# MATERIAL SAFETY DATA SHEET

## 1. SUBSTANCE AND SOURCE IDENTIFICATION

**National Institute of Standards and Technology**
**Standard Reference Materials Program**
**100 Bureau Drive, Stop 2300**
**Gaithersburg, Maryland 20899-2300**

**SRM Number: 1815a**
**MSDS Number: 1815a**
**SRM Name: Reference Fuel n-Heptane**

**Date of Issue: 13 December 2011**

**Telephone: 301-975-2200**
**FAX: 301-926-4751**
**E-mail: SRMMSDS@nist.gov**

**Emergency Telephone ChemTrec:**
**1-800-424-9300 (North America)**
**+1-703-527-3887 (International)**

**Description:** A unit of Standard Reference Material (SRM) 1815a consists of approximately 100 ml of n-Heptane. This SRM is intended for use areas a primary standard in the octane rating of a motor aviation fuel as specified in ASTM test methods and evaluating ASTM methods for chemical analysis of fuels by gas chromatography.

**Substance:** n-Heptane

**Other Designations:** Normal heptane, dipropyl methane, heptyl hydride, heptane.

## 2. HAZARDS IDENTIFICATION

**NFPA Ratings (Scale 0–4):** Health = 2 Fire = 3 Reactivity = 0

**Major Health Hazards:** Respiratory tract irritation; skin and eye irritation; aspiration hazard; and central nervous system depression.

**Physical Hazards:** Extremely flammable liquid and vapor. Vapor may cause flash fire. Electrostatic charges may be generated by flow, agitation, etc.

**Potential Health Effects**

**Inhalation:** Excessive inhalation of vapors may cause irritation of the nasal and respiratory tract. High concentrations may cause asphyxiation and unconsciousness. Myocardial sensitization may occur.

**Skin Contact:** Direct contact with the liquid may cause irritation with redness, pain, burning and itching. Skin absorption may occur. Repeated or prolonged contact with the liquid mat cause defatting of the skin with dermatitis.

**Eye Contact:** Liquid may cause irritation with redness, tearing and blurred vision.

**Ingestion:** Ingestion may cause irritation to the gastrointestinal tract, abdominal pain and swelling, nausea, vomiting and diarrhea. If sufficient amounts are absorbed, headache and central nervous system depression may occur.

**Listed as a Carcinogen/Potential Carcinogen:**

| | Yes | No |
|---|---|---|
| In the National Toxicology Program (NTP) Report on Carcinogens | | X |
| In the International Agency for Research on Cancer (IARC) Monographs | | X |
| Occupational Safety and Health Administration (OSHA) | | X |

## 3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

| Component | CAS Number | EC Number (EINECS) | Nominal Mass Concentration (%) |
|---|---|---|---|
| n-Heptane | 142-82-5 | 205-563-8 | 100 |

**EC Classification:** F, Xn, Xi, N
**EC Risk (R No.):** 11, 38, 50/53, 65, 67
**EC Safety (S No.):** 9, 16, 29, 33, 60, 61, 62

## 4. First Aid Measures

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

**Skin Contact:** Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Seek medical attention.

**Eye Contact:** Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

**Ingestion:** Contact a poison control center immediately for instructions. Seek immediate medical attention.

## 5. Fire Fighting Measures

**Fire and Explosion Hazards:** Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive above flash point.

**Extinguishing Media:** Regular dry chemical, carbon dioxide, water, regular foam.

**Fire Fighting:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

**Flash Point:** –4 °C
**Method Used:** Closed Cup

**Autoignition Temp.:** 204 °C

**Flammability Limits in Air**
**Upper (Volume %):** 6.7 %
**Lower (Volume %):** 1.05 %

## 6. Accidental Release Measures

**Occupational Release:** Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Absorb with sand or other non-combustible material. Collect spilled material in suitable container for proper disposal.

**Disposal:** Refer to Section 13, "Disposal Considerations".

## 7. Handling and Storage

**Storage:** Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances. Store in a tightly closed container. Store in a cool, dry place. Store in a well-ventilated area.

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

## 8. Exposure Controls and Personal Protection

**Exposure Limits:**

| | |
|---|---|
| **ACGIH (TWA):** | 400 ppm |
| **ACGIH (STEL):** | 500 ppm |
| **NIOSH (TWA):** | 85 ppm; 350 mg/m$^3$ |
| **NIOSH (IDLH):** | 750 ppm |
| **NIOSH:** | 440 ppm Ceiling (15 min); 1800 mg/m$^3$ Ceiling (15min) |
| **OSHA (TWA):** | 500 ppm; 2000 mg/m$^3$ |

**Ventilation:** Use local exhaust ventilation system. Ensure compliance with applicable exposure limits. Refer to the ACGIH document, *Industrial Ventilation, a Manual of Recommended Practices*.

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

**Eye Protection:** Wear chemical safety goggles. An eyewash station should be readily available near areas of use.

**Personal Protection:** Wear appropriate protective clothing and chemically resistant gloves to prevent skin exposure.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance and odor:** Clear liquid, gasoline odor.
**Molar Mass:** 100.21 g/mol
**Molecular Formula:** $C_7H_{16}$
**Specific Gravity (water = 1):** 0.6837
**Vapor Density (air = 1):** 3.45
**Water Solubility:** 0.005 %
**Boiling Point:** 98 °C (210 °F)
**Melting Point:** –91 °C (–160 °F)

## 10. STABILITY AND REACTIVITY

**Stability:** X Stable _____ Unstable

Stable at normal temperatures and pressure.

**Conditions to Avoid:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**Incompatible Materials:** Oxidizing materials, reducing agents.

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

**Hazardous Decomposition:** Thermal decomposition will produce oxides of carbon.

**Hazardous Polymerization:** _____ Will Occur X Will Not Occur

## 11. TOXICOLOGICAL INFORMATION

**Route of Entry:** X Inhalation X Skin X Ingestion

**Toxicity Data**

Inhalation, Rat LC50: 103 g/m$^3$ (4 hours)
Oral, Mouse LD50: 5000 mg/kg
Dermal, Rabbit LD50: 3000 mg/kg

**Health Effects (Acute and Chronic):** See Section 2, "Hazards Identification" for potential health effects.

**Target Organ(s):**

Central nervous system.

**Medical Conditions Aggravated by Exposure:** This material may aggravate pre-existing respiratory disorders, skin disorders, and allergies.

**Mutagen/Teratogen:**

This material has been reviewed and the Registry of Toxic Effects of Chemical Substance (RTECS) publishes no data.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity Data**

**Fish Toxicity:**
Cichlid (*Cichlidae* family) LC50: 375 mg/L (96 hours).

**Invertebrate Toxicity:**
Water flea (*Daphnia magna*) EC50: 10 mg/L (24 hours).

## 13. DISPOSAL CONSIDERATIONS

**Waste Disposal:** Dispose in accordance with all applicable federal, state, and local regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number: D001.

## 14. TRANSPORTATION INFORMATION

**U.S. DOT and IATA:** Heptanes, UN 1206, Hazard Class 3, Packing Group II.

## 15. REGULATORY INFORMATION

**U.S. REGULATIONS**

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

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): Not regulated.

OSHA Process Safety (29 CFR 1910.119): Not regulated.

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

| | |
|---|---|
| ACUTE HEALTH: | Yes. |
| CHRONIC HEALTH: | No. |
| FIRE: | Yes. |
| REACTIVE: | No. |
| PRESSURE: | No. |

**STATE REGULATIONS**

Not regulated.

**CANADIAN REGULATIONS**

WHMIS Information: Not provided for this material.

**EUROPEAN REGULATIONS**

**EC Classification:**

F: Highly Flammable.
Xn: Harmful.
Xi: Irritant.
N: Dangerous to the Environment.

**EC Risk (R No.):**

R11 – Highly flammable.
R38 – Irritant to skin.
R50/53 – Very toxic to aquatic organism. May cause long-term adverse effects in the aquatic environment.
R65 – Harmful: may cause lung damage if swallowed.
R67 – Vapors may cause drowsiness and dizziness.

**EC Safety (S No.):**

S9 – Keep container in a well-ventilated place.
S16 – Keep away from sources of ignition – No smoking.
S29 – Do not empty into drains.
S33 – Take precautionary measures against static discharges.
S60 – This material and its container must be disposed of as a hazardous waste.
S61 – Avoid release to the environment.
S62 – If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

**NATIONAL INVENTORY STATUS**

**U.S. Inventory (TSCA):** Listed.

**TSCA 12(b)**

**Export Notification:** Section 4, 1 % de minimis concentration.

## 16. OTHER INFORMATION

**Sources:** ChemAdvisor, Inc., MSDS *n-Heptane*, 16 September 2011.

EC; European Chemical Substance Information System (ESIS), *n-Heptane, Index No. 601-008-00-2*; available at http://esis.jrc.ec.europa.eu/index.php?PGM=cla (accessed Dec 2011).

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.