CID 5362487

Sulfur

Safety and Hazards

1.1 Hazards Identification

1.1.1 GHS Classification

Showing 1 of 5 View More

Pictogram(s)	 Irritant
Signal	Warning
GHS Hazard Statements	H315: Causes skin irritation [Warning Skin corrosion/irritation]
Precautionary Statement Codes	P264, P280, P302+P352, P321, P332+P313, and P362 (The corresponding statement to each P-code can be found at the GHS Classification page.)

▶ EU REGULATION (EC) No 1272/2008

1.1.2 Hazard Classes and Categories

Showing 2 of 5 View More

Skin Irrit. 2

▶ EU REGULATION (EC) No 1272/2008

Skin Irrit. 2 (100%)

Eye Irrit. 2 (100%)

▶ European Chemicals Agency (ECHA)

1.1.3 NFPA Hazard Classification

NFPA 704 Diamond	 2-1-0
NFPA Health Rating	2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
	1 - Materials that must be preheated before ignition can occur. Materials require considerable

NFPA Fire Rating	preheating, under all ambient temperature conditions, before ignition and combustion can occur.
NFPA Instability Rating	0 - Materials that in themselves are normally stable, even under fire conditions.

▶ Hazardous Substances Data Bank (HSDB)

1.1.4 Health Hazards

Can cause eye irritation; may rarely irritate skin. If recovered sulfur, refer to hydrogen sulfide.* (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

1.1.5 Fire Hazards

Special Hazards of Combustion Products: Produces toxic sulfur dioxide gas. Behavior in Fire: Burns with a pale blue flame that may be difficult to see in daylight. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Combustible. Finely dispersed particles form explosive mixtures in air.

▶ ILO International Chemical Safety Cards (ICSC)

1.1.6 Hazards Summary

The major hazards encountered in the use and handling of sulfur stem from its toxicologic properties and flammability. Toxic by all routes (ie, inhalation, ingestion, and dermal contact), exposure to this pale yellow, crystalline substance may occur from the extraction of sulfur-bearing rock, its use in fertilizer, the production of sulfuric acid and other sulfur compounds, in wood pulping, in the vulcanization of rubber, and in the manufacture of matches, explosives, and dyes. Effects from exposure may include ulceration of the skin, conjunctivitis, inflammation of the nasal mucosa, shortness-of-breath, asthma, and tracheobronchitis. In activities and situations where over-exposure may occur, wear chemical protective clothing and a self-contained breathing apparatus. If exposure should occur, immediately irrigate eyes with copious amounts of tepid water for at least 15 minutes and wash skin extremely thoroughly with soap and water. Contaminated clothing should be removed and left at the work site for cleaning before reuse. Sulfur is an easily ignitable solid. In a powdered form it may form explosive mixtures with air, or in contact with oxidizing materials. Sulfur burns with a blue flame that may be difficult to see in daylight, and produces toxic sulfur dioxide gas. For fires involving sulfur, extinguish with dry chemical, sand, water spray (straight streams may scatter the material), fog, or standard foam. If water is used, apply from as far a distance as possible. Sulfur should be stored in a cool, well ventilated area, away from sources of ignition, physical damage, chlorates, nitrates, and other oxidizing materials. Sulfur may be shipped domestically via air, rail, road, and water. International shipments may require the label, "Flammable solid." Small dry spills of sulfur may be carefully shovelled into a clean, dry, covered container for recovery or later disposal. Large spills may be wetted down with water and diked for later disposal. Do not allow material to enter water sources or sewers.

▶ Hazardous Substances Data Bank (HSDB)

1.1.7 Fire Potential

Vapors given off during melting of sulfur may contain sufficient hydrogen sulfide & carbon disulfide to permit ignition of air/vapor mixture on contact with hot surface; such ignition may result in transmission of flames to molten sulfur. ... Sulfur is poor conductor of electricity & tends to develop charges of static electricity during transport or processing; static discharge may lead to ignition of sulfur dust. Fires in heaps of sulfur are frequent & insidious since they may break out again even after original conflagration has ... Been extinguished.

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2121

Hazardous Substances Data Bank (HSDB)

Combustible liquid. Combustion by-products may include sulfur dioxide gas.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-139

Hazardous Substances Data Bank (HSDB)

Ignites in air above 261 °C, in oxygen below 260 °C, burning to the dioxide ... .

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1539

Hazardous Substances Data Bank (HSDB)

1.1.8 Skin, Eye, and Respiratory Irritations

May cause irritation of skin, mucous membranes.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1539

Hazardous Substances Data Bank (HSDB)

... May cause irritation to ... eye & resp tract.

Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984., p. II-116

Hazardous Substances Data Bank (HSDB)

... If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.

Environment Canada; Tech Info for Problem Spills: Sulphur (Draft) p.1 (1977)

Hazardous Substances Data Bank (HSDB)

1.2 Safety and Hazard Properties

1.2.1 Flammable Limits

Lower flammable limit for sulfur dust in air is 35 mg/L ... .

Clayton, G.D., F.E. Clayton (eds.) Patty's Industrial Hygiene and Toxicology. Volumes 2A, 2B, 2C, 2D, 2E, 2F: Toxicology. 4th ed. New York, NY: John Wiley & Sons Inc., 1993-1994., p. 806

Hazardous Substances Data Bank (HSDB)

1.2.2 Critical Temperature & Pressure

Critical temperature: 1040 °C; Critical pressure: 11,75 mPa; Critical volume: 2.48 mL/g

Staff; Kirk-Othmer Encyclopedia of Chemical Technology. (1999-2011). New York, NY: John Wiley & Sons; Sulfur. Online Posting Date: 14 Jul 2006

▶ Hazardous Substances Data Bank (HSDB)

1.2.3 Physical Dangers

Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc.

▶ ILO International Chemical Safety Cards (ICSC)

1.2.4 Explosive Limits and Potential

Grinding of sulfur involves high degree of explosive hazard.

Farm Chemicals Handbook 1991. Willoughby, OH: Meister, 1991., p. C-287

▶ Hazardous Substances Data Bank (HSDB)

Upper explosive limit: 1400 g/cu m, lower explosive limit: 35 g/cu m.

Environment Canada; Tech Info for Problem Spills: Sulfur (Draft) p.1 (1981)

▶ Hazardous Substances Data Bank (HSDB)

...Explosion risk above 260 °F.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 848

▶ Hazardous Substances Data Bank (HSDB)

Explosive limits , vol% in air: 35-1400 g/m³

▶ ILO International Chemical Safety Cards (ICSC)

1.3 First Aid Measures

1.3.1 First Aid

EYES: wash eyes carefully for at least 15 min. SKIN: Treat molten sulfur burns with petroleum jelly or mineral oil. If recovered sulfur, treat as for hydrogen sulfide.* (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

1.3.2 Inhalation First Aid

Fresh air, rest. Half-upright position. Refer for medical attention.

- ILO International Chemical Safety Cards (ICSC)

1.3.3 Skin First Aid

Remove contaminated clothes. Rinse and then wash skin with water and soap.

- ILO International Chemical Safety Cards (ICSC)

1.3.4 Eye First Aid

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

- ILO International Chemical Safety Cards (ICSC)

1.3.5 Ingestion First Aid

Rinse mouth. Refer for medical attention .

- ILO International Chemical Safety Cards (ICSC)

1.4 Fire Fighting

Excerpt from ERG Guide 133 [Flammable Solids]: SMALL FIRE: Dry chemical, CO2, sand, earth, water spray or regular foam. LARGE FIRE: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk. Fire Involving Metal Pigments or Pastes (e.g. "Aluminum Paste") Aluminum Paste fires should be treated as a combustible metal fire. Use DRY sand, graphite powder, dry sodium chloride-based extinguishers, G-1® or Met-L-X® powder. Also, see ERG Guide 170. FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/hazmat/outreach-training/erg*** *(accessed April 26, 2016).*

- CAMEO Chemicals

Use water spray, foam, powder, dry sand. In case of fire: keep drums, etc., cool by spraying with water.

- ILO International Chemical Safety Cards (ICSC)

1.4.1 Fire Fighting Procedures

Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Use fine spray or fog to control fire by preventing its spread and absorbing some of its heat. Water or foam may cause frothing of molten sulfur.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-139

Hazardous Substances Data Bank (HSDB)

If material /is/ on fire or involved in /a/ fire, use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 848

Hazardous Substances Data Bank (HSDB)

In Case of Fire: Use appropriate extinguishing media for combustibles in the area. Wear full protective clothing and self-contained breathing apparatus. Evacuate nonessential personnel from the area to prevent human exposure to fire, smoke, fumes or products of combustion. Prevent use of contaminated buildings, area, and equipment until decontaminated. Water runoff can cause environmental damage. If water is used to fight fire, dike and collect runoff.

Syngenta Crop Protection, Inc.; MSDS, Thiolux Jet (Revision Date: 7/21/2010). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/msds/03_2556407212010.pdf

Hazardous Substances Data Bank (HSDB)

1.4.2 Firefighting Hazards

Burns with a pale blue flame that may be difficult to see in daylight.

U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.

Hazardous Substances Data Bank (HSDB)

1.5 Accidental Release Measures

1.5.1 Isolation and Evacuation

Excerpt from ERG Guide 133 [Flammable Solids]: As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. LARGE SPILL: Consider initial downwind evacuation for at least 100 meters (330 feet). FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. https://www.phmsa.dot.gov/hazmat/outreach-training/erg (accessed April 26, 2016).

CAMEO Chemicals

1.5.2 Spillage Disposal

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting.

ILO International Chemical Safety Cards (ICSC)

1.5.3 Cleanup Methods

Environmental considerations: Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use

natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 848

Hazardous Substances Data Bank (HSDB)

Enviromental considerations: Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 848

Hazardous Substances Data Bank (HSDB)

Large spillages should be dammed-off and pumped into containers; soak up remainder with absorbent material and dispose of in accordance with local regulations.

Mester, R.T.,Sine, C. (eds.) Crop Protection Handbook Volume 97. Meisterpro. Willoughby,OH. 2011, p. 635

Hazardous Substances Data Bank (HSDB)

Stop or reduce discharge of material if this can be done without risk. Eliminate all sources of ignition. Avoid skin contact or inhalation. When spilled in a molten form, contain if possible by forming mechanical or chemical barriers and let it solidify. Shovel solid sulfur into containers with covers (avoid dusting) for recovery or disposal. When spilled in a molten form, contain if possible by using natural deep water pockets, and sand bag barriers to trap material at the bottom. Remove trapped material with suction hoses. If removal is not possible, let it solidify and apply a cover material, preferably inert and basic (limestone), to the spilled area until recovery procedures begin. This will reduce the possible release of sulfuric acid in the water.

Environment Canada; Tech Info for Problem Spills: Sulfur (Draft) p.54 (1981)

Hazardous Substances Data Bank (HSDB)

Do not contaminate water by cleaning of equipment and when disposing of equipment washwaters.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

Hazardous Substances Data Bank (HSDB)

1.5.4 Disposal Methods

SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

Hazardous Substances Data Bank (HSDB)

Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

Hazardous Substances Data Bank (HSDB)

Dump into a landfill site. Recommendable method: Landfill. Not recommendable method: Thermal destruction. Peer review: Caution: sulfur could be a fire hazard and may cause bacterial degradation, landfill is recommendable for small amt only. (Peer-review conclusions of an IRPTC expert consultation (May 1985))

United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 286

Hazardous Substances Data Bank (HSDB)

1.5.5 Preventive Measures

SRP: The scientific literature for the use of contact lenses by industrial workers is inconsistent. The benefits or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place.

Hazardous Substances Data Bank (HSDB)

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

Hazardous Substances Data Bank (HSDB)

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

Hazardous Substances Data Bank (HSDB)

For terrestrial uses, do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not apply when weather conditions favor drift from treated areas.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

Hazardous Substances Data Bank (HSDB)

For more Preventive Measures (Complete) data for Sulfur, Elemental (11 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

1.6 Handling and Storage

1.6.1 Nonfire Spill Response

Excerpt from ERG Guide 133 [Flammable Solids]: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. SMALL DRY SPILL: With clean shovel, place material

into clean, dry container and cover loosely; move containers from spill area. LARGE SPILL: Wet down with water and dike for later disposal. Prevent entry into waterways, sewers, basements or confined areas. (ERG, 2016)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2016 Emergency Response Guidebook. https://www.phmsa.dot.gov/hazmat/outreach-training/erg (accessed April 26, 2016).

▶ CAMEO Chemicals

1.6.2 Safe Storage

Fireproof. Separated from strong oxidants.

▶ ILO International Chemical Safety Cards (ICSC)

1.6.3 Storage Conditions

Store in cool, dry, well-ventilated location. Separate from chlorates, nitrates, other oxidizing materials, and hydrocarbons.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-139

▶ Hazardous Substances Data Bank (HSDB)

Store away from sparks, fire, flames. Isolate from oxidizing materials.

Mester, R.T.,Sine, C. (eds.) Crop Protection Handbook Volume 97. Meisterpro. Willoughby,OH. 2011, p. 635

▶ Hazardous Substances Data Bank (HSDB)

Store the material in a well-ventilated, secure area out of reach of children and domestic animals. Do not store food, beverages or tobacco products in the storage area. Prevent eating, drinking, tobacco use, and cosmetic application in areas where there is a potential for exposure to the material. Wash thoroughly with soap and water after handling.

Syngenta Crop Protection, Inc.; MSDS, Thiolux Jet (Revision Date: 7/21/2010). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/msds/03_2556407212010.pdf

▶ Hazardous Substances Data Bank (HSDB)

Sulfur dust suspended in air ignites easily. Keep away from heat, sparks, and flame.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

▶ Hazardous Substances Data Bank (HSDB)

1.7 Exposure Control and Personal Protection

1.7.1 Inhalation Risk

Evaporation at 20 °C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

▶ ILO International Chemical Safety Cards (ICSC)

1.7.2 Effects of Short Term Exposure

The substance is irritating to the eyes, skin and respiratory tract. Inhalation of the powder may cause inflammation of the nose and respiratory tract.

▶ ILO International Chemical Safety Cards (ICSC)

1.7.3 Effects of Long Term Exposure

Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the respiratory tract. This may result in chronic bronchitis.

▶ ILO International Chemical Safety Cards (ICSC)

1.7.4 Allowable Tolerances

Residues of sulfur are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: stabilizer. Limit: None.

40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: https://www.ecfr.gov

▶ Hazardous Substances Data Bank (HSDB)

1.7.5 Personal Protective Equipment (PPE)

Safety goggles with side shields; approved respirator; heat-resistant gloves; leather heat-resistant clothing. If recovered sulfur, refer to hydrogen sulfide.* (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▶ CAMEO Chemicals

Personal Protective Equipment: Applicators and other handlers must wear: Long-sleeved shirt and long pants; Chemical resistant gloves made of waterproof material; Shoes plus socks; Protective eyewear.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

▶ Hazardous Substances Data Bank (HSDB)

... Restricted-entry interval (REI) of 24 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is: Coveralls over long-sleeved shirt and long pants; Chemical resistant gloves made of waterproof material; Socks and chemical resistant footwear.

Syngenta Crop Protection, Inc.; Product Label for Thiolux Jet dry Flowable Micronized Sulfur (2003). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/labels/SCP1138AL2B1203.pdf

▶ Hazardous Substances Data Bank (HSDB)

Personnel protection: If contact with the material anticipated, wear appropriate chemical protective clothing. Wear positive pressure self-contained breathing apparatus when fighting fires involving this material.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 848

Hazardous Substances Data Bank (HSDB)

Where eye contact is likely, use dust-proof chemical goggles.

Syngenta Crop Protection, Inc.; MSDS, Thiolux Jet (Revision Date: 7/21/2010). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/msds/03_2556407212010.pdf

Hazardous Substances Data Bank (HSDB)

Where contact is likely, wear chemical-resistant gloves (such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride [PVC] or Viton), coveralls, socks and chemical-resistant footwear.

Syngenta Crop Protection, Inc.; MSDS, Thiolux Jet (Revision Date: 7/21/2010). Available from, as of July 22, 2011: https://www.syngentacropprotection.com/pdf/msds/03_2556407212010.pdf

Hazardous Substances Data Bank (HSDB)

1.7.6 Fire Prevention

NO open flames, NO sparks and NO smoking. Closed system, dust explosion-proof electrical equipment and lighting. Prevent deposition of dust. Prevent build-up of electrostatic charges (e.g., by grounding).

ILO International Chemical Safety Cards (ICSC)

1.7.7 Exposure Prevention

PREVENT DISPERSION OF DUST!

ILO International Chemical Safety Cards (ICSC)

1.7.8 Inhalation Prevention

Use local exhaust or breathing protection.

ILO International Chemical Safety Cards (ICSC)

1.7.9 Skin Prevention

Protective gloves.

ILO International Chemical Safety Cards (ICSC)

1.7.10 Eye Prevention

Wear safety goggles.

ILO International Chemical Safety Cards (ICSC)

1.7.11 Ingestion Prevention

Do not eat, drink, or smoke during work.

- ILO International Chemical Safety Cards (ICSC)

1.8 Stability and Reactivity

1.8.1 Air and Water Reactions

Flammable. Insoluble in water.

- CAMEO Chemicals

1.8.2 Reactive Group

Reducing Agents, Strong

- CAMEO Chemicals

1.8.3 Reactivity Alerts

Highly Flammable

Strong Reducing Agent

- CAMEO Chemicals

1.8.4 Reactivity Profile

SULFUR reacts violently with strong oxidizing agents causing fire and explosion hazards [Handling Chemicals Safely 1980 p. 871]. Reacts with iron to give pyrophoric compounds. Attacks copper, silver and mercury. Reacts with bromine trifluoride, even at 10°C [Mellor 2:113. 1946-47]. Ignites in fluorine gas at ordinary temperatures [Mellor 2:11-13 1946-47]. Reacts to incandescence with heated with thorium [Mellor 7:208 1946-47]. Can react with ammonia to form explosive sulfur nitride. Reacts with calcium phosphide incandescently at about 300°C. Reacts violently with phosphorus trioxide [Chem. Eng. News 27:2144 1949]. Mixtures with ammonium nitrate or with metal powders can be exploded by shock [Kirk and Othmer 8:644]. Combinations of finely divided sulfur with finely divided bromates, chlorates, or iodates of barium, calcium, magnesium, potassium, sodium, or zinc can explode with heat, friction, percussion, and sometimes light [Mellor 2 Supp.1:763. 1956]. A mixture with barium carbide heated to 150°C becomes incandescent. Reacts incandescently with calcium carbide or strontium carbide at 500°C. Attacks heated lithium, or heated selenium carbide with incandescence [Mellor 5:862 1946-47]. Reacts explosively if warmed with powdered zinc [Mellor 4:476. 1946-47]. Reacts vigorously with tin [Mellor 7:328. 1946-47]. A mixture with potassium nitrate and arsenic trisulfide is a known pyrotechnic formulation [Ellern 1968 p. 135]. Mixtures with any perchlorate can explode on impact [ACS 146:211-212]. A mixture of damp sulfur and calcium hypochlorite produces a brilliant crimson flash with scatter of molten sulfur [Chem. Eng. News 46(28):9 1968]. Takes fire spontaneously in chlorine dioxide and may produce an explosion [Mellor 2:289 (1946-47)]. Ignites if heated with chromic anhydride ignite and can explode, [Mellor 10:102 (1946-47)]. Even small percentages of hydrocarbons in contact with molten sulfur generate hydrogen sulfide and carbon disulfide, which may accumulate in explosive concentrations. Sulfur reacts with Group I metal nitrides to form flammable mixtures, evolving flammable and toxic NH3 and H2S gases if water is

present (Mellor, 1940, Vol. 8, 99).

▶ CAMEO Chemicals

1.8.5 Hazardous Reactivities and Incompatibilities

Reacts with oxidizing materials.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-139

▶ Hazardous Substances Data Bank (HSDB)

The reaction of ammonia with specially prepared sulfur may form explosive sulfur nitride. Ammonium nitrate mixed with sulfur ... can be exploded by shock. ... Mixtures of ammonium perchlorate with sulfur ... are impact sensitive.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 491-187

▶ Hazardous Substances Data Bank (HSDB)

Mixture of barium carbide and sulfur heated at 150 °C becomes incandescent ... Mixture of sulfur and barium chlorate ignites at about 108-111 °C. ... Calcium carbide reacts incandescently with sulfur vapors at 500 °C. ... Calcium phosphide reacts with sulfur incandescently at about 300 °C.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 491-188

▶ Hazardous Substances Data Bank (HSDB)

Powdered sulfur is spontaneously flammable when mixed with lampblack or freshly calcined charcoal. ... A piece of sulfur ... takes fire spontaneously in chlorine dioxide and may produce an explosion ... Flowers-of-sulfur moistened with chromyl chloride ignites spontaneously. ... Mixture of sulfur & lead chlorate ignites @ about 63-67 °C.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 491-188

▶ Hazardous Substances Data Bank (HSDB)

For more Hazardous Reactivities and Incompatibilities (Complete) data for Sulfur, Elemental (36 total), please visit the HSDB record page.

▶ Hazardous Substances Data Bank (HSDB)

1.9 Transport Information

1.9.1 DOT Emergency Guidelines

/GUIDE 133: FLAMMABLE SOLIDS/ Fire or Explosion: Flammable/combustible material. May be ignited by friction, heat, sparks or flames. Some may burn rapidly with flare burning effect. Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence. Substance may be transported in a molten form at a temperature that may be above its flash point. May re-ignite after fire is extinguished.

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008212-3

▶ Hazardous Substances Data Bank (HSDB)

/GUIDE 133: FLAMMABLE SOLIDS/ Health: Fire may produce irritating and/or toxic gases. Contact may cause burns to skin and eyes. Contact with molten substance may cause severe burns to skin and eyes. Runoff from fire control may

cause pollution.

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008212-3

Hazardous Substances Data Bank (HSDB)

/GUIDE 133: FLAMMABLE SOLIDS/ Public Safety: CALL Emergency Response Telephone Number ... As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas.

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008212-3

Hazardous Substances Data Bank (HSDB)

/GUIDE 133: FLAMMABLE SOLIDS/ Protection Clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008212-3

Hazardous Substances Data Bank (HSDB)

For more DOT Emergency Guidelines (Complete) data for Sulfur, Elemental (8 total), please visit the HSDB record page.

Hazardous Substances Data Bank (HSDB)

1.9.2 DOT ID and Guide

1350 133

DOT Emergency Response Guidebook

1.9.3 Shipping Name/ Number DOT/UN/NA/IMO

UN 1350; Sulfur, lump and coarse grained powder, or fine grained powder; Sulfur, molten

Hazardous Substances Data Bank (HSDB)

UN 2448; Sulfur, molten

Hazardous Substances Data Bank (HSDB)

IMO 4.1; Sulfur, lump and coarse grained powder, or fine grained powder; Sulfur, molten

Hazardous Substances Data Bank (HSDB)

1.9.4 Standard Transportation Number

49 453 56; Sulfur; Sulphur; Sulfur flow; Flowers of Sulfur

Hazardous Substances Data Bank (HSDB)

1.9.5 Shipment Methods and Regulations

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

49 CFR 171.2 (7/1/96)

Hazardous Substances Data Bank (HSDB)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1997., p. 217

Hazardous Substances Data Bank (HSDB)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.4060,4061,4061-1 (1988)

Hazardous Substances Data Bank (HSDB)

1.9.6 DOT Label

Flammable Solid (international) Class 9 (domestic)

CAMEO Chemicals

1.9.7 UN Classification

UN Hazard Class: 4.1; UN Pack Group: III

ILO International Chemical Safety Cards (ICSC)

1.10 Regulatory Information

1.10.1 FIFRA Requirements

Residues of sulfur are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: stabilizer. Limit: None.

40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: https://www.ecfr.gov

Hazardous Substances Data Bank (HSDB)

Section 4(g)(2)(A) of FIFRA calls for the Agency to determine, after submission of relevant data concerning an active ingredient, whether products containing the active ingredient are eligible for reregistration. The Agency has previously identified and required the submission of all the generic (i.e., active-ingredient specific) data required to support reregistration of products containing sulfur as an active ingredient. The Agency has completed its review of these generic data, and has determined that the data are sufficient to support reregistration of products containing sulfur.

USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Sulfur p.9 (March 1991). Available from, as of July 19, 2011: https://www.epa.gov/pesticides/reregistration/status.htm

Hazardous Substances Data Bank (HSDB)

As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether they are eligible for reregistration. In addition, all pesticides must meet the new safety standard of the Food Quality Protection Act of 1996. Sulfur is found on List A, which contains most food use pesticides and consists of the 194 chemical cases (or 350 individual active ingredients) for which EPA issued registration standards prior to FIFRA, as amended in 1988. Case No: 0031; Pesticide type: fungicide; Registration Standard Date: 12/19/82; Case Status: RED Approved 05/91; OPP has made a decision that some/all uses of the pesticide are eligible for reregistration, as reflected in a Reregistration Eligibility Decision (RED) document.; Active ingredient (AI): sulfur; AI Status: OPP has completed a Reregistration Eligibility Decision (RED) document for the case/AI.

USEPA/OPP; Status of Pesticides in Registration, Reregistration and Special Review p.149 (Spring, 1998) EPA 738-R-98-002

Hazardous Substances Data Bank (HSDB)

1.10.2 FDA Requirements

Sulfur is an indirect food additive for use only as a component of adhesives.

21 CFR 175.105 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of July 18, 2011: https://www.ecfr.gov

Hazardous Substances Data Bank (HSDB)

1.11 Other Safety Information

1.11.1 Toxic Combustion Products

Combustion by-products include sulfur dioxide gas.

National Fire Protection Association; Fire Protection Guide to Hazardous Materials. 14TH Edition, Quincy, MA 2010, p. 49-139

Hazardous Substances Data Bank (HSDB)

1.11.2 Special Reports

Environment Canada; Tech Info for Problem Spills: Sulfur (Draft) (1981).

Hazardous Substances Data Bank (HSDB)

Nat'l Research Council Canada; Sulfur and its Inorganic Derivatives in the Canadian Environ. (1977) NRCC No. 15015.

- Hazardous Substances Data Bank (HSDB)

USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Sulfur (March 1991). The RED summarizes the risk assessment conclusions and outlines any risk reduction measures necessary for the pesticide to continue to be registered in the U.S.[Available from, as of July 19, 2011: http://www.epa.gov/pesticides/reregistration/status.htm]

- Hazardous Substances Data Bank (HSDB)