

**SAFETY DATA SHEET**

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**1. SUBSTANCE AND SOURCE IDENTIFICATION**

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**Product Identifier**

**SRM Number:** 2720  
**SRM Name:** Sulfur in Di-*n*-Butyl Sulfide  
**Other Means of Identification:** Not applicable.

**Recommended Use of This Material and Restrictions of Use**

This Standard Reference Material (SRM) is intended for use as an internal standard in X-ray fluorescence spectrometry (XRF) measurements of sulfur in oils and other liquid hydrocarbon matrices. A unit of SRM 2720 consists of 5 amber ampoules, each containing approximately 4.5 mL of di-*n*-butyl sulfide sealed under an argon atmosphere.

**Company Information**

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**2. HAZARDS IDENTIFICATION**

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**Classification**

**Physical Hazard:** Combustible liquid, Category 4  
**Health Hazard:** Not classified.

**Label Elements****Symbol**

No pictogram

**Signal Word**

WARNING

**Hazard Statement(s)**

H227 Combustible liquid.

**Precautionary Statement(s)**

P210 Keep away from heat, sparks, open flames, and hot surfaces. – No smoking.

P280 Wear protective gloves, eye protection, and face protection.

P370+P378 In case of fire: Use regular dry chemical, carbon dioxide, water, or foam.

403 Store in a well-ventilated place. Keep cool.

501 Dispose of contents and container in accordance with all applicable federal, state, and local regulations.

**Hazards Not Otherwise Classified:** None.

**Ingredients(s) with Unknown Acute Toxicity:** None.

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### 3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

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**Substance:** Di-*n*-butyl sulfide

**Other Designations:** *n*-butyl sulfide; butane,1,1'-thiobis-; 1,1'-thiobisbutane; butyl monosulfide; butyl sulfide; butylthiobutane; C<sub>8</sub>H<sub>18</sub>S

Components are listed in compliance with OSHA's 29 CFR 1910.1200.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Di- <i>n</i> -butyl sulfide	544-40-1	208-870-5	100

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### 4. FIRST AID MEASURES

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#### Description of First Aid Measures

**Inhalation:** If adverse effects occur, remove to well-ventilated (uncontaminated) area. If breathing is difficult, qualified personnel may administer oxygen. If not breathing, qualified personnel should give artificial respiration. Seek immediate medical attention.

**Skin Contact:** Rinse affected skin with water for at least 15 minutes and then wash thoroughly with soap or mild detergent and water. If skin irritation persists, seek medical aid and bring the container or label.

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

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

#### Most Important Symptoms/Effects, Acute and Delayed

**Inhalation:** No significant or adverse effects have been reported.

**Skin Contact:** Repeated or prolonged contact with irritants may cause dermatitis.

**Eye Contact:** Direct contact may cause irritation. Repeated or prolonged contact with irritants may cause conjunctivitis.

**Ingestion:** No significant or adverse effects have been reported.

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

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### 5. FIRE FIGHTING MEASURES

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**Fire and Explosion Hazards:** Moderate 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. See Section 9, "Physical and Chemical Properties" for flammability properties.

#### Extinguishing Media

Suitable: Regular dry chemical, carbon dioxide, water, or regular foam.

Unsuitable: None listed.

**Specific Hazards Arising from the Chemical:** Not applicable.

**Special Protective Equipment and Precautions for Fire-Fighters:** Move container from fire area if it can be done without personal risk. Avoid inhalation of material or combustion by-products. 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 = 2

Reactivity = 0

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### 6. ACCIDENTAL RELEASE MEASURES

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**Personal Precautions, Protective Equipment and Emergency Procedures:** Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

**Methods and Materials for Containment and Clean up:** 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 appropriate container for disposal. Keep out of waters supplies and sewers.

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## 7. HANDLING AND STORAGE

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

**Storage and Incompatible Materials:** Avoid heat, flames, sparks, and other sources of ignition. 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 (oxidizing materials).

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## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

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**Exposure Limits:** No occupational exposure limits established for di-*n*-butyl sulfide.

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

**Personal Protection Measures:** 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 Protection:** Splash resistant safety goggles and emergency eyewash are recommended.

**Skin and Body Protection:** Chemical resistant clothing and gloves are recommended.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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Properties	Di- <i>n</i> -butyl sulfide
Molar Mass (g/mol)	146.29
Molecular Formula	C <sub>8</sub> H <sub>18</sub> S
Appearance (physical state, color, etc.)	clear, colorless liquid
Odor	irritating odor
Odor threshold	not available
pH	not available
Evaporation rate	not available
Melting point/freezing point	-80 °C (-112 °F)
Relative Density as Specific Gravity (water = 1)	0.8386
Density	not available
Vapor Pressure	1.2 mmHg at 25 °C
Vapor Density (air = 1)	4.9
Viscosity	not available
Solubilities	water: insoluble; solvent: alcohol, ether, chloroform
Partition coefficient (n-octanol/water)	3.870
<b>Thermal Stability Properties</b>	
Autoignition Temperature	not available
Thermal Decomposition	not available
Initial boiling point and boiling range	185 °C (365 °F)
Explosive Limits, LEL (Volume %)	not available
Explosive Limits, UEL (Volume %)	not available
Flash Point	76.7 °C (170 °F)
Flammability (solid, gas)	not applicable

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## 10. STABILITY AND REACTIVITY

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**Reactivity:** This material is not reactive at normal temperatures and pressure.

**Stability:**       X   Stable                  Unstable

**Possible Hazardous Reactions:** Not applicable.

**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. Dangerous gases may accumulate in confined spaces.

**Incompatible Materials:** Oxidizing materials.

**Hazardous Decomposition:** Oxides of sulfur and carbon.

**Hazardous Polymerization:** \_\_\_\_\_ Will Occur       X  Will Not Occur

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## 11. TOXICOLOGICAL INFORMATION

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

**Symptoms Related to the Physical, Chemical and Toxicological Characteristics:** Eye or skin irritation and possible skin disorders.

### Potential Health Effects (Acute, Chronic, and Delayed)

**Inhalation:** No significant or adverse effects have been reported.

**Skin Contact:** May cause irritation and redness; repeated or prolonged exposure may cause dermatitis.

**Eye Contact:** Irritation; repeated or prolonged exposure may cause conjunctivitis

**Ingestion:** No significant or adverse effects have been reported.

### Numerical Measures of Toxicity

**Acute toxicity:** Not classified.

Rat, Oral, LD50: 2200 mg/kg

Rabbit, Dermal, LD50: >5000 mg/kg

**Skin corrosion/irritation:** Not classified.

Rabbit, skin: 500 mg (24 h) moderate

**Serious eye damage/eye irritation:** No data available.

**Respiratory sensitization:** No data available.

**Skin sensitization:** No data available.

**Germ Cell Mutagenicity:** No data available.

**Carcinogenicity:** Not classified.

**Listed as a Carcinogen/Potential Carcinogen**      \_\_\_\_\_ Yes       X  No

Di-n-butyl sulfide is not listed by OSHA, NTP, and IARC as a carcinogen.

**Reproductive Toxicity:** No data available.

**Specific target organ toxicity, single exposure:** No data available.

**Specific target organ toxicity, repeated exposure:** No data available.

**Aspiration hazard:** Not applicable.

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## 12. ECOLOGICAL INFORMATION

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### Ecotoxicity Data

Fish, Fathead minnow, *Pimephales promelas*, LC50: 3.58 mg/L, flow-through, (96 h).

**Persistence and Degradability:** No data available.

**Bioaccumulative Potential:** No data available.

**Mobility in Soil:** No data available.

**Other Adverse effects:** No data available.

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## 13. DISPOSAL CONSIDERATIONS

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

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## 14. TRANSPORTATION INFORMATION

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**U.S. DOT and IATA:** UN3334, Aviation regulated liquid, n.o.s. (Di-*n*-butyl sulfide), Class 9, Packing Group III, Excepted Quantity E1.

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## 15. REGULATORY INFORMATION

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### 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 listed.

**U.S. TSCA Inventory:** Di-*n*-butyl sulfide is listed.

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

**Canadian Regulations:** WHMIS Information: Not provided for this material.

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## 16. OTHER INFORMATION

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**Issue Date:** 12 August 2013

**Sources:** ChemADVISOR, Inc., MSDS *N-Butyl Sulfide*, 17 June 2013.

Penta Manufacturing Company, Vendor MSDS; *Dibutyl Sulfide*, 28 September 2012.

ChemIDplus Advanced; US National Library of Medicine, *n-Butyl Sulfide CAS No. 544-40-1*; available at <http://chem.sis.nlm.nih.gov/chemidplus/> (accessed Aug 2013).

### Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	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 Level
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
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	STEL	Short Term Exposure Level
LD50	Median Lethal Dose or Lethal Dose, 50 %	TLV	Threshold Limit Value
LEL	Lower Explosive Limit	TPQ	Threshold Planning Quantity
MSDS	Material Safety Data Sheet	TSCA	Toxic Substances Control Act
NFPA	National Fire Protection Association	TWA	Time Weighted Average
NIOSH	National Institute for Occupational Safety and Health	UEL	Upper Explosive Limit
NIST	National Institute of Standards and Technology	WHMIS	Workplace Hazardous Materials Information System
n.o.s.	Not Otherwise Specified		

**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 Certificate of Analysis.

Users of this SRM 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](mailto:srmmsds@nist.gov); or via the Internet at <http://www.nist.gov/srm>.