Section 1: Product and Company Identification:

1.1 Product Identifier

Product Form:	Mixture
Identification of Substance:	Colloidal titanium dioxide in water
Product Name:	NYACOL® TiSol A
Synonym:	None
CAS Number:	13463-67-7
Index Number:	Not available.
EINECS Number:	236-675-5
REACH Registration Number:	Not Registered.
Formula:	TiO2

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

Recommended Use:	Ceramics. Coatings. Catalysts.
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-US Classification (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.

Supplemental Hazard Information (EU):

EUH211 – Warning! Hazardous respirable droplets may be formed when sprayed. Do not breathe spray or mist.

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

3.1 Chemical characterization: Mixtures

Description: Mixture consisting of the following components.

Component name:	Product Identifier	GHS Classification	Percent By Weight
Titanium dioxide: REACH: Not registered by NNT	CAS: 13463-67-7 EINECS: 236-675-5 Index: Not available	Not classified when dispersed in a liquid.	14 – 22
Nitric acid: REACH: 05-2117294590-38-0000	CAS: 7697-37-2 EINECS: 231-714-2 Index: 007-004-00-1	Skin Corr. 1A; H314: C ≥ 20 % Skin Corr. 1B; H314: 5 % ≤ C < 20 % Skin Corr. 2; H315: 1 % ≤ C < 5 % (OSHA HCS)	1 – 3
Water:	CAS: 7732-18-5 EINECS: 231-791-2 Index: Not available	Not classified.	75 – 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.

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 if irritation occurs.
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

See Section 2.2

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. 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 is not flammable. Containers can build pressure if exposed to heat or fire.
Special Hazard Arising from the Chemical:	Combustible products may include nitrogen oxides.
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. 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, spray, 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 and skin. 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

8.1.1 National Limit Values

Titanium Dioxide, CAS #13463-67-7

Country	Occupational exposure limit	Exposure time	Date	Title	Reference
USA	15 mg/m3	8h TWA	2003	Titanium Dioxide (Total Dust)	https://www.osha.gov/dts/chemicalsampling/data/CH_272100.html
UK	10 mg/m³	8h TWA	2011	Titanium Dioxide (total inhalable)	Health and Safety Executive- http://www.hse.gov.uk/pubns/priced/eh40.pdf
Germany	Not established		2014		Senate Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (MAK Commission): http://www.dfg.de/en/dfg_profile/statutory_bodies/senate/health_hazards/index.html

France	10 mg/m³	8h TWA	2012	Titanium dioxide	Institut National de Recherche et de Sécurité – http://www.inrs.fr/accueil/produits/mediatheque/doc/publications.html?refINRS=ED%20984

Nitric Acid, CAS #7697-37-2

Country	Occupational exposure limit	Exposure time	Date	Title	Reference
USA	5 mg/m³	8h TWA	2012	Nitric acid	https://www.osha.gov/dts/chemicalsampling/data/CH_256600.html
UK	2.6 mg/m³	15 minutes	2011	Nitric acid	Health and Safety Executive-
Germany	Not established		2014	Nitric acid	Senate Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (MAK Commission): http://www.dfg.de/en/dfg_profile/statutory_bodies/senate/health_hazards/index.html
France	2.6 mg/m³	15 minutes	2012	Acide nitrique	Institut National de Recherche et de Sécurité – http://www.inrs.fr/accueil/produits/mediatheque/doc/publications.html?refINRS=ED%20984

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. 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

Appearance (Physical State, Color): Translucent liquid. The product is a water-based material.

Upper/lower flammability or explosive limits:	Not determined.
Volatile by Weight:	80%
Odor:	None.
Vapor Pressure:	2260 kPs (17 mm Hg) at 20°C water.
Odor Threshold:	Not determined.
Vapor Density:	Not determined.
pH:	1.5
Density:	1210 kg/m^3
Melting point/freezing point:	Not determined.
Solubility in Water:	Soluble in all proportions.
Initial boiling point and boiling range:	100°C (212° F) water.
Flashpoint:	None.
Evaporation Rate:	Slow (Butyl Acetate =1).
Flammability (solid, gas):	Material will not burn in a fire.
Partition Coefficient:	Not applicable.
Auto-ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Viscosity:	<30 cP
Specific Gravity:	1.2 (water =1)
Freezing Point:	0°C (32° F) water.
Explosion Limits:	Not applicable.
Oxidizing Properties:	Not available.

9.2 Other information

Not applicable.

Section 10: Stability and Reactivity

10.1 Reactivity

There are no known reactivity hazards associated with this product.

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

Fast neutralization with a base.

10.5 Incompatible materials

Basic liquids. Water reactive chemicals.

10.6 Hazardous decomposition products

Oxides of nitrogen.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity:

LD50, Rat, Oral Values for classification:

Titanium dioxide, CAS 13463-67-7	>2000 mg/kg
Nitric Acid, CAS 7697-37-2	>90 mL/kg
Skin corrosion/irritation:	Irritating to skin. Avoid contact with skin.
Eye damage/irritation:	Irritating to eyes and may cause serious eye irritation. Avoid contact with eyes.
Inhalation:	Do not breathe spray or mist
Sensitization:	No further relevant information available.

Chronic Effects:	No further relevant information available.
Carcinogenicity	TiO_2 in dispersions is not classified as carcinogenic.

Section 12: Ecological Information

12.1 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

The PBT and vPvB criteria of Annex XIII to the Regulation do not apply to this product.

12.6 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:	Neutralize with lime or soda ash. Solids should be put in a landfill approved for chemical waste.
United States:	The product may be an unlisted hazardous waste with characteristics of corrosivity, D002.

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 Transport bulk according to Annex II of MARPOL73/78 and the IBC Code

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.

WHMIS: Class E, Nitric acid

SARA Section 311/312 (29 CFR 1910.1200) Hazards: Skin corrosion or irritation; Serious eye damage or eye irritation.

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 of 40 CFR 372:

Chemical Name	CAS #	Percent by Weight
Nitric Acid	7697-37-2	1-3

15. 2 Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

Section 16: Other Information

List of relevant phrases:
H314 - Causes severe skin burns and eye damage
H315 - Causes skin irritation
H319 - Causes serious eye irritation
EUH211 - Warning! Hazardous respirable droplets may be formed when sprayed. Do not breathe spray or mist.

The TiO_2 in the product consists of >1 % (w/w) TiO_2 particles with an aerodynamic diameter of 10 µm or less.

Product detmerined to be non-corrosive 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 as in ceramics, coatings and catalysts. 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.

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