

SDS SHEET

Rev 12-13-17

Lead Sulfide Nanoparticles in Toluene

1. PRODUCT IDENTIFICATION

Chemical Name: Lead Sulfide Nanoparticles in Toluene

Supplier: NNCrystal US Corporation 534 W Research Center Blvd., Ste 254 Fayetteville, AR 72701

Product Line: PBS

Phone: 479.595.0662

Recommended Use: Research and development use only

2. HAZARDS IDENTIFICATION

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids(Category 2), H225

Acute toxicity, Oral(Category 4), H302

Aspiration hazard(Category 1), H304

Skin irritation(Category 2), H315

Acute toxicity, Inhalation(Category 4), H332

Specific target organ toxicity -single exposure(Category 3), Central nervous system, H336

Reproductive toxicity(Category 1A), H360

Reproductive toxicity(Category 2), H361

Specific target organ toxicity -repeated exposure(Category 2), H373

Acute aquatic toxicity(Category 1), H400

Acute aquatic toxicity(Category 2), H401

Chronic aquatic toxicity(Category 1), H410

GHS Label Elements:



Signal Word: Danger

Precautionary statement(s)

P201

Obtain special instructions before use.

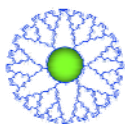
P202

Do not handle until all safety precautions have been read and understood.

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P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion - proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non - sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol - resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well - ventilated place. Keep container tightly closed.
P403 + P235	Store in a well - ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant

Hazards not otherwise classified (HNOC) or not covered by GHS -- none

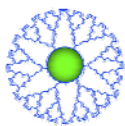
3. COMPOSITION/INFORMATION ON INGREDIENT (EACH VIAL)

Chemical Name: Lead(II) Sulfide

Chemical Formula: PbS

Typical Solvents (CAS No): Toluene (108-88-3), Hexanes (110-54-3), Chloroform (67-66-3), Dichloromethane (75-09-2), Methanol (67-56-1), Water

<u>Substance Name</u>	<u>CAS #</u>
Lead sulfide	1314-87-0
Oleic Acid	112-80-1
Toluene	108-88-3



4. FIRST AID MEASURES

Eye:

1. Flush immediately with warm water for at least 20 minutes.
2. Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
3. If pain persists or recurs seek medical attention.
4. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin:

1. Removing contaminated clothing, shoes and leathery wearings.
2. Washing affected area thoroughly with soap and water for at least 20 minutes.
3. Call a physician if irritation develops or persists.

Ingestion:

1. If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomits.
2. If victim is conscious and alert, give 2-4 cupfuls of milk/water to dilute the substance in the stomach.
3. Never give anything by mouth to an unconscious person.
4. Don't induce vomiting unless directed to by a medical person.
5. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible, prior to initiating first aid procedures.
6. Seek medical attention.

Inhalation:

1. Remove from further exposure and flush thoroughly with air.
2. Lay patient down. Keep warm and rested.
3. Prosthesis such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
4. If respiratory irritation seek immediate medical assistance and call a physician.

5. FIRE FIGHTING MEASURES

Suitable extinguishing agents: Use water spray, alcohol - resistant foam, dry chemical or carbon dioxide.

Protective equipment: Wear self-contained respirator if necessary. Wear protective gloves.

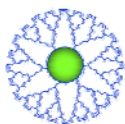
6. ACCIDENTAL RELEASE MEASURES

Person-related safety precautions: Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation.

Measures for environmental protection: Do not allow material to be released to the environment without proper governmental permits.

Measures for cleaning/collecting:

1. Remove all ignition sources.
2. Clean up all spills immediately.
3. Avoid breathing vapors and contact with skin and eyes.
4. Control personal contact by using protective equipment.
5. Contain and absorb small quantities with vermiculite or other absorbent material.
6. Wipe up.



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7. Collect residues in a flammable waste container.

7. HANDLING AND STORAGE

Precautions for safe handling:

1. Keep container tightly sealed. Store in refrigerator (2-8°C) under dark conditions.
2. Wash thoroughly after handling.
3. Use only in well ventilated area.
4. Ground and bond containers when transferring.
5. Use spark free tools and explosion proof equipment.

Conditions for safe storage, including any incompatibilities

1. Keep container tightly sealed. Store in refrigerator (2-8°C) under dark conditions.
2. Do not store with acids or oxidizers.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits Cadmium Sulfide:

TWA:

Exposure for Toluene solvent

OSHA – Final PELs: 200ppm TWA

OSHA Ceiling: 300ppm

ACGIH: 50ppm, skin-potential for cutaneous absorption

NIOSH: 100ppm TWA; 375 mg/m³ TWA; 550ppm IDLH

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.

General protective and hygienic measures: The usual precautionary measures for handling chemicals should be followed. 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.

Protection of hands: Impervious gloves - check gloves using UV light after use to determine level of contamination

Eye protection: Safety glasses

Body protection: Protective work clothing

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Liquid form - Crystalline powder, dissolved in a solvent

Color: Black

Odor: Odor dependent upon solvent used. Crystalline powder is odorless

Melting point/Melting range: ~114 degrees C to bulk melting point of PbS crystals.

Boiling point/Boiling range: Determined by solvent used

Flash point: Dependent upon solvent used

Ignition temperature: Dependent upon solvent used

Decomposition temperature: Not determined

Danger of explosion: Dependent upon solvent used. Crystalline powder does not present an explosion hazard.

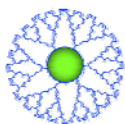
Explosion limits: Currently unknown for nanocrystals

Vapor pressure: Dependent upon solvent used

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Density: 7.5 g/cm³ (crystal at 15 degrees C) for the isolated nanocrystal powder

Solubility in / Miscibility with Polar Solvents: Soluble when hydrophilic ligands are present

Solubility in / Miscibility with Non-Polar Solvents: Soluble when hydrophobic ligands are present

10. STABILITY AND REACTIVITY

Reactivity: Vapor is explosive when exposed to heat or flame

Stability: Stable at room temperature in closed containers under normal storage and handling conditions

Incompatible materials: Strong Oxidizers

Hazardous decomposition products: Carbon

Thermal decomposition / conditions to be avoided: Not determined, but temperature increases will affect the solvent used.

Be aware of the necessary warnings for the specific solvent used.

11. TOXICOLOGICAL INFORMATION

Lead Sulfide:

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 2A - Group 2A: Probably carcinogenic to humans (Lead sulfide)

2A - Group 2A: Probably carcinogenic to humans (Lead sulfide)

NTP: Reasonably anticipated to be a human carcinogen The reference note has been added by TD based on the background information of the NTP. (Lead sulfide)

OSHA: OSHA specifically regulated carcinogen (Lead sulfide)

Reproductive toxicity: Possible risk of congenital malformation in the fetus. Known human reproductive toxicant

Specific target organ toxicity -single exposure: No data available

Specific target organ toxicity - repeated exposure: May cause damage to organs through prolonged or repeated exposure.

Additional Information

RTECS : OG4550000

Lead salts have been reported to cross the placenta and to induce embryo - and feto -mortality. They also have teratogenic effect in some animal species. No teratogenic effects have been reported with exposure to organometallic lead compounds. Adverse effects of lead on human reproduction, embryonic and fetal development, and postnatal (e.g., mental) development have been reported. Excessive exposure can affect blood, nervous, and digestive systems. The synthesis of hemoglobin is inhibited and results in anemia. If left untreated, neuromuscular dysfunction, possible paralysis, and encephalopathy can result. Additional symptoms of overexposure include: joint and muscle pain, weakness of the extensor muscles (frequently the hand and wrist), headache, dizziness, abdominal pain, diarrhea, constipation, nausea, vomiting, blue line on the gums, insomnia, and metallic taste. High body levels produce increased cerebrospinal pressure, brain damage, and stupor leading to coma and often death.

Toluene:

Skin: Irritant to skin and mucous membranes.

Eye: Irritating effect.

Sensitization: No sensitizing effects known.

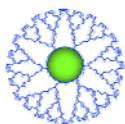
Additional toxicological information: Danger through skin absorption.

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

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Target Organs: Lungs, Liver, Kidneys

EPA-B1: Probable human carcinogen, limited evidence of carcinogenicity from epidemiologic studies.

IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.

NTP-2: Reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals. Carcinogen as defined by OSHA.

ACGIH A2: Suspected human carcinogen: Agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

Reproductive toxicity: Damage to fetus possible suspected human reproductive toxicant Reproductive toxicity - Rat - Inhalation Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count). Experiments have shown reproductive toxicity effects in male and female laboratory animals.

Developmental Toxicity: Rat - Oral Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus)

12. ECOLOGICAL INFORMATION

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

13. DISPOSAL CONSIDERATIONS

Consult local or national regulations for proper disposal.

14. TRANSPORT INFORMATION (Solvent Specific) – When dissolved in toluene

U.S. DOT 49 CFR 172.101

ID Number: 3077

Hazard class: 9

Packing Group: III

ID Number: 1294

Hazard class: 3

Packing Group:

15. REGULATIONS

SARA 302 Components

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

SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
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Massachusetts Right to Know Components

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
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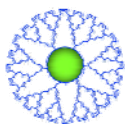
Lead sulfide	CAS-No. 1314-87-0	Revision Date 1993-04-24
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Pennsylvania Right to Know Components

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Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
Lead sulfide	CAS-No. 1314-87-0	Revision Date 1993-04-24

New Jersey Right to Know Components

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
Lead sulfide	CAS-No. 1314-87-0	Revision Date 1993-04-24

California Prop. 65 Components

WARNING: This product contains a chemical known to the State of California to cause cancer.

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
Lead sulfide	CAS-No. 1314-87-0	Revision Date 1993-04-24

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm:

Toluene	CAS-No. 108-88-3	Revision Date 2007-07-01
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16. OTHER INFORMATION

HMIS Rating

Health hazard: 2

Chronic Health Hazard: *

Flammability: 3

Physical Hazard: 0

NFPA Rating

Health hazard: 2

Fire Hazard: 3

Reactivity Hazard: 0