

MATERIAL SAFETY DATA SHEET

Section I. Chemical Product and Company Identification

Product Name	Lanthanum Strontium Cobalt Ferrite / Cerium Gadolinium Oxide Ink
Product Code	LSCF/GDC ink
CAS Number	Mixture
Manufacturer's Name	NexTech Materials, Ltd.
Address	404 Enterprise Drive Lewis Center, OH 43035
Emergency Telephone Number	1-800-424-9300 (Chemtrec)
Information Telephone Number	614-842-6606
Date Prepared	April 21, 2005

Section II. Composition / Information on Ingredients

Component	CAS #	% (Optional)
Cobalt iron oxide	12052-28-7	
Lanthanum oxide	1312-81-8	
Strontium oxide	1314-11-0	
Cerium (IV) oxide	1306-38-3	
Gadolinium oxide	12064-62-9	
Terpineol	8000-41-7	

Section III. Hazards Identification

- ◆ Hazard description: Harmful, Irritant
- ◆ Information pertaining to particular dangers for man and environment
Harmful if swallowed.
May cause sensitization by skin contact.
Irritating to eyes, respiratory system and skin, may cause burns

Section IV. First Aid Measures

- ◆ After inhalation
Supply fresh air and to be sure call for a doctor.
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
- ◆ After skin contact
Immediately wash with water and soap and rinse thoroughly. Remove affected clothing.
Seek immediate medical advice.
- ◆ After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.
- ◆ After swallowing
Seek immediate medical advice.

Section V. Fire Fighting Measures

- ◆ Suitable extinguishing agents
Water fog, alcohol foam, dry chemical
- ◆ Special hazards caused by the material, its products of combustion or resulting gases:
An exothermic reaction may result from contact with water.
In case of fire, the following can be released: Metal oxide fume
- ◆ Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

Section VI. 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:
Ensure adequate ventilation.
Dispose contaminated material as waste according to item 13.
- ◆ Additional information:
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

Section VII. Handling and Storage

- ◆ Handling
- ◆ Information for safe handling:
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
- ◆ Information about protection against explosions and fires:
Protect from humidity and fires.
- ◆ Storage
Requirements to be met by storerooms and receptacles: No special requirements.
- ◆ Information about storage in one common storage facility:
Do not store together with oxidizing and acidic materials. Store away from water/moisture.
- ◆ Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

Section VIII. Exposure Controls and 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.
- ◆ Components with limit values that require monitoring at the workplace:

Component	Limit Values (mg/m ³)	
	ACGIH TLV	OSHA PEL
Cobalt, elemental & inorganic compounds, as Co	0.02	0.1-metal dust and fume

- ◆ Additional information: No data
- ◆ Personal protective equipment
- ◆ 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
- ◆ Eye protection: Safety glasses
- ◆ Body protection: Protective work clothing

Section IX. Physical and Chemical Properties

- ◆ Form: Paste
- ◆ Color: Black
- ◆ Odor: Mild
- ◆ Melting point/Melting range: Not determined
- ◆ Boiling point/Boiling range: 417°F
- ◆ Flash point: 190°F
- ◆ Ignition temperature: Not determined
- ◆ Decomposition temperature: Not determined
- ◆ Danger of explosion: Store below flash point away from open flame or sparks.
- ◆ Explosion limits:

- ◆ Lower: Not determined
- ◆ Upper: Not determined
- ◆ Vapor pressure: <1 mm Hg (estimated for mixture, 20°C)
- ◆ Density: Not determined
- ◆ Solubility in / Miscibility with
- ◆ Water: Negligible

Section X. Stability and Reactivity

- ◆ Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
- ◆ Materials to be avoided: Water/moisture, acids, oxidizing agents, carbon dioxide, air, caustics
- ◆ Dangerous reactions: Exothermic reaction with water may result.
- ◆ Dangerous products of decomposition: Combustion produces carbon monoxide, carbon dioxide, various hydrocarbons and metal oxides.

Section XI. Toxicological Information

- ◆ Acute toxicity:
LD/Lc50 values that are relevant for classification:
Cerium (IV) oxide (CAS# 1306-38-3), 100%
Oral: LD50: >5000 mg/kg (rat)
Gadolinium oxide (CAS# 12064-62-9), 100%
Oral: LD50: 5000 mg/kg (rat)
- ◆ Primary irritant effect:
- ◆ on the skin: Irritant to skin and mucous membranes, possibly corrosive.
- ◆ on the eye: Irritating effect, possibly corrosive.
- ◆ Sensitization: Sensitization possible through skin contact.
- ◆ Subacute to chronic toxicity:
Cobalt is an experimental neoplastigen and tumorigen. It is an experimental carcinogen of the connective tissue and lungs. Cobalt metal and inorganic compounds are classified as an animal carcinogen by the ACGIH. Ingestion may cause burning in the mouth, esophagus, and stomach. Inhalation of dusts and fumes may cause irritation of the respiratory tract and labored breathing and coughing. Sensitization, nausea, flushing of the face and ringing in the ears are also possible. Chronic ingestion may result in pericardial effusion, polycardial effusion, polycythemia, cardiac failure, vomiting, convulsions and thyroid enlargement.
Iron compounds may cause vomiting, diarrhea, pink urine, black stool, and liver damage. May cause damage to the kidneys. Irritating to the respiratory tract, they may cause pulmonary fibrosis if dusts are inhaled.
Cerium salts increase the blood coagulation rate. Exposure to cerium salts may increase sensitivity to heat, itching and skin lesions. Large doses to experimental animals have caused writhing, ataxia, labored respiration, sedation, hypotension and death by cardiovascular collapse.
Lanthanons can cause delayed blood clotting leading to hemorrhages. Exposure may also lead to sensitivity to heat, itching, increased awareness of odor and taste, and liver damage.
Strontium has a low order of toxicity. High doses have caused changes in blood clotting factors, adrenal function and liver function.
Corrosive materials are acutely destructive to the respiratory tract, eyes, skin and digestive tract. Eye contact may result in permanent damage and complete vision loss. Inhalation may result in respiratory effects such as inflammation, edema, and chemical pneumonitis. May cause coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Ingestion may cause damage to the mouth, throat and esophagus. May cause skin burns or irritation depending on the severity of the exposure.
- ◆ Additional toxicological information:
Swallowing may lead to a strong corrosive effect on mouth and throat and to the danger of perforation of esophagus and stomach.
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
IARC-2B: Cobalt Ferrite is possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.
ACGIH A3: Animal carcinogen: Cobalt ferrite is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histological type(s), or by mechanism(s) not

considered relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

Section XII. Environmental Information

- ◆ General notes:
Do not allow material to be released to the environment without proper governmental permits.

Section XIII. Disposal Information

- ◆ Product:
Recommendation: Consult state, local or national regulations for proper disposal.
- ◆ Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

Section XIV. Transportation Information

Not a hazardous material for transportation.

- ◆ DOT regulations:
Hazard class: None
- ◆ Land transport ADR/RID (cross-border)
ADR/RID class: None
- ◆ Maritime transport IMDG:
IMDG Class: None
- ◆ Air transport ICAO-TI and IATA-DGR:
ICAO/IATA Class: None
- ◆ Transport/Additional information:
Not dangerous according to the above specifications.

Section XV. Regulatory Information

- ◆ Product related hazard information:
- ◆ Hazard symbols: Harmful, Irritant
- ◆ Risk phrases:
Harmful if swallowed.
May cause sensitization by skin contact.
Irritating to eyes, respiratory system, and skin.
- ◆ Safety phrases:
Avoid contact with skin.
Wear suitable gloves and protective clothing.
In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- ◆ National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
- ◆ Information about limitation of use:
For use only by technically qualified individuals.
This product contains cobalt and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Section XVI. Other Information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement 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 Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

MSDS Prepared by:

NexTech Materials, Ltd.
404 Enterprise Drive
Lewis Center, OH 43035

Vendee and third persons assume the risk of injury proximately caused by the material if reasonable safety procedures are not followed as provided for in the data sheet, and vendor shall not be liable for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed.

All persons using this product, all persons working in an area where this product is used, and all persons handling this product should be familiar with the contents of this data sheet. This information should be effectively communicated to employees and others who might come in contact with the product.

While the information accumulated and set forth herein is believed to be accurate as of the date hereof, NexTech Materials, Ltd. makes no warrant with respect thereto and disclaims all liability from reliance thereon. Recipients are advised to confirm in advance that the information is current, applicable, and suitable for their particular circumstances.