

SAFETY DATA SHEET

SECTION 1: IDENTIFICATION

Product name: AF-M315E

Synonyms: Air Force Monopropellant 315E, Nitrate Salt Solution

Product Use Description: Liquid Monopropellant

Company: Digital Solid State Propulsion Inc

5301 Longley Ln Suite 118

Reno, NV 89511

Phone: (775)851-4443

SECTION 2: HAZARDS IDENTIFICATION

Hazard Classification: Explosive Liquid (1.4C)

Oral and Aspiration Toxicity, Category 3

Skin Irritation, Category 4

Germ Cell Mutagenicity, Category 1A and 1B

Pictograms:



Signal Word: Danger

Hazard Statements: Fire or projection hazard.

Toxic if swallowed - may cause genetic defects.

Harmful with prolonged skin or eye contact - can cause irritation and dermatitis.

Toxic by ingestion, aspiration or absorbed through skin

Precautionary Statements:

Prevention: Keep away from heat/sparks/open flames/hotsurfaces

Do not subject to shock/impact/or friction

Wear protective rubber gloves, labcoat, goggles, and face protection

DO NOT fight fire when fire reaches explosives

Wash hands thoroughly after handling

Do not eat, drink, or smoke when using this product

Avoid inhaling an aerosol or spray of this product

Response:	In case of fire: evacuate area IF SWALLOWED: Immediately call a POISON CENTER or physician IF ON SKIN: Wash with water In the event of aspiration, remove victim to fresh air and call a physician Remove all contaminated clothing and wash before reuse
Storage:	Store in a dry place in a closed container with secondary containment Store long term at temperatures not exceeding 100°F for optimal shelf life
Disposal:	Dilute waste propellant and contaminated materials with deionized water and dispose in accordance with federal, state and local requirements.

SECTION 3: COMPOSITION/ INFORMATION ON INGREDIENTS

Hazardous Contents: Hydroxylammonium nitrate (HAN)-based propellant

SECTION 4: FIRST-AID MEASURES

Skin Contact: Treat AF-M315E as a corrosive liquid that is toxic if absorbed through the skin or ingested. Flush exposed skin with water immediately. Wash contaminated clothing with water before re-use.

Eye Contact: Immediately flush with copious amounts of water for 15 minutes to prevent or reduce eye or skin irritation. Prolonged skin contact may result in chemical burns, chronic dermatitis, and/or sensitization to the chemical.

Ingestion: Repeatedly drink water and induce vomiting. Obtain medical attention.

Inhalation: In the event of aspiration, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

SECTION 5: FIRE FIGHTING MEASURES

Suitable Extinguishing Media: Small fires: Water, Dry Chemical, Foam

Special Firefighting Procedures: Wear full fire resistant protective clothing and self-contained breathing apparatus. Combustion products include water, ammonia, nitrogen oxides, oxides of carbon and nitrogen. Keep fire from exposed containers by cooling with water spray

Try to prevent fire from reaching cargo; it may undergo very rapid combustion with large rush of hot gases. Do not fight fire if it reaches cargo. Withdraw from area, clear area for 1/2 mile in all directions, and let it burn.

Flash Point : Not Applicable

Autoignition Temperature: 140°C (runaway temperature onset for slow cook-off)

Flammable Limits in Air (% by Volume),

Lower: Not Applicable

Upper: Not Applicable

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Evacuate personnel to safe areas. Remove all sources of ignition. Utilize proper protective equipment (Section 8).

Environmental Precautions: Avoid discharge into the environment. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods for Clean-Up:

- Clean spills immediately
- Use compatible wipes or absorbents (Kimwipes, polypropylene, pure sand)
- Use deionized, distilled water
- Dispose of clean-up wastes by placing wipes or absorbents into a polycontainer containing deionized, distilled water
- Do not store waste in open containers

Spills should be diluted with water, dilute waste taken up on sorbent and wetted sorbent placed into sealed polybags marked for disposal as hazardous waste to be disposed of properly.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling:

- Protect propellant from moisture & ignition sources and keep container closed
- Store with proper labels and in properly sited location (Class 1 Explosive)
- Not necessary to store as a flammable liquid
- Storage is optimum in controlled temperature lockers (< 80F), but should not be stored at temperatures > 100°F for long term
- Store separately from other propellants, oxidizers, & fuels
- Regularly check stored material for abnormalities
- Keep away from high temperature, fire, other ignition sources, reactive transition metals, rust, ketones and strong acids and strong bases
- Use clean containers (be sure containers are washed thoroughly with DDI water and allowed to dry completely)
- Containers should be spill-proof/Leak-proof
- Glass and poly containers for transfer are compatible
- Provide compatible, secondary containment
- Ensure sample container is closed- not exposed to excessive moisture or heat sources

In Case of Accident: Shut off all ignition sources; no flares or smoking

SECTION 8: EXPOSURE CONTROLS/ PERSONAL PROTECTION

Protective Clothing: Fire Retardant coveralls and rubber (nitrile) gloves recommended

Eye Protection: Goggles (full eye protection) recommended

Respiratory Protection: None required under ambient conditions unless there is the probability of aerosol exposure

Face Protection: Face shield if working with pressurized propellant

Exposure Limits: Unknown

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Description:	Translucent, light pink-orange Liquid
Appearance:	Liquid
Color:	light pink-orange
Odor:	No Discernible Odor
Specific Gravity:	1.46
Freezing Point:	Does not freeze; glasses at -80°C
pH	3.7-4.0
Reactivity in Water:	None
Viscosity:	23 cP at 25°C
Boiling Point:	Not Applicable
Flash Point :	Not Applicable
Autoignition Temperature:	140°C (runaway temperature onset for slow cook-off)
Flammable Limits in Air (% by Volume),	
Lower:	Not Applicable
Upper:	Not Applicable

SECTION 10: STABILITY AND REACTIVITY

Reactivity:	
Adiabatic Compression Sensitivity (U-tube):	9 of 10 Negative at 35:1 driving pressure ratio@293 K
Critical Diameter:	4 in < CD < 7 in; confined
Shock Sensitivity:	0 cards (witness plate deformed) in NOL gap test and “No Go” (witness plate deformed) in SLSGT @ 70 kbar
Electrostatic Discharge Sensitivity:	>1 J (10 of 10 negative tests)
Friction Sensitivity:	300 N (Julius Peters Sliding Friction) (5 successive negative tests)
Impact Sensitivity:	126 kg-cm (E50) with a 3 kg weight (Olin Mathieson Drop Weight Test)
Thermal Stability:	0.43 %/day weight loss @ 75 C
Unconfined Burning Test:	Negative (mild burn)
Explosion:	Thermal or high impact stimulus of confined propellant may result in an explosion.
Stability:	AF-M315E is a mild corrosive. This material contains HAN, which is unstable to acids, isocyanates, cellulose products, and ketones (for example, acetone). Prolonged contact with certain metals (iron, nickel, copper, and other transition metals) will cause HAN decomposition. The propellant contains a metal sequestrant and a red coloration of the liquid indicates the presence of transition metals. Recognize the potential hazard of exposure to rust. Keep propellant away from prolonged temperatures above 200 °F. The presence of brown fumes indicates propellant decomposition.

SECTION 11: TOXICOLOGICAL INFORMATION

The most likely routes of exposure are ingestion, skin, and eye contact. AF-M315E is a mild corrosive and physical contact may cause skin irritation and redness.

Toxicity:	
LD50 (oral, rat) =	550 mg/kg
Skin Irritation (rabbit) =	Slight

Mutagenicity (AMES) = 3 Negative/2 Positive
Dermal Sensitization = Non-Sensitizer (Guinea Pig)
Carcinogenicity not determined

Combustion Toxicity: Fire produces irritating or poisonous gas; primary irritants can be nitric acid, oxides of nitrogen, and ammonia.

SECTION 12: ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State Regulations

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal: Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14 - TRANSPORT INFORMATION

Packaging and EX number: EX2017030320
Hazard Classification: 1.4C
U.N. Proper shipping name: Substance, Explosive, n.o.s (Nitrate Salt Solution)
U.N. Number: UN0479
Packing Group: II

SECTION 15 - REGULATORY INFORMATION

With the exception of DoT and DoD explosive regulations noted above, this product is not currently regulated by any health or environmental agencies.

SECTION 16 - OTHER INFORMATION

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. All information contained on this MSDS is based on available data and is subject to change.
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