

SAFETY DATA SHEET

ANGUS CHEMICAL COMPANY

Product name : TRIS AMINO™ ULTRA PURE
USP/EP/JP GRADE (Tromethamine) (2-Amino-2-
(Hydroxymethyl)- 1,3-Propanediol

Issue Date: 11/02/2017

Print Date: 11/03/2017

ANGUS CHEMICAL COMPANY encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. PRODUCT AND COMPANY IDENTIFICATION

Product name TRIS AMINO™ ULTRA PURE USP/EP/JP GRADE
(Tromethamine) (2-Amino-2-(Hydroxymethyl)- 1,3-
Propanediol

Manufacturer or supplier's details

Company name of supplier ANGUS CHEMICAL COMPANY

Address 1500 E. LAKE COOK ROAD
Buffalo Grove IL 60089-6553

Customer Information +1-847-808-3711
Number

E-mail address NAR_CC@ANGUS.COM

**Emergency telephone
number 800-424-9300**

Recommended use of the chemical and restrictions on use

Recommended use Biological buffer.
Pharmaceutical intermediate.
The ANGUS Chemical Company recommends that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact the Customer Information Group (see Section 1 of this data sheet).

2. HAZARDS IDENTIFICATION

GHS Classification

Not a hazardous substance or mixture.

GHS Label elements, including precautionary statements

This product is not hazardous per the Globally Harmonized System of Classification and Labelling (GHS).

Other hazards

None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

This product is a substance.

Components

Chemical Name	CAS-No.	Concentration (% w/w)
Tris(hydroxymethyl)aminomethane	77-86-1	99.0%

4. FIRST AID MEASURES

If inhaled	Move person to fresh air; if effects occur, consult a physician.
In case of skin contact	Wash off with plenty of water.
In case of eye contact	Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.
If swallowed	No emergency medical treatment necessary.
Most important symptoms and effects, both acute and delayed	Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.
Protection of first-aiders	If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Notes to physician	Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. No specific antidote.

5. FIREFIGHTING MEASURES

Suitable extinguishing media	Water. Carbon dioxide fire extinguishers. Dry chemical fire extinguishers.
Specific hazards during firefighting	Pneumatic conveying and other mechanical handling operations can generate combustible dust. To reduce the potential for dust explosions, do not permit dust to

	accumulate. Container may rupture from gas generation in a fire situation.
Hazardous combustion products	During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon dioxide. Carbon monoxide. Nitrogen oxides.
Further information	Hand held dry chemical or carbon dioxide extinguishers may be used for small fires. Soak thoroughly with water to cool and prevent re-ignition. Keep people away. Isolate fire and deny unnecessary entry. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed.
Special protective equipment for firefighters	Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.
Environmental precautions	Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up	Contain spilled material if possible. Collect in suitable and properly labeled containers. Use care to minimize generation of airborne dust. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Advice on safe handling	Avoid generating and breathing dust. Good housekeeping and controlling of dusts are necessary for
-------------------------	--

safe handling of product.
Keep container closed.
See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage Store in a dry place.
Do not store in:
Zinc.
Galvanized containers.
Aluminum.
Copper.
Copper alloys.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Engineering measures

Local exhaust ventilation may be necessary for some operations.
Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

Personal protective equipment

Respiratory protection

Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process.
In dusty or misty atmospheres, use an approved particulate respirator.
The following should be effective types of air-purifying respirators:
Particulate filter.

Hand protection

Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Neoprene. Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as

	well as the instructions/specifications provided by the glove supplier.
Eye protection	Use safety glasses (with side shields).
Skin and body protection	Wear clean, body-covering clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Crystals
Color	White
Odor	Odorless
Odor Threshold	No test data available
pH	10.4 Method: Literature 1% aqueous solution.
Melting point/range	171 - 172 °C (340 - 342 °F) Method: Literature
Freezing point	171 - 172 °C (340 - 342 °F) Method: Literature
Boiling point/boiling range	Not applicable
Flash point	Test Type: closed cup Not applicable
Evaporation rate	No test data available
Flammability (solid, gas)	No data available.
Upper explosion limit	No test data available
Lower explosion limit	No test data available
Vapor Pressure	Method: Literature Nil
Relative Vapor Density (air = 1)	Not applicable
Relative density	No data available.
Water solubility	Method: Literature Soluble
Partition coefficient: n-	log Pow: -2.31

octanol/water	Method: Measured Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Viscosity Viscosity, kinematic	Not applicable
Explosive properties	No data available.
Oxidizing properties	No data available.
Molecular weight	121.14 g/mol Method: Calculated.
Hygroscopic	yes

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity	No dangerous reaction known under conditions of normal use.
Chemical stability	Hygroscopic Stable under recommended storage conditions. See Storage, Section 7.
Conditions to avoid	Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Avoid moisture.
Incompatible materials	Avoid contact with: Strong acids. Strong oxidizers. Avoid contact with metals such as: Zinc. Galvanized metals. Aluminum. Copper. Copper alloys. Avoid unintended contact with: Halogenated hydrocarbons.
Hazardous decomposition products	Decomposition products depend upon temperature, air supply and the presence of other materials.

11. TOXICOLOGICAL INFORMATION

Toxicological information on this product or its components appear in this section when such data is available.

Acute toxicity

Product:

Acute oral toxicity

Remarks: Very low toxicity if swallowed.
Harmful effects not anticipated from swallowing small amounts.

LD50 (Rat): > 5,000 mg/kg
Symptoms: No deaths occurred at this concentration.

Acute inhalation toxicity

Remarks: Dust may cause irritation to upper respiratory tract (nose and throat).
Vapors are unlikely due to physical properties.

Remarks: The LC50 has not been determined.

Acute dermal toxicity

Remarks: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50
(Rat, male and female): > 5,000 mg/kg
Method: OECD 402 or equivalent
Symptoms: No deaths occurred at this concentration.

Skin corrosion/irritation

Product:

Remarks: Prolonged contact is essentially nonirritating to skin.
Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation

Product:

Remarks: May cause slight temporary eye irritation.
Corneal injury is unlikely.

Respiratory or skin sensitization

Product:

Remarks: For skin sensitization:
Did not cause allergic skin reactions when tested in guinea pigs.

Remarks: For respiratory sensitization:
No relevant data found.

Carcinogenicity

Product:

No relevant data found.

IARC	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
NTP	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Teratogenicity

Product

For similar material(s):
Did not cause birth defects or any other fetal effects in laboratory animals.

Mutagenicity

Product

In vitro genetic toxicity studies were negative.

Reproductive toxicity

Product:

In animal studies, did not interfere with reproduction.

STOT - single exposure

Product:

Assessment: Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Repeated dose toxicity

Product:

Remarks: Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

Aspiration toxicity

Product:

Aspiration Hazard	Product test data not available.
-------------------	----------------------------------

12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish

Remarks: Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).

LC50 (zebra fish (Brachydanio rerio)): 460 mg/l

Exposure time: 96.0 h

Remarks: For similar material(s):

Toxicity to daphnia and other aquatic invertebrates

EC50 (Daphnia magna (Water flea)): 980.00 mg/l

Exposure time: 48.0 h

Toxicity to algae

ErC50 (Pseudokirchneriella subcapitata (green algae)): 397 mg/l

End point: Growth rate

Exposure time: 72 h

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)

NOEC (water flea Daphnia magna): 3.99 mg/l

Exposure time: 21 d

End point: number of offspring

Remarks: For similar material(s):

Persistence and degradability

Product:

Biodegradability

Result: Readily biodegradable

Remarks: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation: 100 %

Exposure time: 28 d

Method: OECD Test Guideline 301F or Equivalent

Remarks: 10-day Window: Pass

Biochemical Oxygen Demand (BOD)

0 %

Incubation time: 5 d

84%

Incubation time: 28 d

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitiser: OH radicals

Rate constant: Degradation half life: 0.32 d

Method: Estimated.

Bioaccumulative potential

Product:

Partition coefficient: n-

log Pow: -2.31

octanol/water

Method: Measured
Remarks: Bioconcentration potential is low (BCF < 100 or Log
Pow < 3).

Mobility in soil

Product:

Distribution among
environmental compartments

Koc: 75
Method: Estimated.
Remarks: Potential for mobility in soil is high (Koc between 50
and 150).

Other adverse effects

Product:

Results of PBT and vPvB
assessment

This substance is not considered to be persistent,
bioaccumulating and toxic (PBT). This substance is not
considered to be very persistent and very bioaccumulating
(vPvB).

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND,
OR INTO ANY BODY OF WATER.
All disposal practices must be in compliance with all Federal,
State/Provincial and local laws and regulations.
Regulations may vary in different locations.
Waste characterizations and compliance with applicable laws
are the responsibility solely of the waste generator.
THE INFORMATION PRESENTED HERE PERTAINS ONLY
TO THE PRODUCT AS SHIPPED IN ITS INTENDED
CONDITION AS DESCRIBED IN MSDS SECTION:
Composition Information.
FOR UNUSED & UNCONTAMINATED PRODUCT, the
preferred options include sending to a licensed, permitted:
Incinerator or other thermal destruction device.
Landfill.
ANGUS HAS NO CONTROL OVER THE MANAGEMENT
PRACTICES OR MANUFACTURING PROCESSES OF
PARTIES HANDLING OR USING THIS MATERIAL.

14. TRANSPORT INFORMATION

International Regulation

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations

49 CFR (DOT) – NON BULK

Not regulated as a dangerous good

49 CFR (DOT) - BULK

Not regulated as a dangerous good

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazards

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

No OSHA Hazards

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards

This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.
No SARA Hazards

SARA 302

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMII Intermediate or Final VOC's (40 CFR 60.489).

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Cas No.	Component
77-86-1	Tris(hydroxymethyl)aminomethane

New Jersey Right To Know

The following chemicals are listed because of the additional requirements of New Jersey law:

Cas No.	Component
77-86-1	Tris(hydroxymethyl)aminomethane

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

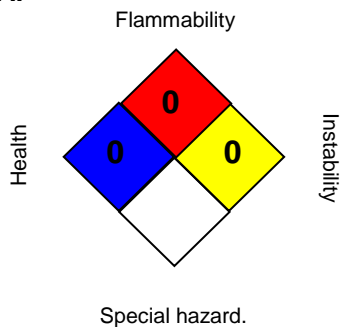
United States TSCA Inventory

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date 11/02/2017
Version 0.0

Identification Number: 000040003932

US / EN

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Full text of other abbreviations

(Q)SAR - (Quantitative) Structure Activity Relationship; ASTM - American Society for the Testing of Materials; bw - Body weight; DIN - Standard of the German Institute for Standardisation; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ErCx - Concentration associated with x% growth rate response; GHS - Globally

Harmonized System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISO - International Organisation for Standardization; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative; DSL - Domestic Substances List (Canada); KECI - Korea Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); AICS - Australian Inventory of Chemical Substances; IECSC - Inventory of Existing Chemical Substances in China; ENCS - Existing and New Chemical Substances (Japan); ISHL - Industrial Safety and Health Law (Japan); PICCS - Philippines Inventory of Chemicals and Chemical Substances; NZIoC - New Zealand Inventory of Chemicals; TCSI - Taiwan Chemical Substance Inventory; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; DOT - Department of Transportation; EHS - Extremely Hazardous Substance; HMIS - Hazardous Materials Identification System; MSHA - Mine Safety and Health Administration; NFPA - National Fire Protection Association; RCRA - Resource Conservation and Recovery Act; RQ - Reportable Quantity; SARA - Superfund Amendments and Reauthorization Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; GLP - Good Laboratory Practice; ERG - Emergency Response Guide; NTP - National Toxicology Program; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods