection and careful disposal of spent motors is highly advisable; soak used motors in water, then discard with normal trash.			
SECTION 13 - DISPOSAL/CONSIDERATIONS			
WASTE DISPOSAL METHOD:			
The user of this material has the responsibility to dispose of unused motors and spent motor casings in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes. Damaged motors may pose a danger. For disposal of large quantities of Pro Series II model rocket motors, incineration in a licensed facility is preferable. Small numbers of damaged or defective motors may be disposed of as follows: 1. Dig a small hole in the ground. 2. Place motor, nozzle pointing skyward into the hole and pack the hole with dirt to restrain the motor. 3. Ignite the motor from a minimum distance of 30 feet away using an electrical model rocket motor ignition system. Never place any part of your body above the motor nozzle during the disposal process. 4. Wait for five minutes to allow the motor casing to cool before removing and disposing of it. 5. Soak spent casings in water, then discard in normal trash. Residual materials should be treated as potentially hazardous until soaked.			
SECTION 14 - TRANSPORT INFORMATION			
DOMESTIC SHIPPING WITHIN THE USA			
PROPER SHIPPING NAME: Model Rocket Motors, NA0323, Class 1.4S/ PG II for E30 series motors only. All other motors will use Model Rocket Motors, NA0276, Class 1.4C (See note for USPS rules)			
DOT HAZARD CLASS / Pack Group: Class 1.4 (S or C) / PG II			
REFERENCE: 49CFR		UN / NA IDENTIFICATION NUMBER: NA 0323 (1.4S) / NA 0276 (1.4C)	
LABEL: Explosives 1.4S or 1.4 C		NOTES: Shipped via the United States Postal Service via Surface Mail	
HAZARD SYMBOLS: See notes for correct symbols		Only as: Toy Propellant Devices, NA0323, Class 1.4S/ PG II for E30 series motors only. All other motors will use NA0276, Class 1.4C / PG II for shipping and may not be shipped by the USPS. Contact manufacturer to confirm specific shipping requirements for an individual product.	
			
			
INTERNATIONAL SHIPPING			
PROPER SHIPPING NAME: Articles, Explosive, n.o.s., UN0349, Div. 1.4S, PG II (E30 series motors) Articles, Explosive, n.o.s., UN0351, Div. 1.4C, PG II (motors except G80 & E30 series) Articles, Explosive, n.o.s., UN0471, Div. 1.4E, PG II (G80 series motors)			
IMDG HAZARD CLASS / Pack Group: Class 1.4S / 1.4C / 1.4E PG II (Category 06 - UN0349, 06 - UN0351/0471) EmS: F-B, S-X			
IATA HAZARD CLASS / Pack Group: Class 1.4S / PG II or 1.4C PG II or 1.4E / PG II (See Notes)			
RID/ADR HAZARD CLASS / Pack Group: Class 1.4S / PG II or 1.4C PG II or 1.4E / PG II, EAC=1Y			
TDG (Canada) HAZARD CLASS / Pack Group: Class 1.4S / PG II or 1.4C PG II or 1.4E / PG II			
REFERENCE: IMDG, IATA, RID/ADR, TDG		UN / NA IDENTIFICATION NUMBER: UN 0349 / UN 0276 / UN 0351	
LABEL: Explosive, Class 1.4 (C or S), CAO (1.4C only)		NOTES: motors with >30g propellant (Class 1.4C/E) may not be shipped on a passenger aircraft; 75 kg is the maximum load per Cargo Only Aircraft (CAO). For motors with 530 g of propellant, 25kg is the maximum load for passenger aircraft, 100 kg is the maximum for CAO. Contact manufacturer to confirm specific shipping requirements for an individual product.	
HAZARD SYMBOLS: See notes for correct symbols			
			
			
Note: Transportation information provided is for reference only. Client is urged to consult CFR 49 parts 100 - 177, IMDG, IATA, EU, United Nations TDG, and WHMIS (Canada) TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging materials and methods of shipping.			

MATERIAL SAFETY DATA SHEET

Page 5 of 5

PRODUCT NAME: Estes Pro Series II Model Rocket Motors							
PRODUCT NUMBER:							
SECTION 15 - REGULATORY INFORMATION							
TSCA (USA - Toxic Substance Control Act): Components are listed under Section 8b.							
SARA TITLE III (USA - Superfund Amendments and Reauthorization Act):							
Acute Health: YES	Chronic Health: NO						
Fire: YES	Sudden Release of Pressure: YES						
Reactive: NO	* - Only if confined under fire conditions						
SARA 313 REPORTABLE INGREDIENTS: Potassium Nitrate, Ammonium perchlorate, aluminum powder							
CERCLA (USA - Comprehensive Response Compensation and Liability Act): RQ=5000 pounds for product as Nitrates.							
California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986: Hexavalent chromium in trace amounts only.							
State Right To Know Laws: This product contains chemicals listed on the RTK Laws of CA, FL, MA, MI, MN, NJ, PA, & RI.							
CPR (Canadian Controlled Products Regulations): Exempt under WHMIS regulations as explosive.							
IDL (Canadian Ingredient Disclosure List): Components are listed in Section 2.							
DSL / NDSL (Canadian Domestic Substances List / Non-Domestic Substances List): Listed or exempt on both CDSL and NDSL.							
EINECS (European Inventory of Existing Commercial Chemical Substances): 9003-55-8 not listed in EINECS or NLP.							
WGK Water Quality Index: NA for product.							
EUROPEAN (GHS) HAZARD SYMBOLS							
 							
EU RISK PHRASES							
R2: Risk of explosion by shock, friction, fire or other sources of ignition.							
R22: Harmful if swallowed.							
R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.							
EU SAFETY PHRASES							
S1/2: Keep locked up and out of the reach of children.							
SECTION 16 - OTHER INFORMATION							
HMIS HAZARD RATINGS							
0 = INSIGNIFICANT, 1 = SLIGHT 2 = MODERATE, 3 = HIGH 4 = EXTREME	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">HEALTH: HAZARDOUS</td> <td style="width: 33%;">HEALTH: HAZARDOUS</td> <td style="width: 33%;">HEALTH: HAZARDOUS</td> </tr> <tr> <td>PHYSICAL HAZARD:</td> <td>PHYSICAL HAZARD:</td> <td>PHYSICAL HAZARD:</td> </tr> </table>	HEALTH: HAZARDOUS	HEALTH: HAZARDOUS	HEALTH: HAZARDOUS	PHYSICAL HAZARD:	PHYSICAL HAZARD:	PHYSICAL HAZARD:
HEALTH: HAZARDOUS	HEALTH: HAZARDOUS	HEALTH: HAZARDOUS					
PHYSICAL HAZARD:	PHYSICAL HAZARD:	PHYSICAL HAZARD:					
Personal Protective Equipment: See Section 8							
Legend:							
ACGIH - American Congress of Government Industrial Hygienists, CAS - Chemical Abstracts Service							
EINECS - European Inventory of Existing Commercial Chemical Substances							
HMIS - Hazardous Materials Identification System, IARC - International Agency for Research on Cancer							
NA - Not Available, ND - Not Determined, NE - Not Established, NR - Not Reported							
NIOSH - National Institute for Occupational Safety and Health, NTP - National Toxicology Program							
OSHA - Occupational Safety and Health Administration							
Full R-Phrases (Not listed in Section 15): R8 Contact with combustible material may cause fire. R9 Explosive when mixed with combustible material. R11 Highly flammable. R15 Contact with water liberates extremely flammable gases. R17 Spontaneously flammable in air. R20/22 Harmful by inhalation and if swallowed. R36/37/38 Irritating to eyes, respiratory system and skin. R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.							
REVISION SUMMARY: New Issue 10/20/2011, LB							
MSDS Prepared by: ChemTel Inc. 1305 North Florida Avenue Tampa, Florida USA 33602-2802 Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573 Website: www.chemtelinc.com							
<small>The information contained herein is believed to be accurate but is not warranted to be so. Data and calculations are based on information furnished by the manufacturer of the product and manufacturer of the components of the product. Users are advised to confirm the identity of each material information is current, applicable and suited to the circumstances of use. Vendor assumes no responsibility for injury to persons or damage to property caused by the material if reasonable safety procedures are not followed as stipulated in this data sheet. Furthermore, vendor assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed. Any questions regarding this product should be directed to the manufacturer of the product (see description in Section 1).</small>							