Section 1: Product and Company Identification:

1.1 Product Identifier

Product Form:	Mixture
Identification of Substance:	Colloidal zirconia in water
Product Name:	NYACOL® ZR10/20 NH4
Synonym:	Zirconium dioxide colloid
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	20	

Organic base	Trade secret, not a hazardous substance	Not classified.	1-20	
Ammonium hydroxide	CAS: 1336-21-6 EINECS: 215-647-6 Index: 007-001-01-2	Skin corr. 1B - H314 Aquatic Acute 1 - H400	<1	STOT SE 3 - H335: C >=5%
Water:	CAS: 7732-18-5 EINECS: 231-791-2 Index: Not available	Not classified	70-80	

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. If not breathing, clear person's airway and give artificial respiration. If breathing is difficult, qualified medical personnel may administer oxygen. Get medical attention.

Ingestion: Consult medical professional. Do not induce vomiting unless directed by medical professional. 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:	All are acceptable. Use water spray, dry chemical, foam or carbon dioxide to extinguish flames. Use water spray to cool fire-exposed containers. Water or foam may cause frothing.
Unsuitable extinguishing media:	No further relevant information available.

5.2 Special hazards arising from the substance or mixture

Flammability of the product:	Material is not flammable. 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. Avoid mist formation. An approved air-purifying respirator should be worn if mist is present.

6.1.1 For non-emergency personnel

Wear protective equipment. Keep unprotected persons away. Avoid inhalation of mist or fumes, avoid contact with skin and eyes.

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 mist or fumes. Avoid contact with skin, eyes or clothing. Wear appropriate personal protective equipment, including appropriate respiratory protection. Recover for recycle or disposal. Put in appropriate container. Prevent entry into sewers and waterways.

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 during use. Use only in well ventilated area. Do not breath mist or vapors.

7.1.1 Protective measures

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

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. Periods of exposure to high temperatures should be minimized. 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

Zirconium Oxide, CAS 1314-23-4		
USA OSHA	OSHA PEL Ceiling (mg/M^3)	5 mg/m^3 TWA (as Zr)
Ammonium Hydroxide, CAS 1336-21-6		
USA OSHA	OSHA PEL Ceiling (mg/$M^{3)}$	17 mg/M^3 TWA

8.2 Exposure Controls

Engineering Controls:	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:	Pale yellow to clear
Odor:	Slight ammonia
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:	8-9
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)	1.3
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

Not determined.

10.2 Chemical Stability

Stable under normal ambient and anticipated storage and handling conditions.

10.3 Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4 Conditions to avoid

No recommendation.

10.5 Incompatible materials

No further relevant information available.

10.6 Hazardous decomposition products

Oxides of nitrogen and carbon.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity:

LD50, Rat, Oral Values for classification:

Zirconium Oxide, 1314-23-4	>8800 mg/kg
Ammonium Hydroxide, 1336-21-6	>90 mL/kg
Skin corrosion/irritation:	Avoid contact with skin, may cause skin irritation or dryness.
Eye damage/irritation:	Avoid contact with eyes, may cause irritation.
Inhalation:	Not determined. Use breathing protection when aerosol or mist is formed.
Sensitization:	No sensitizing effects known.
Chronic Effects:	No further relevant information available.
Carcinogenicity	No ingredients listed by NTP, IARC, or OSHA as carcinogen.

Section 12: Ecological Information

12.1 Toxicity

Aquatic toxicity:

Ammonium Hydroxide CAS 1336-21-6
EC50/48 hrs., 89 mg/l (Daphnia Magna (Water flea))
LC50/96 hrs., <1 mg/l (fish)

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

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

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. Dispose in accordance with all federal, state and local environmental regulations.
United States:	Not an RCRA regulated 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 user

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 the 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
WHMIS:	Ammonium Hydroxide: E Corrosive Material; Disclosure at 1.0%
Technical Instructions (air):	Not determined.
California Proposition 65:	No ingredients listed.
State Right-to-Know Laws:	Section 3 of this SDS lists all components of the product.
SARA Section 311/312 (29 CFR 1910.1200) Hazards:	Not classified according to GHS.
SARA 313, 304 and CERCLA 102 (A):	Ammonium Hydroxide, CAS 1336-21-6 is listed in SARA 313.
Controlled Products Regulations:	This SDS contains all the information items specified in Schedule 1, Column 3 of the Controlled Products Regulations in a 16-heading format.

15. 2 Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

Section 16: Other Information

List of relevant phrases from section 2 and 3:
H314 Causes severe skin burns and eye damage.
H400 Very toxic to aquatic life.
H335 May cause respiratory irritation, single exposure.

National Fire Protection Association (U.S.A.) 704 Hazard	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.
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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