

SAFETY DATA SHEET

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SECTION 1. IDENTIFICATION

Product Name: Sulfur Nanoparticle Dispersion

Product Number: All applicable American Elements product codes, e.g. S-E-02-NPD , S-E-03-NPD , S-E-04-NPD , S-E-05-NPD

CAS #: 7704-34-9

Relevant identified uses of the substance: Scientific research and development

Supplier details:

American Elements
10884 Weyburn Ave.
Los Angeles, CA 90024
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Emergency telephone number:

+1 800-424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS02 Flame

Flam. Sol. 1 H228 Flammable solid.

GHS07

Skin Irrit. 2 H315 Causes skin irritation.

Hazards not otherwise classified

No data available.



GHS label elements

The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms

GHS02

GHS07

Signal word

Danger

Hazard statements

H228 Flammable solid.

H315 Causes skin irritation.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ventilating/lighting/equipment.

P362 Take off contaminated clothing and wash before reuse.

P321 Specific treatment (see on this label).

WHMIS classification

B4 - Flammable solid

D2B - Toxic material causing other toxic effects

Classification system

HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)

HEALTH 1

FIRE 2

REACTIVITY 0

Health (acute effects) = 1

Flammability = 2

Physical Hazard = 0

Other hazards

Results of PBT and vPvB assessment:

PBT:

N/A.

vPvB:

N/A.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

CAS No. / Substance Name: 7704-34-9 Sulphur

Identification number(s):

EC number: 231-722-6

Index number: 016-094-00-1

SECTION 4. FIRST AID MEASURES

Description of first aid measures

If inhaled:

Supply fresh air. If not breathing, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

In case of skin contact:

Immediately wash with soap and water; rinse thoroughly.

Seek immediate medical advice.

In case of eye contact:

Rinse opened eye for several minutes under running water. Consult a physician.

If swallowed:

Seek medical treatment.

Information for doctor

Most important symptoms and effects, both acute and delayed

No information available.

Indication of any immediate medical attention and special treatment needed
No information available.

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

Special hazards arising from the substance or mixture

If this product is involved in a fire, the following can be released:

Sulfur oxides (SO_x)

Hydrogen sulfide

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Keep away from ignition sources

Environmental precautions:

Do not allow material to be released to the environment without official permits.

Methods and material for containment and cleanup:

Keep away from ignition sources.

Ensure adequate ventilation.

Prevention of secondary hazards:

Keep away from ignition sources.

Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling

Keep container tightly sealed.

Store in cool, dry place in tightly closed containers.

Ensure adequate ventilation.

Information about protection against explosions and fires:

Protect against electrostatic charges.

Conditions for safe storage, including any incompatibilities

Storage

Requirements to be met by storerooms and receptacles:

Store in a cool location.

Information about storage in one common storage facility:

Store away from oxidizing agents.
Store away from halocarbons.
Do not store with interhalogens.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Specific end use(s)
No information available.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
Control parameters
Components with limit values that require monitoring at the workplace:
The product does not contain any relevant quantities of materials with critical values that should be monitored at the workplace.
Additional information:
No data
Exposure controls
Personal protective equipment
Follow typical general protective and industrial hygiene measures for handling chemicals.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
Breathing equipment:
Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with type N95 (USA) or PE (EN 143) cartridges as a backup to engineering controls.
Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards.
Protection of hands:
Impervious gloves
Inspect gloves prior to use.
Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.
Material of gloves
Nitrile rubber, NBR
Penetration time of glove material (in minutes)
480
Glove thickness
0.11 mm
Eye protection:
Safety glasses

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance:

Form:

Various forms (powder/flake/crystalline/beads, etc.)

Color:

Pale yellow

Odor:

Weak

Odor threshold:

No data available.

pH:

N/A.

Melting point/range:

115.21 °C (239 °F)

Boiling point/range:

444.6 °C (832 °F)

Sublimation temperature / start:

No data available.

Flash point:

> 999 °C (> 1830 °F)

Flammability (solid, gas):

Highly flammable.

Ignition temperature:

248 °C (478 °F)

Decomposition temperature:

No data available.

Auto igniting:

No data available.

Danger of explosion:

No data available.

Explosion limits:

Lower:

3.3 Vol %

Upper:

46 Vol %

Vapor pressure:

N/A.

Density at 20 °C (68 °F):

2.07 g/cm³ (17.274 lbs/gal)

Relative density

No data available.

Vapor density

N/A.

Evaporation rate

N/A.

Solubility in Water (H₂O):

Insoluble

Partition coefficient (n-octanol/water):

No data available.

Viscosity:

Dynamic:

N/A.

Kinematic:

N/A.

Other information

No information available.

SECTION 10. STABILITY AND REACTIVITY

Reactivity

No data available.

Chemical stability

Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided:

Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions

Reacts with strong oxidizing agents

Conditions to avoid

No information available.

Incompatible materials:

Oxidizing agents

Halocarbons

Interhalogens

Hazardous decomposition products:

Sulfur oxides (SO_x)

Hydrogen sulfide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity:

The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for components in this product.

LD/LC50 values that are relevant for classification:

Inhalative LC50 1660 mg/m³ (mam)

Skin irritation or corrosion:

Causes skin irritation.

Eye irritation or corrosion:

May cause irritation

Sensitization:

No sensitizing effects known.

Germ cell mutagenicity:

N/A

Carcinogenicity:

No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

Reproductive toxicity:

N/A

Specific target organ system toxicity - repeated exposure:

N/A

Specific target organ system toxicity - single exposure:

N/A

Aspiration hazard:

N/A

Subacute to chronic toxicity:

N/A

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

Carcinogenic categories
OSHA-Ca (Occupational Safety & Health Administration)
Substance is not listed.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity

Aquatic toxicity:

No information available.

Persistence and degradability:

No information available.

Bioaccumulative potential:

No information available.

Mobility in soil:

No information available.

Additional ecological information:

General notes:

Do not allow material to be released to the environment without official permits.

Avoid transfer into the environment.

Results of PBT and vPvB assessment:

PBT:

N/A.

vPvB:

N/A.

Other adverse effects

No information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Recommendation:

Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation:

Disposal must be made according to official regulations.

SECTION 14. TRANSPORT INFORMATION

UN-Number

DOT, IMDG, IATA

UN1350

UN proper shipping name

DOT

Sulfur

IMDG, IATA

SULPHUR

Transport hazard class(es)

DOT

Class

4.1 Flammable solids, self-reactive substances and solid desensitised explosives.

Label

4.1

Class

4.1 (F3) Flammable solids, self-reactive substances and solid desensitised explosives

Label 4.1

IMDG, IATA

Class

4.1 Flammable solids, self-reactive substances and solid desensitised explosives.

Label

4.1

Packing group

DOT, IMDG, IATA

III

Environmental hazards:

N/A.

Special precautions for user

Warning: Flammable solids, self-reactive substances and solid desensitised explosives

EMS Number:

F-A,S-G

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

N/A.

Transport/Additional information:

DOT

Marine Pollutant (DOT):

No

UN "Model Regulation":

UN1350, Sulfur, 4.1, III

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

GHS label elements

The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms

GHS02

GHS07

Signal word

Danger

Hazard statements

H228 Flammable solid.

H315 Causes skin irritation.

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ventilating/lighting/equipment.

P362 Take off contaminated clothing and wash before reuse.

P321 Specific treatment (see on this label).

National regulations

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)

Substance is not listed.
California Proposition 65
Prop 65 - Chemicals known to cause cancer
Substance is not listed.
Prop 65 - Developmental toxicity
Substance is not listed.
Prop 65 - Developmental toxicity, female
Substance is not listed.
Prop 65 - Developmental toxicity, male
Substance is not listed.
Information about limitation of use:
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use)
Substance is not listed.
Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H225: Highly flammable liquid and vapor.

H336: May cause drowsiness or dizziness.

H371: May cause damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P233: Keep container tightly closed.

P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240: Ground/Bond container and receiving equipment.

P241: Use explosion-proof-electrical/ventilating/li

P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge.

P271: Use only outdoors or in a well-ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

P261: Avoid breathing dust/fume/gas/mist/vapors/spray.

P264: Wash hands thoroughly after handling.

P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing.

Rinse skin with water/shower.

P312 Call a POISON CENTER or doctor/ physician if you feel unwell.

P370+P378: In case of fire: Use ... for extinction.

Hazards not otherwise classified (HNOC) or not covered by GHS

None

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

Sulphur (S) CAS#: 7704-34-9

Ethanol (C₂H₆O) CAS#: 64-17-5

SECTION 4. FIRST AID MEASURES

Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labeling (see section 2) and/or in section 11

Indication of any immediate medical attention and special treatment needed

no data available

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

Use water, CO₂, dry chemical, or foam for extinction.

Special hazards arising from the substance or mixture

Flammable. Risk of ignition. Dust can form an explosive mixture in air. Keep product and empty container away from heat and sources of ignition.

Advice for firefighters

Wear self contained breathing apparatus for firefighting if necessary.

Further information

no data available

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

Environmental precautions

Avoid release to the environment. See Section 12 for additional ecological information.

Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

Reference to other sections

For disposal see section 13.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection. For precautions see section 2.

Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area.

Specific end use(s)

Apart from the uses mentioned in section 1 no other specific uses are stipulated

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Exposure controls

Appropriate engineering controls

Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

For any handling steps where the substance is in particulate form or in a suspension with pure water where the substance is not solubilized, the gloves must be comprised of material that successfully passes ASTM F-1671. For any handling steps where the substance is part of a carrier liquid, other than the aqueous suspension noted in the previous paragraph, gloves must be comprised of material that successfully passes ASTM F-739 (continuous liquid contact method). Gloves must be changed before they show degradation and before the designated breakthrough time for the carrier liquid (as determined by the ASTM F-739 testing or by the manufacturer). Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection

Impervious clothing, The type of protective equipment must be selected according to the concentration

and amount of the dangerous substance at the specific workplace.

Respiratory protection

The EPA mandates the use of full face respirators with minimum N100 grade cartridges if there is any risk of exposure to the dust. For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Do not let product enter drains.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

- a) Appearance: liquid
- b) Odor: Odorless
- c) Odor Threshold:
- d) pH: no data available
- e) Melting point/freezing point: no data available
- f) Initial boiling point and boiling range: no data available
- g) Flash point: no data available
- h) Evaporation rate: no data available
- i) OSHA Flammability Class: no data available
- j) Upper/lower flammability or explosive limits: Flammable
- k) Vapor pressure: no data available
- l) Vapor density (air = 1): no data available
- m) Relative density (water = 1): no data available
- n) Water solubility: Insoluble in water
- o) Partition coefficient - noctanol/water: no data available
- p) Auto-ignition temperature: no data available
- q) Decomposition temperature: no data available
- r) Viscosity: no data available
- s) Explosive properties: no data available

Other safety information

no data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity

None known, based on information available.

Chemical stability

Moisture/oxygen sensitive.

Possibility of hazardous reactions

None under normal processing.

Conditions to avoid

Avoid heat, flames, sparks and other sources of ignition. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers. Do not store at elevated temperatures.

Incompatible materials

Strong acids, strong bases, strong oxidizers, nitrates

Hazardous decomposition products

Other decomposition products - Hydrogen

In the event of fire: see section 5

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity

Acute oral toxicity LD50 rat: Not listed

Acute inhalation toxicity: Not listed

Acute dermal toxicity LD50 rabbit: Not listed

Skin corrosion/irritation

No information available

Serious eye damage/eye irritation

No information available

Respiratory or skin sensitization

No information available

Germ cell mutagenicity

no data available

Carcinogenicity

Not listed

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

Product may be an aspiration hazard

Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Freshwater Fish: No information available

Persistence and degradability

No information available

Bioaccumulative potential

No information available

Mobility in soil

no data available

Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

Other adverse effects

Do not allow product to enter surface waters, wastewater or soil.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

SECTION 14. TRANSPORT INFORMATION

US DOT Information

Shipping Name: Ethanol

Hazard Class: 3

UN/NA #: UN1170

Packing Group: II

Required Label(s): 3

IMDG Information

Shipping Name: Ethanol

Hazard Class: 3

UN/NA #: UN1170

Packing Group: II

Required Label(s): 3

IATA Information

Shipping Name: Ethanol

Hazard Class: 3

UN/NA #: UN1170

Packing Group: II

Required Label(s): 3

SECTION 15. REGULATORY INFORMATION

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard

Full text of H-Statements referred to under sections 2 and 3.

HMIS Rating

Health hazard: 0

Flammability: 3

Physical Hazard 1

NFPA Rating

Health hazard: 0

Fire Hazard: 3

Reactivity Hazard: 1

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product.

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any

use of the product not in conformance with this Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

SECTION 16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2019 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.