Section 1: Product and Company Identification:

1.1 Product Identifier

Product Form:	Mixture
Product Name:	BurnEx® ADP480
Synonym:	Antimony pentoxide powder
Unique formula identified (UFI):	NDS2-C04H-T00R-9XS3
Nanoforms:	Antimony pentoxide exists as a nanoform

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

Recommended Use:	Recommended for use as a flame retardant.
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)

Acute toxicity (Oral): Category 4
Skin irritation: Category 2
Serious eye damage: Category 1

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

H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

2.2 Label Elements

Signal Word: Danger

Hazard determining components of labelling: Alkyl amine, ethoxylated

Hazard Statement(s):
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary Statement(s):

P261 – Avoid breathing dust/fume/gas/mist/vapors/spray.
P271 – Use only outdoors or in a well-ventilated area.
P264 – Wash face, hands and any exposed skin thoroughly after handling.
P270 – Do no eat, drink or smoke when using this product.
P280 – Wear protective gloves/protective clothing/eye protection/ face protection.
P304 + P340 – IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P302 + P352 – IF ON SKIN: Wash with plenty of soap and water.
P330 – Rinse mouth.
P332 + P313 – If skin irritation occurs: Get medical advice/attention.
P301 + P312 – IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P362 – Take off contaminated clothing and wash before reuse.
P391 – Collect spillage.
P501 – Dispose of contents/container in accordance with local/ regional/national/international regulations.

2.3 Other Hazards

Antimony pentoxide does 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

3.2 Mixtures

Description: Mixture consisting of the following components.

Component Name:	Product Identifiers	GHS Classification	Percent By Weight	SCL, M-factor, ATE
Antimony Pentoxide: REACH: 01-2119918494-33-0001	CAS No. 1314-60-9 EC: 215-237-7 Index: 051-003-00-9	Not classified	79-91	
Amines, tallow alkyl, ethoxylated:	CAS #: 61791-26-2 EC: 500-153-8 Index: Not available.	Acute Tox. 4, H302 Skin Irrit. 2 H315 Eye Dam. 1 H318 Aquatic Acute 1 H400	9-15	
Water:	CAS No. 7732-18-5 EINECS: 231-791-2 Index: Not available	Not classified	0-6	

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: Antimony Pentoxide		
		Value
Number based particle size distribution, nm	d10	6-50
	d50	8-70
	d90	13-90
Shape and aspect ratio		Spherical
Crystallinity		Cubic
Surface functionalization		None
Specific surface area, m^2/g		2-60

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 to ensure rinsing of the entire surface of the eye and lids with water. Get medical attention immediately.

Skin Contact: Wash with soap and plenty of water for at least 15 minutes. Wash contaminated clothing before reuse. If irritation occurs get medical attention.

Inhalation: Remove person from exposure source. Get medical attention.

Ingestion: If swallowed seek medical attention immediately. Rinse out mouth and then drink plenty of water. Never give anything by mouth to an unconscious person.

First Aid Facilities: Eye wash station

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.

Symptomatic treatment is recommended.

Section 5: Fire-Fighting Measures

5.1 Extinguishing Media

Suitable Extinguishing Media: 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: Product is not flammable.

Special Hazard Arising from the Chemical: Formation of toxic gases is possible during heating or in case of fire including carbon oxides and nitrogen oxides.

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

6.1.1 For non-emergency personnel

Emergency responders should wear eye protection and impervious gloves. An approved air-purifying respirator should be worn if mist is present.

6.2 Environmental precautions

Do not allow product to reach sewage system or water bodies.

6.3 Methods and material for containment and cleaning up

Prevent dust, cover spill if windy. Vacuum or shovel into containers for reuse or disposal. Ensure adequate ventilation.

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

Avoid generating dust during use. Ensure good ventilation/ exhaustion at the workplace.

7.1.1 Protective measures

As a precautionary measure, the wearing of standard work gear is suggested.

7.1.2 Advice on general occupational hygiene

Avoid inhalation. ingestion, eye contact, and skin contact. 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

Store in cool, dry area and keep container tightly sealed. Provide sufficient ventilation at store- and workrooms.

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

Antimony pentoxide (1314-60-9)

Country	Occupational exposure limit (as Sb)	Maximum exposure time	Date	Title	Reference
USA	0.5 mg/m3 (as Sb)	8h TWA	2006	Antimony and compounds	https://www.osha.gov/dts/chemicalsampling/data/CH_219100.html

UK	0.5 mg/m³ (as Sb)	8h TWA	2011	Antimony and compounds	http://www.hse.gov.uk/pubns/priced/eh40.pdf
Germany	Not established		2009	Antimony and its inorganic compounds (inhalable fraction)	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
Finland	0.5 mg/m³	8h TWA	2009	Antimony and its compounds	The Ministry of Social Affairs and Health- http://pre20090115.stm.fi/hm1113394626349/passthru.pdf
Belgium	0.5 mg/m³ (as Sb)	8h TWA	2010	Antimony and its compounds	Service public fédéral Emploi, Travail et Concertation sociale: http://www.emploi.belgique.be/WorkArea/showcontent.aspx?id=23914
France	0.5 mg/m³ (as Sb)	8h TWA	2012	Antimony and its compounds	Institut National de Recherche et de Sécurité - http://www.inrs.fr/accueil/produits/mediatheque/doc/publications.html?refINRS=ED%20984
Spain	0.5 mg/m³ (as Sb)	8h TWA	2010	Antimony and antimony compounds	http://www.insht.es/InshtWeb/Contenidos/Documentacion/TextosOnline/Valores_Limite/Limites2010/LEP%202010%20ActualizadoMayo(1).pdf
Austria	0.5 mg/m³ (as Sb)	8h TWA	2011	Antimony compounds	http://www.arbeitsinspektion.gv.at/NR/rdonlyres/F173280B-D4FB-44D2-8269-8DB2CB1D2078/0/GKV2011.pdf

8.1.2 PNECs and DNELs - Antimony Pentoxide (1314-60-9)

Descriptor	Route of Exposure/Environmental protection target	DNEL/PNEC
DNEL (Derived No Effect Level)		
	Inhalation - Long term/systemic effects	10 mg/m^3
PNEC (Predicted No Effect Concentration)		
	Freshwater	0.113 mg Sb/L
	Marine	0.0113 mg Sb/L
	Sediment freshwater	7.8 mg Sb/kg wwt
	Sediment marine	1.56 mg Sb/kg wwt
	Soil	37 mg Sb/kg dw (32.6 mg Sb/kg wwt)
	STP (Sewerage Treatment Plant)	2.55 mg Sb/L

8.2 Exposure Controls

8.2.1 Appropriate Engineering Controls

Use exhaust ventilation to keep airborne concentrations below exposure limits. Waste water generated during the production process or cleaning operations should be collected.

8.2.2 Individual protective measures, such as personal protective equipment (PPE)

Hygiene Measures: Change contaminated clothing. Wash hands after working with substance.

Respiratory: When respiratory protection is required, or concentrations unknown, use approved air-purifying respirator with a dust cartridge.

Hands:	Wear impervious gloves such as neoprene.
Eyes:	Wear approved safety glasses.
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.

8.2.3 Environmental Exposure Controls

The product should be recycled when possible. Appropriate controls should be put in place to prevent release of the product to the environment, including sewage systems and water bodies.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical State:	Solid
Color:	White
Odor:	Odorless
Metling point/freezing point:	Not determined
Boiling point:	Not applicable
Flammability:	Not flammable
Lower and upper explosion limit:	Not applicable
Flash point:	Not applicable
Auto-ignition temperature:	Not applicable
Decomposition temperature:	Not determined
pH (slurry in water):	5-7
Kinematic viscosity, mm^2/s	Not applicable
Solubility:	Nanoform solubility 0.05% in water.
Partition coefficient, n-octanol/water (log value)	Not applicable
Vapor pressure	Not applicable
Relative density (specific gravity)	3.7
Relative vapor density	Not applicable
Particle characteristics	See Section 3 for nanoform characteristics

9.2 Other information

Not applicable.

Section 10: Stability and Reactivity

10.1 Reactivity

Reactive with water reactive chemicals. Exposure to acidic reducing conditions may form the poisonous gas stibine.

10.2 Chemical Stability

Stable under normal ambient and anticipated storage and handling conditions.

10.3 Possibility of hazardous reactions

Reacts with acids, alkalis and oxidizing agents.

10.4 Conditions to avoid

Acidic reducing environments.

10.5 Incompatible materials

Alkali metals. Acidic reducing conditions.

10.6 Hazardous decomposition products

Oxides of nitrogen and carbon.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Toxic kinetics

Antimony pentoxide: The oral absorption of soluble pentavalent antimony compounds is less than 1% (Felicetti, 1974; ICRP, 1981). Together with particle-size derived respiratory deposition and 100% absorption from the pulmonary fraction, an inhalation absorption factor of 0.7% may be assumed. Based on read-across and analogies with other metals HERAG (2007), a conservative default dermal absorption factor of 1% is appropriate for diantimony pentoxide.

Acute toxicity

Antimony pentoxide: Oral: LD50 rat > 2000 mg/kg bw (Robertson, 2005)
The classification criteria according to regulation (EC) 1272/2008 as acutely toxic are not met for APO since the ATE is above 2000 mg/kg body weight, hence no classification required.
Inhalation: LC50 rat> 5.4 mg/L (Leuschner, 2010)
The classification criteria according to regulation (EC) 1272/2008 as acutely toxic are not met for sodium hexahydroxoantimonate (CAS 33908-66-6) since the ATE for dusts and mists is above 5.0 mg/L, hence no classification required. Based on read across from SHHA, APO does not require a classification as acutely toxic, inhalation.

Dermal: APO does not require a classification as acutely toxic via dermal route. Conduct of an acute dermal toxicity study is unjustified as inhalation of the substance is considered as major route of exposure and physicochemical properties of the substance do not suggest a significant rate of absorption through the skin (cf. Annex VIII section 8.5 Column 2 of regulation (EC) 1907/2006).

Amines, tallow alkyl, ethoxylated: 300 - 2000 mg/kg (Oral, LD50, rat)

Skin corrosion/irritation

Antimony pentoxide: Based on available data, the classification criteria as skin irritant are not met for APO (Robertson, 2005). Since APO is not irritating to the skin, eyes or the respiratory tract, corrosive properties can be excluded and the classification criteria are not met.

Amines, tallow alkyl, ethoxylated: Irritating to the skin (rabbit).

Serious eye damage/irritation

Antimony pentoxide: Based on available data, the classification criteria as eye irritant are not met for sodium hexahydroxoantimonate (CAS 33908-66-6) (Leuschner, 2009). Based on read across from SHHA, APO does not require a classification as eye irritant.

Amines, tallow alkyl, ethoxylated: Risk of serious damage to eyes.

Respiratory or skin sensitization

Antimony pentoxide: Based on available data, the classification criteria as skin sensitizer are not met for diantimony pentoxide (Robertson, 2005). Based on the results of the histopathological and macroscopic investigations and on an industry survey, SHHA (CAS 33908-66-6) does not require a classification for respiratory irritation/sensitization. Based on read across from SHHA, and an industry survey, APO does not require classification for respiratory irritation/sensitization.

Germ cell mutagenicity

Antimony pentoxide: Based on available data, SHHA (CAS 33908-66-6) does not require a classification as germ cell mutagen.
Sodium hexahydroxoantimonate (CAS# 33908-66-6) did not induce micronuclei in cultured human lymphocytes (Whitwell, 2010) and gene mutation in the tk locus of the L5178Y mouse lymphoma cell line (Stone, 2010). Therefore sodium hexahydroxoantimonate is considered as non-clastogenic and non-mutagenic. Based on read across from SHHA, APO does not require a classification as germ cell mutagen.

Carcinogenicity

Antimony pentoxide: No data indicating any concern for carcinogenicity.

Amines, tallow alkyl, ethoxylated: No data indicating any concern for carcinogenicity.

Reproductive toxicity

Antimony pentoxide: Data lacking – testing proposal issued in the REACH registration dossier of sodium hexahydroxoantimonate (CAS 33908-66-6). Data will be read-across to APO.

STOT-single exposure

Based on available data, the classification criteria as STOT, single exposure, oral and inhalation are not met for APO since no reversible or irreversible adverse health effects were observed immediately or delayed after exposure and no effects were observed at the guidance value.

STOT-repeated exposure

Data lacking – testing proposal issued in the REACH registration dossier of sodium hexahydroxoantimonate (CAS 33908-66-6). Data will be read-across to APO.

Aspiration hazard

APO as an inorganic metal oxide is void of a low surface tension effect and as a solid does have a very high viscosity, i.e. an aspiration hazard can safely be excluded. Based on available data, the classification criteria are not met.

Section 12: Ecological Information

12.1 Toxicity

Antimony pentoxide

Antimony metal and antimony containing compounds will dissolve and generate antimony ions (Vangheluwe et al., 2001). The environmental section will therefore discuss the fate of antimony in general.

Acute aquatic toxicity test results:		
Marine fish [*Pagrus major*]	96 h LC50	6.9 mg Sb/L (Takayanagi, 2001)
Freshwater fish [*Pimephales promelas*]	96 h LC50	14.4 mg Sb/L (Brooke et al, 1986)
Invertebrates [*Chlorohydra viridissimus*]	96 h LC50	1.77 mg Sb/L (TAI, 1990)
Algae [*Pseudokirchneriella subcapitata*]	72 h ErC50 (growth rate)	> 36.6 mg Sb/L (Heijerick et al, 2004)
Plants [*Lemna minor*]	4 d EC50	> 25.5 mg Sb/L (Brooke et al, 1986)
Chronic aquatic toxicity test results:		
Fish [*Pimephales promelas*]	28 d NOEC/LOEC (growth; length)	1.13/2.31 mg Sb/L (Kimball, 1978)
Invertebrates [*Daphnia magna*]	21 d NOEC/LOEC (reproduction)	1.74/3.13 mg Sb/L (Heijerick et al, 2003)
Algae [*Pseudokirchneriella subcapitata*]	72 h NOEC/LOEC (growth rate)	2.11/4.00 mg Sb/L (Heijerick et al, 2004)
Chronic sediment toxicity test results:		
Midge [*Chironomus riparius]*	14 d NOEC (growth)	78 mg Sb/kg ww (Heijerick et al, 2005)
Chronic terrestrial toxicity test results (values were determined in a soil spiked with Sb_2O_3 and aged for 31 weeks before testing):		
Soil invertebrates	NOEC	999 mg Sb/kg dw (Moser, 2007)
Plants	NOEC	999 mg Sb/kg dw (Smolders et al., 2007)
Soil microorganisms	NOEC	2930 mg Sb/kg dw (Smolders et al., 2007)
Toxicity tests for microorganisms (for STP)		
Aquatic microorganisms	NOEC	2.55 mg Sb/L (EPAS, 2005)
Inhibition of nitrification	EC50	27 mg Sb/L (EPAS, 2005)

Amines, tallow alkyl, ethoxylated

Species	LC(E)50	Exposure time
Fish (rainbow trout)	0.13 mg/l	96 hr
Invertebrates (water flea)	0.17 mg/l	96 hr
Algae	0.1 -1 mg/l	72 hr

M-Factor: 1

12.2 Persistence and degradability

Antimony cannot be degraded, but may be transformed between different phases, chemical species, and oxidation states. Antimony is therefore considered to be persistent (P) and very persistent (vP) like any other metal.

12.3 Bioaccumulative potential

Bioaccumulation of antimony by both aquatic and terrestrial organisms is low. A BCF of 40 has been determined for aquatic organisms and a BASF of 1 for earthworms. Therefore, antimony is not considered bioaccumulative (B) or very bioaccumulative (vB) based on the definitive criteria. Bioaccumulation of amines, tallow alkyl, ethoxylated is not likely.

12.4 Mobility in soil

Reports claim that antimony compounds released in the environment are absorbed by the soil with no general mobility except in sandy soils. Some methylated antimony compounds can form in reducing conditions such as found in anaerobic sediment. A log K_p of 2.07 has been determined for soil.

12.5 Results of PBT and vPvB Assessment

The PBT and vPvB criteria of Annex XIII to the Regulation do not apply to inorganic substances, such as antimony and its inorganic compounds. However, the available data have been compared to the criteria:
See 12.2 for (P) and 12.3 for (B). For (T): Chronic NOEC values are available for fish, invertebrates and algae (see Section 12). The lowest NOEC is 1.13 mg Sb/L for fish (Kimball, 1978). Antimony and antimony compounds do not meet any of the toxicity criteria based on carcinogenicity, mutagenicity or reprotoxicity and there is no evidence of other chronic concerns. Therefore, antimony is not considered toxic (T) based on the definitive criteria. Antimony, and therefore APO, is not PBT or vPvB.

12.6 Endocrine disrupting properties

No further relevant information available.

12.7 Other adverse effects

APO 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:	Disposal must be made according to official regulation.
United States:	Should the product become a waste, EPA TCLP test should be performed. If test is not done then waste should be treated as an EP toxic material and given EPA waste numbers D004 and D008.

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

The product is not an environmental hazard in the EU.

14.6 Special precautions for user

Not available.

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 conform
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
SARA Section 311/312 (29 CFR 1910.1200) Hazards:	Acute toxicity; Skin corrosion or irritation; Serious eye damage or eye irritation.
SARA Section 313:	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:
Antimony Pentoxide	1314-60-9	92

California Proposition 65:	No ingredients listed.
State Right-to-Know Laws:	Section 3 of this SDS lists all components of the product.
WHMIS:	Class D, Division 2, Material causing other toxic effects.

15. 2 Chemical safety assessment

A chemical safety assessment has been carried out for antimony pentoxide.

15.3 International Regulations

Technical Instructions (air):	Water: 5%. Class III: 81%
Water hazard class:	Water hazard class 2: hazardous for water.

Section 16: Other Information

List of relevant phrases:

H302 - Harmful if swallowed.
H315 - Causes skin irritation.
H318 - Causes serious eye damage.
H400 - Very toxic to aquatic life.

Recommended Use:	The product is recommended for use as flame retardant. 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.
Revision Date:	July 10, 2023
Supersedes:	July 21, 2015

This SDS has been prepared with data from Nyacol Nano Technologies, Inc.'s laboratories, raw material suppliers, and government publications. Information herein is accurate to the best of our knowledge. Suggestions are made without warranty or guarantee of results. Before using, the user should determine the suitability of the products for the intended use, and the user assumes the risk and liability in connection therewith. We do not suggest violation of any existing patents or give permission to practice any patented invention without license.