Section 1: Product and Company Identification:

1.1 Product Identifier

Product Form:	Mixture
Identification of Substance:	Colloidal ceria in water
Product Name:	NYACOL® CEO2(NO3)
Synonym:	Cerium oxide in water
CAS Number:	1306-38-3
Index Number:	Not available.
EINECS Number:	215-150-4
REACH Registration Number:	01-2119488673-24-0062; See Section 3.
Formula:	CeO_2
Nanoforms:	CeO_2 exists as a nanoform
Unique formula identifier (UFI):	VQS2-C0W4-100R-XA3C

1.2 Relevant identified uses of the substance or mixture and uses advised against

Recommended Use:	Ceramics.
Restrictions on Use:	For industrial use only, not for food, drug or home use.

1.3 Details of the supplier of the safety data sheet

Company Identification:	Nyacol Nano Technologies, Incorporated Megunko Road, P.O. Box 349, Ashland, MA 01721 U.S.A. +1 508-881-2220
Email Contact:	info@nyacol.com
Internet:	www.nyacol.com

1.4 Emergency telephone number

In Case of Emergency:	USA/Canada CHEMTREC: +1 (703) 527-3887 International CHEMTREC: +1 (703) 741-5970 24 Hours/Day: 7 Days/Week

Section 2: Hazard(s) Identification

2.1 Classification of the substance or mixture

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

Skin Irritant, Category 2, H315 - Causes skin irritation
Eye Irritation, Category 2, H319 - Causes serious eye irritation

Classification according to Regulation (EC) No. 1272/2008 (CLP)

Skin Irritant, Category 2, H315 - Causes skin irritation
Eye Irritation, Category 2, H319 - Causes serious eye irritation

2.2 Label Elements

Signal Word: Warning

Hazard determining components of labeling:	Nitric acid
Hazard Statement(s)	H315 - Causes skin irritation H319 - Causes serious eye irritation

Precautionary Statement(s):

P264 – Wash face, hands and any exposed skin thoroughly after handling.
P280 – Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 – IF ON SKIN: Wash with plenty of soap and water.
P332+P313 – If skin irritation occurs: Get medical advice/attention.
P362 – Take off contaminated clothing and wash before reuse.
P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 – If eye irritation persists: Get medical advice/attention.

2.3 Other Hazards

Components do not meet the criteria for a PBT or vPvB substance.

2.4 Unknown acute toxicity (GHS US)

No data available.

Section 3: Composition / Information on Ingredients

Description: Mixture consisting of the following components:

Component Name:	Product Identifiers	GHS Classification	Percent By Weight	SCL, M-factor, ATE
Cerium oxide REACH: 01-2119488673-24-0062	CAS: 1306-38-3 EINECS: 215-150-4 Index: Not available	Not classified	20	
Acetic acid	CAS: 64-19-7 EINECS: 200-580-7 Index: 607-002-006	Flam. Liq. 3, H226 Skin Corr. 1A, H314	<2	Eye Irrit. 2; H319: 10 % ≤ C < 25 % Skin Corr. 1A; H314: C ≥ 90 % Skin Corr. 1B; H314: 25 % ≤ C < 90 % Skin Irrit. 2; H315: 10 % ≤ C < 25 % ATE: >2000 mg/kg (oral) 25 mg/m³ (inhalation) (DNEL)
Nitric acid: REACH: 01-2119487297-23-0090	CAS: 7697-37-2 EINECS: 231-714-2 Index: Not available	Ox. Liq. 3 – H272 Acute Tox. 3 – H331 Skin Corr. 1A – H314 Corrosive to the respiratory tract – EUH071	<2	Ox. Liq. 3; H272: C ≥ 65 % Skin Corr. 1A; H314: C ≥ 20 % Skin Corr. 1B; H314: 5 % ≤ C < 20 % Inhalation: ATE = 2.65 mg/L (Vapours)
Water:	CAS: 7732-18-5 EINECS: 231-791-2 Index: Not available	Not classified	76	

Impurities: Present at a level below that to be taken into account for classification.

Stabilizing Additives: None

The supplier currently has no knowledge on additional ingredients that are classified and that contribute to the classification of this substance.

See Section 16 for a list of hazards if identified above.
Nanoform characteristics:

Name of nanoform: Cerium oxide		
		Value
Number based particle size distribution, nm	d10	2-4
	d50	3-6
	d90	5-10
Shape and aspect ratio		Spherical
Crystallinity		Cubic
Surface functionalization		None
Specific surface area, m^2/g		60-190

Section 4: First-Aid Measures

4.1 Description of first aid measures

Eye Contact: Immediately flush eyes with large quantities of water for at least 15 minutes. Hold eyelids apart while flushing to rinse entire surface of the eye and lids with water. Get medical attention immediately.

Skin Contact: Immediately flush skin with plenty of water for several minutes. Remove contaminated clothing. Get medical attention.

Inhalation: If inhaled, remove to fresh air; remove person from exposure source. Get medical attention immediately.

Ingestion: Rinse mouth with water. Do NOT induce vomiting unless directed by medical professional. Never give anything by mouth to an unconscious person. Consult medical professional.

First Aid Facilities: Eye wash station, safety shower.

Advice to Physicians: No further relevant information available.

4.2 Most important symptoms and effects, both acute and delayed

Acute or delayed effects are not anticipated.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

Section 5: Fire-Fighting Measures

5.1 Extinguishing Media

Suitable Extinguishing Media: Use fire fighting measures that suit the environment. All are acceptable. Cool containers with water spray.

Unsuitable extinguishing media: No further relevant information available.

5.2 Special hazards arising from the substance or mixture

Flammability of the product: Not flammable.

Special hazard arising from the chemical: Acid fumes may be generated. Combustible products may include carbon monoxide and carbon dioxide.

Fire Hazard: Containers can build pressure if exposed to heat or fire.

Explosion Hazard: No further relevant information available.

Reactivity: No further relevant information available.

5.3 Advice for firefighters

Special Protective Equipment for Fire-fighters: Wear standard full firefighter turn-out gear (full bunker gear) and respiratory protection (SCBA).

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Eye protection and impervious gloves. An approved air-purifying respirator should be worn if vapor or mist is present.

6.1.1 For non-emergency personnel

Avoid breathing vapors, mist or dust. Avoid contact with skin and eyes. Wear protective equipment. Keep unprotected persons away.

6.2 Environmental precautions

Prevent entry into sewers and waterways or onto the ground. Discharge into the environment must be avoided.

6.3 Methods and material for containment and cleaning up

Avoid breathing vapors, mist or dust. Ventilate area. Contain spill or leak with sand, clay or absorbents. Recover liquid for recycle or disposal. Prevent entry into sewers or surface waters. Place absorbents, waste products and contaminated soil into containers for disposal. Dispose of material via a licensed waste disposal contractor.

6.4 Reference to other sections

For more information on exposure controls and personal protection or disposal considerations, check Section 8 and 13 of this SDS.

Section 7: Handling and Storage

7.1 Precautions for safe handling

Minimum feasible handling should be maintained. Use only in well ventilated area. Avoid generating mist during use. Do not breath mist or vapors. An approved air-purifying respirator should be worn if vapor or mist is present. Keep container tightly closed when not in use.

7.1.1 Protective measures

Use only in well ventilated areas. As a precautionary measure, the wearing of standard work gear is suggested.

7.1.2 Advice on general occupational hygiene

Avoid inhalation, ingestion and contact with eyes. General occupational hygiene measures are required to ensure a safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating, drinking and smoking at the workplace and wearing standard working clothes and shoes unless otherwise stated. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home.

7.2 Conditions for safe storage, including any incompatibilities

Keep from freezing. Provide sufficient ventilation in storage and workrooms. Store in a cool dry area. Keep containers tightly sealed.

7.3 Specific end use(s)

No additional information available. Refer to Section 1.2 of this SDS.

Section 8: Exposure Controls / Personal Protection

8.1 Control Parameters

Cerium oxide, CAS #1306-38-3

USA OSHA	OSHA PEL Ceiling (mg/m^3):	Not available.

Acetic acid, CAS #64-19-7

Country	Occupational exposure limit	Exposure time	Date	Title	Reference

USA	25 mg/m^3 (10 ppm)	8h TWA	2018	Acetic acid	https://www.osha.gov/chemicaldata/chemResult.html?recNo=469

Nitric Acid, CAS #7697-37-2

Country	Occupational exposure limit	Exposure time	Date	Title	Reference
USA	5 mg/m^3 (2 ppm)	8h TWA	2018	Nitric acid	https://www.osha.gov/dts/chemicalsampling/data/CH_256600.html

8.2 Exposure Controls

Engineering Controls:	Ventilation adequate to meet occupational exposure limits.
Hygiene Measures:	Workers should wash exposed skin several times daily with soap and water. Soiled work clothing should be laundered or dry-cleaned.
Respiratory:	Airborne concentrations should be kept to lowest levels possible. When respiratory protection required or concentrations are unknown, use an approved air-purifying respirator equipped with vapor cartridge.
Hands:	Wear impervious gloves such as neoprene.
Eyes:	Safety glasses, chemical type goggles, or face shield recommended to prevent eye contact.
Skin:	Wear clean body-covering clothing; impervious gloves such as neoprene. Workers should wash exposed skin several times daily with soap and water. Soiled work clothing should be laundered or dry-cleaned.
Environmental Exposure Controls:	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical State	Liquid
Color:	Translucent yellow
Odor:	Faint vinegar
Metling point/freezing point:	Not determined
Boiling point:	100 °C (212 °F)
Flammability:	Not flammable
Lower and upper explosion limit:	Not applicable
Flash point:	Not applicable
Auto-ignition temperature:	Not applicable
Decomposition temperature:	Not applicable
pH:	3
Kinematic viscosity, mm^2/s	<15
Solubility:	Fully miscible with water. Nanoform solubility <0.001% in water
Partition coefficient, n-octanol/water (log value)	Not determined
Vapor pressure	Not determined
Relative density (specific gravity)	1.2
Relative vapor density	Not determined
Particle characteristics	See Section 3 for nanoform characteristics

9.2 Other information

No further relevant information available.

Section 10: Stability and Reactivity

10.1 Reactivity

No further relevant information available.

10.2 Chemical Stability

Stable under normal ambient and anticipated storage and handling conditions.

10.3 Possibility of hazardous reactions

No further relevant information available.

10.4 Conditions to avoid

Strong bases, fast neutralization with a base.

10.5 Incompatible materials

Strong bases, water reactive chemicals.

10.6 Hazardous decomposition products

Acetic acid, nitric acid, oxides of nitrogen, oxides of carbon.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity:

LD50, Rate, Oral Values for classification:

Cerium oxide:	>5000 mg/kg
Acetic acid:	3310 mg/kg
Nitric acid:	>90 mL/kg
Water:	None.

Skin corrosion/irritation:	Avoid contact with skin. May cause irritation.
Eye damage/irritation:	Avoid contact with eyes. May cause irritation.
Inhalation:	No further relevant information available.
Sensitization:	No further relevant information available.
Chronic Effects:	No further relevant information available.
Carcinogenicity	No data indicating any concern for carcinogenicity.

Section 12: Ecological Information

12.1 Aquatic Toxicity

No further relevant information available.

12.2 Persistence and degradability

No further relevant information available.

12.3 Bioaccumulative potential

No further relevant information available.

12.4 Mobility in soil

No further relevant information available.

12.5 Results of PBT and vPvB Assessment

No further relevant information available.

12.6 Endocrine disrupting properties

No further relevant information available.

12.7 Other adverse effects

No further relevant information available.

Section 13: Disposal Considerations

This information presented only applies to the materials as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

Disposal Considerations:	The product should be recycled or solidified for disposal in a landfill approved for chemical waste.
United States:	The product is not a RCRA hazardous waste.

Section 14: Transport Information

The product is not restricted for transportation.

Sections 14.1 - 14.4

Regulations

U.S. D.O.T.: Not regulated.

ICAO/IATA: Not regulated.

IMO/IMDG: Not regulated.

ADR: Not regulated.

14.5 Environmental hazards:

Not an environmental hazard for transport.

14.6 Special precautions for users:

None.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable.

Section 15: Regulatory Information

15. 1 Safety, health and environmental regulations/legislation specific for substance or mixture:

Worldwide Chemical Inventories

EINECS (EU):	All ingredients listed
TSCA (USA):	All ingredients listed
DSL (Canada):	All ingredients listed
AICS (Australia):	All ingredients listed
ENCS (Japan):	All ingredients listed
ECL (Korea):	All ingredients listed
PICCS (Philippines):	All ingredients listed
IECSC (China):	All ingredients listed
State Right-to-Know Laws:	Section 3 of this SDS lists all components of the product.
California Proposition 65:	No ingredients listed.
SARA Section 311/312 (29 CFR 1910.1200) Hazards:	Serious eye damage or eye irritation.
SARA 313, 304 and CERCLA 102 (A):	Nitric acid
WHMIS:	Acetic Acid: Disclosure 1% Nitric Acid: Class E.

15. 2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

Section 16: Other Information

Full text of abbreviated classifications (CLP/GHS) and H Statements:
H226 - Flammable liquid and vapor
H272 - May intensify fire; oxidizer
H314 - Causes severe skin burns and eye damage
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H331 - Toxic if inhaled
EUH071 - Corrosive to the respiratory tract

Product determined to be GHS category 2 for corrosivity and not regulated for transport using the Corrositex invitro test.

National Fire Protection Association (U.S.A.) 704	Health-1, Flammability-0, Reactivity-0, Special-None
HMIS® Hazard Rating:	Health-1, Flammability-0, Reactivity-0, Protective Equipment - B; safety glasses, gloves.
Recommended Use:	The product is recommended for use in ceramics. Other uses have not been investigated and may have other hazards. For industrial use only, not for food, drug or home use.
Work Alert:	Workers using this product should read and understand this SDS and be trained in the proper use of this material.
Other Special Considerations:	None known.
SDS Prepared By:	Andrew A. Guzelian Nyacol Nano Technologies, Incorporated Telephone: 508-881-2220 U.S.A.
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