Product name	Benzene Trioxane Mixture		NAGH/EN
MSDS number	87026	**Revision Date**	Mar.24.2016
Revision Number	0.02	**Issuing date**	May.04.2016

1. Product and company identification

Trade Name

Benzene Trioxane Mixture

Manufacturer, importer, supplier
Celanese Ltd.
222 W. Las Colinas Blvd., Suite 900N
Irving, TX 75039
United States
Phone: 972 443 4000
Internet: www.celanese.com

Transportation emergency phone numbers:
In USA, call 800 424 9300
Outside USA, call 703 527 3887, collect calls accepted.

Product Information
1-800-833-4882
info-engineeredmaterials-am@celanese.com

Identified uses
For industrial use only

2. Hazard Identification

GHS Classification

Hazards	**Category**
Flammable liquid	Category 2
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Skin sensitization	Category 1
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A
Reproductive toxicity	Category 2
Specific target organ systemic toxicity (single exposure)	Category 3 Respiratory
Specific target organ systemic toxicity (repeated exposure)	Category 1
Aspiration toxicity	Category 1
Acute aquatic toxicity	Category 3
Chronic aquatic toxicity	Category 3

Label elements



Signal Word Danger

Hazard Statements

Highly flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
Suspected of damaging fertility or the unborn child
May cause respiratory irritation
Causes damage to organs through prolonged or repeated exposure
May be fatal if swallowed and enters airways
Harmful to aquatic life
Harmful to aquatic life with long lasting effects

Precautionary statements

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
In case of fire:
Use water, alcohol-resistant foam, dry chemical, carbon dioxide (CO2) to extinguish.
Wear protective gloves/protective clothing/eye protection/face protection
Wash face, hands and any exposed skin thoroughly after handling.
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace
Do not eat, drink or smoke when using this product
Avoid release to the environment
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor if you feel unwell.
IF SWALLOWED: Immediately call a POISON CENTER or doctor.
Do NOT induce vomiting.
Get medical advice/attention if you feel unwell
Store locked up.
Store in a well-ventilated place. Keep cool.
Dispose of contents/ container to an approved waste disposal plant.

3. Composition/information on ingredients

3. Composition/information on ingredients

Components	CAS-No	Percent %
Benzene	71-43-2	40 - 75
1,3,5-Trioxane	110-88-3	25 - 60
Water	7732-18-5	1 - 3
Formaldehyde	50-00-0	< 1
Methanol	67-56-1	< 1

4. First aid measures

General Information
Remove contaminated, soaked clothing immediately and dispose of safely. Pay attention to own protection. In any case show the physician the Safety Data Sheet.

Skin
Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Eyes
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Inhalation
Move to fresh air. Keep at rest. If breathing is difficult, give oxygen. Call a physician immediately.

Ingestion
If swallowed, do not induce vomiting - seek medical advice. Risk of product entering the lungs on vomiting after ingestion..

Notes to physician
Treat symptomatically.

5. Fire-fighting measures

NFPA: **Health:** 3 **Flammability:** 3 **Instability:** 1

Suitable extinguishing media
Water, Alcohol-resistant foam, Dry chemical, Carbon dioxide (CO2)

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

Special exposure hazards arising from the substance or preparation itself, its combustion products, or released gases
Vapors may form explosive mixture with air
Vapors may travel to source of ignition and flash back
Under conditions giving incomplete combustion, hazardous gases produced may consist of
Carbon monoxide
Carbon dioxide (CO2)
Formaldehyde vapours
Combustion gases of organic materials must in principle be graded as inhalation poisons

Special protective equipment for fire-fighters
Fire fighter protection should include a self-contained breathing apparatus (NIOSH-approved or EN 133) and full firefighting turn out gear..

Environmental precautions
Water used to fight fire runoff can cause environmental damage. Dike and collect water used to fight fire.

Other Information
In the event of fire, cool tanks with water spray. Container may explode if heated. Keep people away from and upwind of fire.

6. Accidental release measures

Personal precautions
Do not breathe vapors, aerosols.. Do not get in eyes, on skin, or on clothing. Keep away from heat and sources of ignition. Provide adequate ventilation.

Isolation
Keep unnecessary people away; isolate hazard area and deny entry. Isolate for 800 meters or 0.5 miles in all directions if tank, rail car, or tank truck is involved in fire. Evacuate downwind areas as conditions warrant to prevent exposure and to allow vapors or fumes to dissipate. Spills may expose downwind areas to toxic or flammable concentrations over considerable distances in some cases.

Environmental precautions
Prevent further leakage or spillage. Do not discharge into the drains/surface waters/groundwater. Dike and collect water used to fight fire.

Methods for cleaning up
Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal. Do not empty into drains. Dispose of in accordance with local regulations.

Authority Notification
Within the United States, call the National Response Center (800-424-8802) and appropriate state and local authorities if the quantity released over 24 hours is equal to or greater than the reportable quantity listed below:

10lb/4.5kg

7. Handling and storage

Advice on safe handling
Provide sufficient air exchange and/or exhaust in work rooms. Handle in accordance with good industrial hygiene and safety practice. Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Keep containers tightly closed in a dry, cool and well-ventilated place. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Always open containers slowly to allow any excess pressure to vent. . Decontaminate soiled clothing thoroughly before re-use. . Destroy contaminated leather clothing..

Protection - fire and explosion:
Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge. Ground and bond containers when transferring material. In case of fire, emergency cooling with water spray should be available. Use only non-sparking tools. Use explosion-proof equipment.

Technical measures/Storage conditions
Keep tightly closed in a dry, cool and well-ventilated place. Handle an open container with care. Store at temperatures not exceeding <=12 °C/ 54 °F.

Material storage
Store locked up. Keep in a dry, cool and well-ventilated place. Maximum storage temperature <=12°C.

Incompatible products
strong acids, strong bases, amines, oxidizing agents, oxygen, reducing agents , Halogenated compounds, Metallic salts

8. Exposure controls / personal protection

OSHA Exposure Limits

Components	TWA
Formaldehyde	0.75 PPM
Benzene	10 PPM

Components	STEL
Formaldehyde	2 PPM
Benzene	50 PPM 10MIN

Components	CEILING
Benzene	25 PPM

ACGIH Exposure Limits

Components	TWA
Benzene	0.5 PPM

Components	STEL
Benzene	2.5 PPM

Components	Ceiling Limit Value:
Formaldehyde	0.3 PPM

Components	2005 NIOSH IDLH
Formaldehyde	20 ppm
Benzene	3,000 ppm

Mexico National Exposure Limits

Components	LMPE - PPT	
Benzene	3.2 mg/m^3	1 PPM

Components	STEL	
Benzene	16 mg/m^3	5 PPM

Components	Mexican Carcinogen Category
Formaldehyde	A2
Benzene	A2

Components	Mexican Ceiling Exposure Limit	
Formaldehyde	3 mg/m^3	2 PPM

Exposure controls

Engineering measures
General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems.

Protective equipment
A safety shower and eyebath should be readily available.

General advice
Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. Use only in an area equipped with a safety shower.

Respiratory protection
For concentrations > 1 and < 10 times the occupational exposure level: Use air-purifying respirator with full facepiece and organic vapor cartridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator fitted with organic vapor cartridge(s). The air purifying element must have an end of service life indicator, or a documented change out schedule must be established. Otherwise, use supplied air.

For concentrations more than 10 times the occupational exposure level and less than the lower of either 100 times the occupational exposure level or the IDLH: Use Type C full facepiece supplied-air respirator operated in positive-pressure or continuous-flow mode.

For concentrations > 100 times the occupational exposure level or greater than the IDLH level or unknown concentrations (such as in emergencies): Use self-contained breathing apparatus with full facepiece in positive-pressure mode or Type C positive-pressure full facepiece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus escape system.

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

Skin protection:
Wear impervious clothing and gloves when there is a reasonable chance for skin contact..

Eye/face protection:
Wear chemical goggles when there is a reasonable chance of eye contact.. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face..

9. Physical and chemical properties

9. Physical and chemical properties

Appearance

Form	liquid
Color	colourless
Odor	aromatic
Flash point	-10.99°C (12.22°F) for Benzene
Lower explosion limit	1.3 Vol. %
Upper explosion limit	8 Vol. %
Boiling point/range	80°C (176°F)
Density	Not Determined
Vapor density	Not determined
Water solubility	Not determined

10. Stability and reactivity

Chemical stability
Stable under normal conditions of handling, use and transportation.

Conditions to avoid
Keep away from heat,sparks and flame Heating above 302 deg F (150 deg C) can generate formaldehyde gas Avoid temperatures above 33°C

Incompatible Materials
strong acids
strong bases
amines
oxidizing agents
oxygen
reducing agents
Halogenated compounds
Metallic salts

Hazardous Combustion or Decomposition Products:
Carbon oxides, formaldehyde, paraformaldehyde

Possibility of hazardous reactions
Contact with acids can lead to rapid exothermic polymerization, which could cause bursting of the container or storage vessel.

11. Toxicological information

Potential health effects

Routes of exposure Skin, eyes, inhalation, ingestion.

Immediate effects

Skin	Harmful if absorbed through skin. Causes skin irritation. Erythema Redness or discoloration, swelling, itching, burning or blistering of skin. Drying, cracking or inflammation of skin. May cause allergic skin reaction. Prolonged or repeated contact may dry skin and cause irritation.
Eyes	Causes severe irritation. Symptoms of exposure may include: Eye irritation, burning sensation, pain, watering, and/or change of vision. Eye injury which may persist for several days.
Inhalation	Harmful if inhaled. Inhalation of vapors in high concentration may cause irritation of respiratory system Symptoms of exposure may include: Central nervous system depression with nausea, dizziness, headache, stupor, uncoordinated or strange behavior or unconsciousness. Nasal discharge, hoarseness, coughing, chest pain and breathing difficulty. Circulatory collapse May cause respiratory arrest Accumulation of fluid in the lungs (pulmonary edema); symptoms can be delayed for several hours.
Ingestion	Harmful if swallowed. Nausea, vomiting, loss of appetite, gastrointestinal irritation and/or diarrhea. Aspiration hazard if swallowed - can enter lungs and cause damage May cause additional affects as listed under "Inhalation"
Other:	Benzene has been classified by the International Agency for Research on Cancer (IARC) as a known human carcinogen (Group 1) Formaldehyde is listed as a potential cancer hazard by OSHA, a known human carcinogen by The International Agency for Research on Cancer (IARC, Group 1), and is listed in the 12th Report on Carcinogens (RoC) released by The National Toxicology Program (NTP). Contains material that may cause adverse reproductive effects.

Target organ effects	Blood-producing system damage Central nervous system effects

1,3,5-Trioxane

Acute oral toxicity	LD50: >3200 mg/kg
Acute dermal toxicity	LD50: > 3980 mg/kg
Acute inhalation toxicity	LC50 (4h): > 39.2 mg/l
Method	OECD 403
Skin corrosion/irritation	No skin irritation
Species	rabbit
Method	OECD 404
Skin Sensitization	nonsensitizer
Species	guinea pig female
Method	OECD 406
Serious eye damage/eye irritation	Not irritating
Species	rabbit eye
Method	OECD 405
Carcinogenic effects	No evidence of carcinogenicity
Species	rat

in vitro Mutagenicity	Cell gene-mutation in Chinese Hamster Cells: negative - with and without metabolic activation - Method: OECD 476 Ames Test: negative - with and without metabolic activation - Method: OECD 471 Chromosome aberrations in Chinese Hamster Cells: negative - without metabolic activation - Method: OECD 473
in vivo Mutagenicity	Mammalian Erythrocyte Micronucleus Test in mice: negative - Method: OECD 474
Developmental effects	Ingestion of excessive amounts by pregnant animals resulted in maternal and fetal toxicity
Routes of exposure	oral gavage
Species	rat
	NOAEL: 100 mg/kg bw/day
Repeated exposure	No adverse effects
Routes of exposure	oral gavage
Species	rat
Method	OECD 408
	NOAEL: 300 mg/kg bw/day
Repeated Exposure	May cause respiratory irritation
Routes of exposure	Inhalation
Species	rat
Method	OECD 412
	NOAEC: > 3.62 mg/l

Formaldehyde

Acute oral toxicity	LD50: 460 mg/kg
Acute dermal toxicity	Data waiving: formaldehyde has corrosive properties.
Acute inhalation toxicity	LC50 (30 min): 1000 mg/m³
Method	OECD 403
Skin corrosion/irritation	corrosive
Species	rabbit
Method	OECD 404
Skin Sensitization	sensitizing
Species	mouse female
Method	OECD 429
Serious eye damage/eye irritation	corrosive
Species	rabbit eye
Method	OECD 405
Species	rats
Carcinogenic Effects	oral
Species	rats
Study	oral (drinking water) lifetime study
	NOAEL: 82 mg/kg
in vitro Mutagenicity	Ames Test: positive - with and without metabolic activation - Method: OECD 471

in vivo Mutagenicity	Formaldehyde is a direct acting locally effective mutagen, with genotoxic effects limited to those cells in direct contact with formaldehyde (OECD SIDS). Did not cause chromosomal damage in rat bone marrow Method: EU B.12
Reproductive toxicity	No toxicity to reproduction
Developmental effects	no adverse developmental effects
Routes of exposure	oral gavage
Species	mouse
Developmental effects	no adverse developmental effects
Routes of exposure	Inhalation
Species	rat
Repeated Exposure	Repeated Exposure
Routes of exposure	oral drinking water
Species	rats
Method	OECD 453 NOAEL: 15 mg/kg bw/day

Observe the usual hygienic measures for handling chemicals.

12. Ecological Information

1,3,5-Trioxane

Acute fish toxicity	LC50: ~4000 mg/l (96h)
Species:	Leuciscus idus (Golden orfe)
Method	DIN 38412 T.15
Acute daphnia toxicity	EC50: >1000 mg/l (48h)
Species:	Daphnia magna
Method	EU C.2
Toxicity to aquatic plants	EC50: >500 mg/l (72h)
Species:	Desmodesmus subspicatus
Method	88/302/EEC
Toxicity to bacteria	EC20 (3h): 270 mg/l
Species:	in activated sludge
Method	OECD 209
Biodegradation	Inherently biodegradable
Method	OECD 302 B (Zahn-Wellens Test)
Bioaccumulation	Does not bioaccumulate
Other potential hazards	The substance does not meet the criteria for PBT / vPvB according to REACH, Annex XIII

Formaldehyde

Acute fish toxicity	LC50: 6.7 mg/l (96h)
Species:	Danio rerio (Zebra fish)
Method	OECD 203
Acute daphnia toxicity	EC50: 5.8 g/l (48h)
Species:	Daphnia pulex
Method	OECD 202
Species:	Desmodesmus subspicatus

12. Ecological Information

Method	OECD 201
	EC50 (biomass): 4.89 mg/l (72h)
Species:	Scenedesmus quadricauda
Method	OECD 201
Biodegradation	in fresh water
	Readily biodegradable
Method	OECD 301 C
Bioconcentration factor (BCF)	0.396 l/kg
Bioaccumulation	Bioaccumulative potential - low
Other potential hazards	The substance does not meet the criteria for PBT / vPvB according to REACH, Annex XIII

Do not discharge product unmonitored into the environment.

13. Disposal considerations

Disposal considerations
Dispose of spilled material in accordance with state and local regulations for hazardous waste. Recommended methods are incineration or biological treatment at a federally or state-permitted disposal facility. Note that this information applies to the material as manufactured; processing, use, or contamination may make this information inappropriate, inaccurate, or incomplete.

Note that this handling and disposal information may also apply to empty containers, liners and rinsate. State or local regulations or restrictions are complex and may differ from federal regulations. This information is intended as an aid to proper handling and disposal; the final responsibility for handling and disposal is with the owner of the waste.

EPA Hazardous Waste Code(s): D001, U019

14. Transport information

US Department of Transportation

UN/NA Number:	UN 1114
Proper Shipping Name	Benzene mixture
Hazard class	3
Packing Group	II
Reportable Quantity (RQ)	10lb/4.5kg
Emergency Resp. Guide	130

TDG

UN/NA Number:	UN 1114
Proper Shipping Name	BENZENE MIXTURE
Class:	3
Packing Group:	II

ICAO/IATA

UN-No.	UN 1114
Proper Shipping Name	Benzene mixture
Hazard Class	3
Packing group	II

IMDG

UN/ID No.	UN 1114
Proper Shipping Name	Benzene mixture
Hazard Class	3
Packing group	II

15. Regulatory Information

US State Regulations

Chemicals associated with the product which are subject to the state right-to-know regulations are listed along with the applicable state(s):

1,3,5-Trioxane 110-88-3

Pennsylvania	Listed
Massachusetts	Listed

Benzene 71-43-2

Pennsylvania	Listed
New York	Listed
New Jersey	Listed
Illinois	Listed
Massachusetts	Listed
Rhode Island	Listed

Formaldehyde 50-00-0

Pennsylvania	Listed
New York	Listed
New Jersey	Listed
Illinois	Listed
Louisiana	Listed
Massachusetts	Listed
Rhode Island	Listed

California Prop. 65

WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

WARNING! This product contains a chemical known in the State of California to cause cancer

Benzene 71-43-2

Listed

1,3,5-Trioxane 110-88-3

Formaldehyde 50-00-0
Listed

U.S. FEDERAL REGULATIONS

TSCA Inventory:
This product complies with the U.S. Toxic Substances Control Act (TSCA).

Environmental Regulations:

SARA 313 Chemicals
Benzene (71-43-2)
Formaldehyde (50-00-0)

Benzene 71-43-2

EPCRA Section 313	Listed
CERCLA Hazardous Substance	Listed

Formaldehyde 50-00-0

EPCRA Section 313	Listed
CERCLA Hazardous Substance	Listed
Extremely Hazardous Substance	Listed

SARA 311:

Acute health:	Yes
Chronic health:	Yes
Fire:	Yes
Sudden release of pressure:	No
Reactive:	No

INTERNATIONAL REGULATIONS

WHMIS Ingredient Disclosure List IDL:
Benzene (71-43-2)
Formaldehyde (50-00-0)
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16. Other information

NFPA:	Health: 3	Flammability: 3	Instability: 1
HMIS:	Health: 2	Flammability: 3	Physical Hazard: 1

Prepared By
Product Stewardship Department
Celanese

Sources of key data used to compile the datasheet
Information contained in this safety data sheet is based on Celanese owned data and public sources deemed valid or acceptable.. The absence of data elements required by ANSI or 1907/2006/EC indicates that no data meeting these requirements is available..

Other Information:
Observe national and local legal requirements
Changes against the previous version are marked by ***

For industrial use only. The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Celanese makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. Effects can be aggravated by other materials and/or this material may aggravate or add to the effects of other materials. This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards. Material safety data sheets are provided on the Internet by Celanese as a service to its customers. Possession of an Internet MSDS does not indicate that the possessor of the MSDS was a purchaser or user of the subject product.

Abbreviation and Acronym:
CAS = Chemical Abstracts Service (division of the American Chemical Society)
CLP = Classification, Labelling and Packaging
ADR = Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
DNEL = Derived No Effect Level
EINECS = European Inventory of Existing Commercial Chemical Substances
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC Code = International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IMO)
ICAO = International Civil Aviation Organization
IMDG = International Maritime Code for Dangerous Goods
LC50 = Lethal Concentration
LD50 = Lethal Dose
LOAEC = Low Observed Adverse Effect Concentration
LOAEL = Low Observed Adverse Effect Level
LOEL = Low Observed Effect Level
MEST = Mouse Ear Swelling Test
NOAEC = No Observed Adverse Effect Concentration
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
NOEL = No Observed Effect Level
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RCR = Risk Characterization Ratio
RID = Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
R-Phrases = Risk Phrases
S-Phrases = Safety Phrases
STOT RE = Specific Target Organ Toxicity Repeated Exposure
STOT SE = Specific Target Organ Toxicity Single Exposure
STP = Sewage Treatment Plant
vPvB = very Persistent and very Bioaccumulative