

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

RM Number: 8553

RM Name: IAEA-S-4 (Soufre de Lacq) (Sulfur Isotopes in Elemental Sulfur)

Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Reference Material (RM) is intended for use in method development, method harmonization and as a control for sulfur isotope-number ratios of working standards that have been calibrated to the VCDT (Vienna Canyon Diablo Troilite) δ -scale. The equivalent name for this RM, as used by the International Atomic Energy Agency (IAEA) and the U.S. Geological Survey (USGS), is IAEA-S-4. This material has historically been known as Soufre de Lacq. A unit of RM 8553 consists of 0.5 g of powdered elemental sulfur.

Company Information

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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard: Flammable Solids Category 2
Health Hazard: Skin Corrosion/Irritation Category 2

Label Elements

Symbol



Signal Word

WARNING

Hazard Statement(s):

H228 Flammable solid.
H315 Causes skin irritation.

Precautionary Statement(s):

P210 Keep away from heat, sparks, open flames, and hot surfaces. No smoking.
P241 Use explosion-proof electrical, ventilating, and lighting equipment.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves, protective clothing, and eye protection.

P302+P352 If on skin: Wash with plenty of water.
P332+P313 If skin irritation occurs: Get medical attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

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: Sulfur

Other Designations: Brimstone; flowers of sulfur; sublimed sulfur; sulphur.

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

Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Sulfur	7704-34-9	231-722-6	100

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. 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 and shoes before reuse.

Eye Contact: Flush eyes with 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: Skin irritation.

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

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Slight fire hazard. Dust/air mixtures may ignite or explode. May ignite if exposed to shock, friction or heating. Avoid friction and static electricity. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media:

Suitable: Regular dry chemical, dry sand, earth, regular foam, and water.

Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Thermal decomposition will produce oxides of sulfur.

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).

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Any accumulated material on surfaces should be removed and properly disposed of. 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. 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: Minimize dust generation and accumulation on surfaces. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. 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: This material is a particulate matter and adequate inhalation/respiratory protection should be used to minimize exposure. No occupational exposure limits have been established for sulfur. The exposure limits for Particulates Not Otherwise Regulated are applicable.

OSHA (PEL): 15 mg/m³ (TWA, total particulates)
5 mg/m³ (TWA, respirable particulates)

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 29 CFR 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 eye wash 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:

Appearance (physical state, color, etc.):	yellow powder
Molecular Formula:	S
Molar Mass (g/mol):	32.07
Odor:	odorless
Odor threshold:	not available
pH:	not available
Evaporation rate:	not available
Melting point/freezing point:	113 °C (235.4 °F)
Density:	2.07 g/mL
Vapor Pressure:	1 mmHg at 184 °C
Vapor Density (air = 1):	not available
Viscosity (cP):	not available
Solubility(ies):	insoluble in water; soluble in carbon disulfide, carbon tetrachloride, benzene, liquid ammonia, and methylene iodide
Partition coefficient (n-octanol/water):	not available
Particle Size:	not available

Thermal Stability Properties:

Autoignition Temperature (°C):	not available
Thermal Decomposition (°C):	not available
Initial boiling point and boiling range:	232 °C (450 °F)
Explosive Limits, LEL (Volume %):	35 g/m ³
Explosive Limits, UEL (Volume %):	1400 g/m ³
Flash Point (Closed Cup):	207 °C (405 °F)
Flammability (solid, gas):	not available

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: X Stable Unstable

Possible Hazardous Reactions: None listed.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition.

Incompatible Materials: Metal salts, metals, bases, oxidizing materials, halogens, combustible materials, metal oxides, metal carbide, and reducing agents.

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

Hazardous Decomposition: Thermal decomposition will produce oxides of sulfur.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: skin irritation.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Short-term (acute) exposure to sulfur dust may irritate the respiratory tract, and result in coughing, difficulty breathing, and death. Long-term (chronic) exposure may result in respiratory tract irritation, asthma, lung damage.

Skin Contact: Skin contact may result in irritation. Repeated exposure result in dermatitis or skin lesions.

Eye Contact: May cause eye irritation.

Ingestion: No information on significant adverse effects.

Numerical Measures of Toxicity:

Acute Toxicity: Not classified.

Rat, Oral LD50: >3000 mg/kg

Rat, Inhalation LD50: >9.23 mg/L (4 h)

Rabbit, Dermal LD50: >2000 mg/kg

Skin Corrosion/Irritation: Category 2.

Skin contact may result in irritation.

Serious Eye Damage/Irritation: Not classified.

Human, Eyes: 8 ppm

Respiratory Sensitization: Not classified; no data available.

Skin Sensitization: Not classified; no data available.

Germ Cell Mutagenicity: Not classified; no data available.

Carcinogenicity: Not classified.

Listed as a Carcinogen/Potential Carcinogen _____ Yes X No

Sulfur is not listed by IARC, NTP, or OSHA as a carcinogen/potential carcinogen.

Reproductive Toxicity: Not classified; no data available.

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

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

Aspiration Hazard: Not classified; no data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Fish Toxicity: Blue gill (*Lepomis machrochirus*) LC50 (static): <14 mg/L static (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.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

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: No.

REACTIVE: No.

PRESSURE: No.

State Regulations:

California Proposition 65: Not listed.

U.S. TSCA Inventory: Listed.

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

Canadian Regulations:

WHMIS Information: Not provided for this material.

16. OTHER INFORMATION

Issue Date: 15 February 2022

Sources: ChemADVISOR, Inc., SDS *Sulfur*, 20 March 2015.

CDC; NIOSH; *NIOSH Pocket Guide to Chemical Hazards*; Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health; *Particulates Not Otherwise Regulated*, 30 October 2019; available at <https://www.cdc.gov/niosh/npg/npgd0480.html> (accessed Feb 2022).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
ALI	Annual Limit on Intake	OSHA	Occupational Safety and Health Administration
CAS	Chemical Abstracts Service	PEL	Permissible Exposure Limit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
CFR	Code of Federal Regulations	REL	Recommended Exposure Limit
DOT	Department of Transportation	RM	Reference Material
EC50	Effective Concentration, 50 %	RQ	Reportable Quantity
EINECS	European Inventory of Existing Commercial Chemical Substances	RTECS	Registry of Toxic Effects of Chemical Substances
EPCRA	Emergency Planning and Community Right-to-Know Act	SARA	Superfund Amendments and Reauthorization Act
IARC	International Agency for Research on Cancer	SCBA	Self-Contained Breathing Apparatus
IATA	International Air Transport Association	SRM	Standard Reference Material
IDLH	Immediately Dangerous to Life and Health	STEL	Short Term Exposure Limit
LC50	Lethal Concentration, 50 %	TLV	Threshold Limit Value
LD50	Lethal Dose, 50 %	TPQ	Threshold Planning Quantity
LEL	Lower Explosive Limit	TSCA	Toxic Substances Control Act
MSDS	Material Safety Data Sheet	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
NRC	Nuclear Regulatory Commission		

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