

SAFETY DATA SHEET



Revision Date **28-Dec-2022*****
Version / Revision **6**

product code **TP07**
Issuing date **02-Jan-2023**
Supersedes Version **5.02*****

Norbornene

SECTION 1: Identification of the substance / mixture and of the company / undertaking

1.1. Product identifier

Identification of the substance/preparation

Norbornene

Chemical Name	Bicyclo-[2.2.1] hept-2-ene
CAS-No	498-66-8
EC No.	207-866-0
Registration number (REACH)	01-2119635054-47-0000

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

Use of the Substance / Preparation Intermediate, Monomer.

Identified uses Transported isolated intermediate (1907/2006)

1.3. Details of the supplier of the safety data sheet

Company/Undertaking Identification	TOPAS Advanced Polymers GmbH Am Prime Parc 9 65479 Raunheim Germany
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Product Information	email: info@topas.com Tel: +49 (0) 69 / 945158 000
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1.4. Emergency telephone number

Emergency telephone number +49 (0)69-305 6418 available 24/7

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation)

Flammable solid Category 2, H228
Serious eye damage/eye irritation Category 2, H319
Reproductive toxicity Category 2, H361
Environmental hazard Aquatic Chronic 2; H411

2.2. Label elements

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Labelling according to Regulation 1272/2008/EC and its amendments (CLP Regulation).

Hazard pictograms

Flame
Exclamation mark
Environment
Health Hazard



Signal word

Warning

Hazard statements

H228: Flammable solid.
H319: Causes serious eye irritation.
H411: Toxic to aquatic life with long lasting effects.
H361: Suspected of damaging fertility or the unborn child.

Precautionary statements

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240: Ground and bond container and receiving equipment.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313: IF exposed or concerned: Get medical advice/ attention.
P391: Collect spillage.

2.3. Other hazards

Vapours may form explosive mixture with air
Hazardous polymerisation may occur

PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

Endocrine disrupting assessments

The substance is not listed on the candidate list according to Art. 59(1), REACH.
The substance was not assessed as having endocrine disrupting properties according to regulation 2017/2100/EU or 2018/605/EU.***

SECTION 3: Composition / information on ingredients

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3.1. Substances

Component	CAS-No	1272/2008/EC	Concentration (%)
Bicyclo [2.2.1]-hept-2-en	498-66-8	Flam. Sol. 2; H228 Eye Irrit. 2; H319 Repr. 2; H361 Aquatic Chronic 2; H411 ATE 9577 mg/kg (oral) ATE 4350 mg/kg (dermal) ATE 26,6*** (inhalation)***	>98
Toluene	108-88-3	Flam. Liq. 2; H225 Repr. 2; H361d Asp. Tox. 1; H304 STOT RE 2; H373 Skin Irrit. 2; H315 STOT SE 3; H336 Aquatic Chronic 3; H412 ATE 5580 mg/kg (oral) ATE 12267 mg/kg (dermal) ATE 28*** (inhalation)***	<2

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice

Remove/Take off immediately all contaminated clothing. Remove contaminated, soaked clothing immediately and dispose of safely. First aider needs to protect himself.

Inhalation

Aerate with fresh air. When symptoms persist or in all cases of doubt seek medical advice.

Eyes

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

Skin

Wash off immediately with soap and plenty of water. When symptoms persist or in all cases of doubt seek medical advice.

Ingestion

Do not induce vomiting without medical advice. Obtain medical attention.

Protection of First-aiders

First aider needs to protect himself. For further specification, refer to section 8 of the SDS.

4.2. Most important symptoms and effects, both acute and delayed

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Main symptoms

Exposure may result in reddening, tears and itching of the eyes and soreness in the nose and throat, together with coughing. Repeated and prolonged exposure to solvents may cause brain and nervous system damage.

Special hazard

None known.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media

foam, dry chemical, carbon dioxide (CO₂)

Unsuitable Extinguishing Media

Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Vapours are heavier than air and may spread along floors

Under conditions giving incomplete combustion, hazardous gases produced may consist of:

carbon monoxide (CO)

carbon dioxide (CO₂)

Combustion gases of organic materials must in principle be graded as inhalation poisons

5.3. Advice for firefighters

Special protective equipment for firefighters

Fire fighter protection should include a self-contained breathing apparatus (NIOSH-approved or EN 133) and full fire-fighting turn out gear.

Precautions for firefighting

Keep people away from and upwind of fire. Cool closed containers exposed to fire with water spray. Dike and collect water used to fight fire.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions

Avoid contact with skin and eyes. Keep away from heat and sources of ignition. Avoid breathing vapors or mists.

Ensure adequate ventilation, especially in confined areas.

For emergency responders: Personal protection see section 8. For non-emergency personnel: For personal protective equipment see section 8. Keep people away from and upwind of spill/leak.

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For non-emergency personnel. Stay upwind/keep distance from source.

6.2. Environmental precautions

Prevent further leakage or spillage. Do not flush into surface water or sanitary sewer system.

6.3. Methods and material for containment and cleaning up

Methods for containment

Stop the flow of material, if possible without risk.

Methods for cleaning up

DO NOT use combustible materials such as sawdust. Soak up with inert absorbent material. Allow to solidify, use mechanical handling equipment. Sweep up or vacuum up spillage and collect in suitable container for disposal. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours).

6.4. Reference to other sections

For personal protective equipment see section 8.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling

Avoid contact with skin, eyes and clothing. Provide sufficient air exchange and/or exhaust in work rooms. Refill and handle product only in closed system.

Hygiene measures

When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Take off all contaminated clothing immediately.

Advice on the protection of the environment

See Section 8: Environmental exposure controls.

Incompatible products

Incompatible products:
strong oxidizing agents
acids and bases
radical initiators

7.2. Conditions for safe storage, including any incompatibilities

Advice on protection against fire and explosion

Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Ground and bond containers when transferring material. Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback. Vapours may form explosive mixture with air. In case of fire, emergency cooling with water spray should be available.

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Technical measures/Storage conditions

Keep containers tightly closed in a dry, cool and well-ventilated place.

Storage Class (TRGS510)

4.1 B: Flammable solids

Temperature class

T2

7.3. Specific end use(s)

Transported isolated intermediate (1907/2006)

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Exposure limits European Union

No exposure limits established

Directive 98/24/EC

Directive 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU

Component	TWA (mg/m ³)	TWA (ppm)	STEL (mg/m ³)	STEL (ppm)	Skin Absorption
Toluene CAS: 108-88-3	192	50	384	100	Yes

Exposure limits UK

EH40 WELs

Component	TWA (mg/m ³)	TWA (ppm)	STEL (mg/m ³)	STEL (ppm)
Toluene CAS: 108-88-3	191	50	384	100

EH40 WELs and Appendix 5 Carcinogens

Component	Skin Absorption	Asphyxia	Respiratory irritant	included w/o limits	Carcinogen
Toluene CAS: 108-88-3	Yes				

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DNEL & PNEC

This substance is registered as intermediate under strictly controlled conditions.

8.2. Exposure controls

Appropriate Engineering controls

Handle product only in closed system or provide appropriate exhaust ventilation at machinery. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems. Vapors may cause flash fire or explosion.

Engineering and risk Management measures should maintain strictly controlled conditions. This also applies to environmental exposure controls.

Personal protective equipment

General industrial hygiene practice

Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing. Ensure that eyewash stations and safety showers are close to the workstation location.

Hygiene measures

When using, do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Take off all contaminated clothing immediately.

Eye protection

Safety glasses with side-shields. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face.

Hand protection

Wear protective gloves. Recommendations are listed below. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

Suitable material

Viton

Skin and body protection

Impervious clothing.

Environmental exposure controls

Use product only in closed system. If leakage can not be prevented, the substance needs to be suck off at the emersion point, if possible without danger. Inform the responsible authorities in case of leakage into the atmosphere, or of entry into waterways, soil or drains.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance
Colour

solid
colourless

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Odour	pungent
Odour threshold	No data available
Melting point/freezing point	46 - 47 °C
Boiling point or initial boiling point and boiling range	95 - 96 °C @ 1013 hPa
Flammability (solid, gas)	Not applicable
Lower explosion limit	0,77 Vol %
Upper explosion limit	6,5 Vol %
Flash point	-8 °C
Autoignition temperature	450 °C
Decomposition temperature	No data available
pH	No data available
Evaporation rate	No data available
Water solubility	0.13 g/l @20°C
Partition coefficient n-octanol/water (log value)	4.1 (measured)
Vapour pressure	301 hPa @ 59 °C
Density and/or relative density	0.8706 g/cm ³ @20°C
Relative vapour density	No data available

9.2. Other information

Molecular weight 94.2

SECTION 10: Stability and Reactivity

10.1. Reactivity

The reactivity of the product corresponds to the typical reactivity shown by the substance group as described in any text book on organic chemistry.

10.2. Chemical stability

Stable under normal conditions of handling, use and transportation.

10.3. Possibility of hazardous reactions

Hazardous polymerisation may occur. Polymerization is a highly exothermic reaction and may generate sufficient heat to cause thermal decomposition and/or rupture containers.

10.4. Conditions to avoid

Avoid any source of ignition. Avoid contact with heat, sparks, open flame and static discharge.

10.5. Incompatible materials

oxygen, oxidizing agents, radical initiators, strong acids, strong bases.

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10.6. Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Likely routes of exposure Inhalation, Eye contact, Skin contact

Acute toxicity				
Bicyclo [2.2.1]-hept-2-en (498-66-8)				
Routes of Exposure	Endpoint	Values	Species	Method
Oral	LD50	9577 mg/kg	rat	
Dermal	LD50	> 4350 ml/kg	rabbit	
Inhalative	LC50	> 26,6 mg/l (4h)	rat	

Toluene (108-88-3)				
Routes of Exposure	Endpoint	Values	Species	Method
Oral	LD50	5580 mg/kg		
Dermal	LD50	12267 mg/kg		
Inhalative	LC50	28 mg/l (4h)		

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

Assessment

Based on available data, the classification criteria are not met for:

Acute oral toxicity
Acute dermal toxicity
Acute inhalation toxicity
STOT SE

Toluene, CAS: 108-88-3

Assessment

Based on available data, the classification criteria are not met for:

Acute oral toxicity
Acute dermal toxicity
Acute inhalation toxicity

Irritation and corrosion				
Bicyclo [2.2.1]-hept-2-en (498-66-8)				
Target Organ Effects	Species	Result	Method	
Eyes	rabbit	Low irritating potential severe irritation		
Skin	rabbit	No skin irritation		

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

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Assessment

The available data lead to the classification given in section 2

Sensitization				
Bicyclo [2.2.1]-hept-2-en (498-66-8)				
Target Organ Effects	Species	Evaluation	Method	
Skin	mouse	not sensitizing	OECD 429	

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

Assessment

Based on available data, the classification criteria are not met for:

Skin sensitization

Subacute, subchronic and prolonged toxicity				
Bicyclo [2.2.1]-hept-2-en (498-66-8)				
Type	Dose	Species	Method	
28-day	NOAEL: 500 mg/kg/d	rat, male/female	OECD 422	
90-day	NOAEL: 2,02 mg/l	rat, male/female	OECD 413	

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

Assessment

Based on available data, the classification criteria are not met for:

STOT RE

Carcinogenicity, Mutagenicity, Reproductive toxicity					
Bicyclo [2.2.1]-hept-2-en (498-66-8)					
Type	Dose	Species	Evaluation	Method	
Mutagenicity		V79 cells, Chinese hamster	negative	OECD 473 (Chromosomal Aberration)	In vitro study
Mutagenicity		V79 cells, Chinese hamster	negative	OECD 476 (Mammalian Gene Mutation)	In vitro study
Reproductive toxicity	NOAEL 500 mg/kg/d	rat, parental	negative	OECD 422	
Reproductive toxicity	NOAEL 500 mg/kg/d	rat, 1. Generation, male/female	negative	OECD 422	
Mutagenicity	5000 µg/plate	Salmonella typhimurium	negative	OECD 471 (Ames)	
Reproductive toxicity	NOAEL 300 mg/kg/d	rat	positive	OECD 414, Oral	

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

CMR Classification

not evaluated by:

NTP: (National Toxicity Program)

IARC: (International Agency for Research on Cancer)

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OSHA: (Occupational Safety & Health Administration)

Evaluation

Suspected of damaging the unborn child

In the absence of specific alerts no cancer testing is required

Toluene, CAS: 108-88-3

CMR Classification

Directive 1272/2008/EC, Annex VI: Repr. 2

11.2. Information on other hazards

Bicyclo [2.2.1]-hept-2-en (498-66-8)

Endocrine disrupting properties

The substance has not been identified as having endocrine disrupting properties in accordance with section 2.3
The substances contained in this mixture have not been identified as having endocrine disrupting properties in accordance with section 2.3***

Toluene (108-88-3)

Endocrine disrupting properties

The substance has not been identified as having endocrine disrupting properties in accordance with section 2.3
The substances contained in this mixture have not been identified as having endocrine disrupting properties in accordance with section 2.3***

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic toxicity			
Bicyclo [2.2.1]-hept-2-en (498-66-8)			
Species	Exposure time	Dose	Method
Danio rerio (Zebra fish)	96h	LC50: > 7,5 mg/l	OECD 203
Poecilia reticulata (guppy)	5 d	EC50: > 40 mg/l	
Daphnia magna (Water flea)	48h	EC50: 7,3 mg/l	OECD 202
Scenedesmus subspicatus	72h	EC50: 9,9 mg/l (Biomass)	OECD 201
Activated sludge (domestic)	3 h	EC50: > 1000 mg/l	OECD 209

12.2. Persistence and degradability

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

Biodegradation

no significant degradation.

12.3. Bioaccumulative potential

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Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

Bioaccumulative potential

log Pow: 4.1

12.4. Mobility in soil

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

No data available

12.5. Results of PBT and vPvB assessment

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

12.6. Endocrine disrupting properties

The substance has not been identified as having endocrine disrupting properties in accordance with section 2.3. The substance was not assessed as having endocrine disrupting properties according to regulation 2017/2100/EU or 2018/605/EU.***

12.7. Other adverse effects

Bicyclo [2.2.1]-hept-2-en, CAS: 498-66-8

No data available

Note

Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product Information

Disposal required in compliance with all waste management related state and local regulations. The choice of the appropriate method of disposal depends on the product composition by the time of disposal as well as the local statutes and possibilities for disposal.

Uncleaned empty packaging

Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse.

SECTION 14: Transport information

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ADR/RID

14.1. UN number or ID number	UN 1325
14.2. UN proper shipping name	
Flammable solid, organic, n.o.s. (Norbornene)	
14.3. Transport hazard class(es)	
Class	4.1
14.4. Packing group	II
14.5. Environmental hazards	Fish and tree
14.6. Special precautions for user	
ADR Tunnel restriction code	(E)
Classification Code	F1
Hazard Number	40

ICAO-TI / IATA-DGR

14.1. UN number or ID number	UN 1325
14.2. UN proper shipping name	Flammable solid, organic, n.o.s. (Norbornene)
14.3. Transport hazard class(es)	4.1
14.4. Packing group	II
14.5. Environmental hazards	Fish and tree
14.6. Special precautions for user	

IMDG

14.1. UN number or ID number	UN 1325
14.2. UN proper shipping name	Flammable solid, organic, n.o.s. (Norbornene)
14.3. Transport hazard class(es)	4.1
14.4. Packing group	II
14.5. Environmental hazards	Fish and tree
Marine pollutant	yes
14.6. Special precautions for user	
EmS	F-A, S-G

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code not applicable***

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulation 1272/2008, Annex VI

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Toluene, CAS: 108-88-3

Classification

Flam. Liq. 2; H225
Repr. 2; H361d***
Asp. Tox. 1; H304
STOT RE 2*; H373**
Skin Irrit. 2; H315
STOT SE 3; H336

Hazard statements

H225, H361d***, H304, H373**, H315, H336

DI 2012/18/EU (Seveso III) ***

Category

E2***

Component	Status
Bicyclo [2.2.1]-hept-2-en CAS: 498-66-8	not subject***
Toluene CAS: 108-88-3	regulated***

National Regulatory Information

German storage class

Storage Class (TRGS510)

4.1 B: Flammable solids

Water hazard class according to AwSV

KBwS Class

1

KBwS Number

2026

Maternity Protection Law

The product falls into a hazard category which, in accordance with §11 of the Maternity Protection Act, suggests an uncontrollable hazard. A risk assessment taking into account §10 and §11 as well as the general provisions of the Maternity Protection Act must be observed. The employment restrictions for the protection of working mothers (MuschG) must be observed***

Youth Employment Protection Act

The employment restrictions for the protection of young people at work (JArbSchG) must be observed***

Other regulations

Toluene, CAS: 108-88-3

Reg 111/2005/EC

DI 96/61/EC (water)***

Reg. 273/2004/EC, Annex I, Category 3

DI 92/85/EEC

International Inventories

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AICS (AU)
DSL (CA)
NDSL (CA)
EC-No. 2078660 (EU)
ENCS (4)-1763 (JP)
ISHL 7-(2)-108 (JP)
KECI 2012-3-5388 (KR)
PICCS (PH)
TSCA (US)
NZIoC (NZ)

Toluene, CAS: 108-88-3

AICS (AU)
DSL (CA)
IECSC (CN)
EC-No. 203-625-9 (EU)***
ENCS (3)-2 (JP)
ISHL (3)-2 (JP)
ISHL 2-(8)-869 (JP)***
KECI 97-1-298 (KR)
KECI KE-33936 (KR)
INSQ (MX)
PICCS (PH)
TSCA (US)
NZIoC (NZ)***

15.2. Chemical safety assessment

The Chemical Safety Assessment (CSR) has been generated (intermediate use under strictly controlled conditions)

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3

H228: Flammable solid.
H319: Causes serious eye irritation.
H411: Toxic to aquatic life with long lasting effects.
H225: Highly flammable liquid and vapour.
H361: Suspected of damaging fertility or the unborn child.
H304: May be fatal if swallowed and enters airways.
H373: May cause damage to organs through prolonged or repeated exposure if inhaled.
H315: Causes skin irritation.
H336: May cause drowsiness or dizziness.

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Training advice

For effective first-aid, special training / education is needed.

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Restrictions on use None known

Sources of key data used to compile the datasheet

Information contained in this safety data sheet is based on TOPAS owned data and public sources deemed valid or acceptable. The absence of data elements required by OSHA, ANSI or Annex II, Regulation 1907/2006/EC indicates, that no data meeting these requirements is available.

Further information for the safety data sheet

For more information, consult the Technical Data Sheet (www.topas.com). Observe national and local legal requirements. Changes against the previous version are marked by ***.

Disclaimer

This information is based on our present state of knowledge. It shall describe our products regarding safety requirements and shall not be construed as a guarantee or statement of condition and/or quality

End of Safety Data Sheet