Section 1: Product and Company Identification:

1.1 Product Identifier

Product Form:	Mixture
Identification of Substance:	Colloidal zirconium dioxide in water
Product Name:	NYACOL® ZR10/15
Synonym:	Zirconia Sol
CAS Number:	1314-23-4
Index Number:	Not available.
EINECS Number:	215-227-2
REACH Registration Number:	Not registered.
Formula:	ZrO_2
Nanoforms:	Zirconium dioxide exists as a nanoform

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)

Not classified.

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

Not classified.

2.2 Label Elements

Not labelled.

Signal Word: Not applicable.

Hazard Pictogram: Not applicable.

Hazard Statement(s): Not applicable.

Precautionary Statement(s): Not applicable.

2.3 Other Hazards

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

2.4 Unknown acute toxicity (GHS US)

No further relevant information available.

Section 3: Composition / Information on Ingredients

3.1 Chemical characterization: Mixtures
Description: Mixture consisting of the following components.

Component Name:	Product Identifiers	GHS Classification	Percent By Weight	SCL, M-factor, ATE
Zirconium oxide:	CAS: 1314-23-4 EINECS: 215-227-2 Index: Not available	Not classified.	15	
Nitric acid: REACH: 01-2119487297-23-0090	CAS: 7697-37-2 EINECS: 231-714-2 Index: Not available	Ox. Liq. 3 - H272 Met. Corr. 1 - H290 Acute Tox. 3 - H331 Skin Corr. 1A - H314 Eye Dam. 1 - H318 Corrosive to the respiratory tract - EUH071	<1	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 (Vapors)
Water:	CAS: 7732-18-5 EINECS: 231-791-2	Not classified	85	

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: Zirconium dioxide		
		Value
Number based particle size distribution, nm	d10	1-3
	d50	2-5
	d90	3-7
Shape and aspect ratio		Spherical
Crystallinity		Amorphous
Surface functionalization		None
Specific surface area, m^2/g		30-170

Section 4: First-Aid Measures

4.1 Description of first aid measures

Eye Contact: Immediately flush eyes with plenty 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.

Skin Contact: In case of contact, immediately flush skin with plenty of water for several minutes. Remove contaminated clothing. Get medical attention if skin irritation develops or persists.

Inhalation: If inhaled, remove to fresh air; remove person from exposure source. Consult medical professional.

Ingestion: If swallowed, seek medical attention immediately. Do NOT induce vomiting. Give large quantities of water with Milk of Magnesia or other medical antacid. Never give anything by mouth to an unconscious person.

First Aid Facilities: Eye wash station.

Advice to Physicians: No further relevant information available.

4.2 Most important symptoms and effects, both acute and delayed

No further relevant information available.

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:	None known.

5.2 Special hazards arising from the substance or mixture

Flammability of the product:	Material will not burn in a fire. Containers can build pressure if exposed to heat or fire.
Special Hazard Arising from the Chemical:	No further relevant information available.
Fire Hazard:	No further relevant information available.
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 dust or mist is present.

6.1.1 For non-emergency personnel

Wear protective equipment. Keep unprotected persons away.

6.2 Environmental precautions

Prevent entry into sewers and waterways or onto the ground.

6.3 Methods and material for containment and cleaning up

Ventilate area. Avoid breathing vapor. Wear appropriate personal protective equipment, including appropriate respiratory protection. Contain spill or leak with sand, clay or absorbents. Recover liquid for recycle or disposal. Put in appropriate container. Prevent entry into sewers and waterways. Avoid contact with skin, eyes or clothing.

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, and temperatures should be maintained. Avoid generating mist or dust during use. Use only in well ventilated area.

7.1.1 Protective measures

Use only in well ventilated areas. As a precautionary measure, the wearing of standard work gear is suggested. Keep ignition sources away. Do not smoke. Protect from heat. Protect against electrostatic charges.

7.1.2 Advice on general occupational hygiene

Avoid inhalation or ingestion. 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

Periods of exposure to high temperatures should be minimized. Water contamination should be avoided. Provide sufficient ventilation in storage and workrooms. Keep from freezing. 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

Zirconium oxide, CAS #1314-23-4

USA OSHA	OSHA PEL Ceiling (mg/M$^{3)}$	5 mg/M^3 Zr

Nitric acid, CAS#7697-37-2

USA OSHA	OSHA PEL Ceiling (mg/M$^{3)}$	2 ppm TWA

8.2 Exposure Controls

Engineering Controls:	Use exhaust ventilation to keep airborne concentrations below 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. If vapor, mist or dust is generated and the occupational exposure limit of the product, or any component of the product, is exceeded, use appropriate NIOSH or MSHA approved air purifying or air supplied respirator after determining the airborne concentration of the contaminant. Air-supplied respirators should always be worn when airborne concentrations of the contaminant or oxygen content is unknown.
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:	Adverse effects of this material on the environment have not been evaluated. Proper disposal techniques to isolate and recover material should be implemented.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical State:	Liquid
Color:	Colorless
Odor:	None
Metling point/freezing point:	0°C (32°F) water
Boiling point:	100°C (212°F) water
Flammability:	Not flammable
Lower and upper explosion limit:	Not determined
Flash point:	Not determined
Auto-ignition temperature:	Not determined
Decomposition temperature:	Not determined
pH:	2-3
Kinematic viscosity, mm^2/s	<20 cP
Solubility:	Nanoform is insoluble in water
Partition coefficient, n-octanol/water (log value)	Not determined
Vapor pressure	Not determined
Relative density (specific gravity)	1.15
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

Water reacts violently with alkali metals.

10.4 Conditions to avoid

Fast neutralization with a base.

10.5 Incompatible materials

Basic liquids.

10.6 Hazardous decomposition products

Nitrous oxides.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity:

LD50, Rat, Oral Values for classification:

Zirconium oxide:	>8800 mg/kg
Nitric acid:	>90 mL/kg

Skin corrosion/irritation:	Irritant. Avoid contact with skin.
Eye damage/irritation:	Irritant. Avoid contact with eyes.
Inhalation:	Use breathing protection when aerosol or mist is formed. Breathing dried dust or spray mist causes irritation.
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

The product is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

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:	Neutralize with lime or soda ash. Solids should be put 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 to product as supplied.

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:	Not classified according to GHS.
SARA 313, 304 and CERCLA 102 (A):	This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and 40 CFR 372:

Chemical Name	CAS #	Percent by Weight
Nitric acid	7697-37-2	<1%

WHMIS:	Nitric Acid: Class E.

15. 2 Chemical safety assessment

A Chemical Safety Assessment has not been carried out.

Section 16: Other Information

Full text for relevant phrases from section 2 and 3:
H314 - Causes severe skin burns and eye damage.

Full text of classifications (CLP/GHS)
Skin Corr. 1B, H314, SKIN CORROSION/IRRITATION - Category 1B

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 the product should read and understand this SDS and be trained in the proper use of this material.

This SDS contains all the information items specified in Schedule 1, Column 3 of the Controlled Products Regulations in a 16-heading format.

Other Special Considerations:	None known.
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