

MATERIAL SAFETY DATA SHEET

Section I. Chemical Product and Company Identification

Product Name	Nickel Oxide - Yttria-Stabilized Zirconia Ink
Product Code	NiO/YSZ-I
CAS Number	Mixture
Manufacturer's Name	Nexceris, LLC.
Address	404 Enterprise Dr. Lewis Center, OH 43035
Information Telephone Number	614-842-6606
Date Prepared	May 13, 2016

Section II. Composition / Information on Ingredients

Component	CAS #	% (Optional)
Nickel (II) oxide	1313-99-1	
Yttrium(III) oxide	1314-36-9	
Zirconium(IV) oxide	1314-23-4	
Terpineol	8000-41-7	

Section III. Hazards Identification

- ◆ Hazard description: **T** Toxic
- ◆ Information pertaining to particular dangers for man and environment
R 49 May cause cancer by inhalation.
R 43 May cause sensitization by skin contact.

Section IV. First Aid Measures

- ◆ After inhalation
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.
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**
Product is not flammable. Use fire-fighting measures that suit the surrounding fire.
- **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:
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
- ◆ 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.
 - Open and handle container with care.
- ◆ Information about protection against explosions and fires:
 - No special measures required
- ◆ Storage
 - Requirements to be met by storerooms and receptacles: No special requirements.
- ◆ Information about storage in one common storage facility: Do not store with acids or oxidizing agents.
- ◆ Further information about storage conditions:
 - This product is hygroscopic.
 - Protect from carbon dioxide.
 - Keep container tightly sealed.
 - Store in cool, dry conditions in well sealed containers.
 - Store under lock and key and with access restricted to technical experts or their assistants only.

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)	
	NIOSH REL	OSHA PEL
Nickel, elemental & inorganic compounds as Ni	0.015	1
Yttrium, elemental & inorganic compounds as Y	1.0	1.0
Zirconium compounds (as Zr)	5.0	5.0

- ◆ 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.
 - Store protective clothing separately.
- ◆ 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: Powder
- ◆ Color: Gray-Green
- ◆ Odor: Not determined
- ◆ Melting point/Melting range: Not determined
- ◆ Boiling point/Boiling range: Not determined
- ◆ Flash point: Not applicable
- ◆ Ignition temperature: Not determined
- ◆ Decomposition temperature: Not determined
- ◆ Danger of explosion: Product does not present an explosion hazard.
- ◆ Explosion limits:
- ◆ Lower: Not determined
- ◆ Upper: Not determined

- ◆ Vapor pressure: Not determined
 - ◆ Density: Not determined
 - ◆ Solubility in / Miscibility with
 - ◆ Water: Not determined
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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: acids, air, carbon dioxide, oxidizing agents
 - ◆ Dangerous reactions: No dangerous reactions known
 - ◆ Dangerous products of decomposition: Metal oxide fume
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Section XI. Toxicological Information

- ◆ Acute toxicity: No data
 - ◆ Primary irritant effect:
 - ◆ on the skin: powder: irritant effect
 - ◆ on the eye: powder: irritant effect
 - ◆ Sensitization: sensitization possible through skin contact
 - ◆ Subacute to chronic toxicity:
Nickel and nickel compounds may cause a form of dermatitis known as nickel itch. They may also cause intestinal disorders, convulsions and asphyxia. Airborne nickel contaminated dusts are regarded as carcinogenic to the respiratory tract.
 - ◆ Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
 - ◆ Carcinogenicity classification information for **Nickel Oxide**:
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.
ACGIH A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiological studies of, or convincing clinical evidence in, exposed humans.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for components in this product.
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Section XII. Environmental Information

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

- ◆ Product related hazard information: observe the general safety regulations when handling chemicals.
Hazard symbols: T Toxic

Risk phrases:

49 May cause cancer by inhalation.

43 May cause sensitization by skin contact.

Safety phrases:

53 Avoid exposure - obtain special instructions before use.

45 In case of accident or if you feel unwell, seek medical advice immediately.

◆ National regulations

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

This product contains a chemical known to the state of California to cause cancer or reproductive toxicity.

◆ Information about limitation of use:

For use only by technically qualified individuals.

This product contains nickel 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:

Nexceris, LLC.

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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.