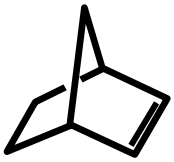
Data Sheet

Norbornene Bicyclo[2.2.1]hept-2-ene

Structural Formula



Empirical Formula $C_7 H_{10}$

Synonyms

– 2-Norbornylene
– 2-Norbornene
– Norcamphene

CAS Number 498-66-8

Colourless or white solid with characteristic odour. Norbornene is a liquid with low viscosity above 47 °C. Solid norbornene has a high solubility in common organic solvents as for example in acetone and in aliphatic, cycloaliphatic or aromatic solvents.

Unsaturated bicyclic hydrocarbon (cycloolefin)

Property	Value	Unit
Molecular weight	**94.2**	g/mol
Melting Point	**47**	°C
Boiling Point	**96**	°C
Density (50°C)	**0.845**	g/ml
Viscosity (50°C)	**0.75**	mPas s
Heat of evaporation	**372**	kJ/kg
Vapor pressure at 65°C	**40**	kPa
Flash point	**- 15**	°C
Ignition Temperature	**445**	°C
Lower explosion limit	**2.5**	% weight
	0.77	% vol.
	31	g/m³
Upper explosion limit	**18.4**	% weight
	6.5	% vol.
	272	g/m³
Dipole moment	**0.396**	Debye
Thermal conductivity	**0.12**	W/m K
Water solubility	**70**	mg/l
Odour threshold	**0.25**	mg/m³

Purity

98% area (GC); different grades are available. This typical value is subject to change without further notice. Norbornene will be delivered unstabilized. The addition of a stabilizer is possible on request.

Packaging

Norbornene can be supplied in containers of different kind and size. More information on request.

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Storage and Handling

Norbornene is a solid, capable of being stored in mild steel, stainless steel or glass containers at atmospheric pressure. Use only PTFE, perfluorated elastomers or metal for gaskets and seals. The storage under nitrogen is recommended to avoid contact with oxygen. Storage vessels and transfer equipment should be adequately grounded to prevent the accumulation of static electricity. Norbornene should be stored in a tightly closed and dry container in a cool, wellventilated place away from heat, flames, sparks and other sources of ignition. Furthermore norbornene should be separated from food and feeding stuff. The German VCI storage category is 4.1 (flammable solid substances).

Avoid contact with strong oxidizing agents, mineral acids or bases, strong Lewis acids or bases or polymerization initiators. Use norbornene only with adequate ventilation and avoid direct contact with the substance, as it can be absorbed into the body by inhalation and by ingestion. Please review the informations on our material safety data sheet (MSDS) which is available on request. The MSDS must be consulted and fully understood before handling, storage, use or disposal of this product.

Stability and Reactivity

Norbornene is stable at normal temperatures and pressure even without stabilizer. No hazardous polymerization or other reactions may occur under ordinary conditions. Norbornene is an inflammable hydrocarbon but begins burning after reaching its ignition temperature under access of air or oxygen. Furthermore it may form explosive mixtures with air and oxygen. Like all other hydrocarbons and olefins, norbornene reacts even below its ignition temperature with air or oxygen to form traces of autoxidation products.

Other Information

Hazard Ratings

NFPA (Scale 0-4)	Health = 1	Fire = 3	Reactivity = 0
HMIS	Health = 1	Fire = 3	Reactivity = 0
EC Classification	F (highly flammable)		

Toxicological and Ecological Information

RTECS Number RB7900000

Toxicity Data

Acute oral toxicity (species rat)	LD50 11300 mg/kg
Acute dermal toxicity (species rabbit)	LD50 > 5 ml/kg
Acute inhalative toxicity (species rat)	LC50 26,6 mg/l (Duration of exposure: 4 hours)
Long term / delayed effects	No specific information available
Carcinogenicity	Not considered carcinogenic by NTP, IARC or OSHA
Neurotoxicity	No data available
Mutagenicity	Not mutagenic
Teratogenicity	No data available
Exposure Limits	No occupational exposure limits established
Water hazard class (Germany)	2 (scale: 0 – 3 with 3 being the worst)

Health effects

- Inhalation may cause irritation
- Skin contact may cause irritation
- Eye contact may cause irritation
  (in tests done on rabbit eyes norbornene was rated 7 on a scale of 1-10 with 10 being the worst)

Regulatory Information

2-Norbornene is listed in the following international chemical inventories:

Country	Inventory
EC	EINECS Number 207-866-0
Switzerland	SWISS Number G-4815
USA	TSCA
Canada	NDSL
Australia	AICS
Japan	ENCS Number 4-1763 (MITI)
Philippines	PICCS

1999/91/EC

2-Norbornene is added in the register of monomers and other starting materials in „Anlage 1“ of the EC guideline 1999/91/EC from 11/23/1999 (supplementation of EC guideline 90/128EEC, appendix II, section A, from 02/23/1990) which are permitted for the production of neccessary articles made of polymers being designed for the contact with food. For further details the review of the EC guidelines 1999/91/EC and 90/128EEC is strongly recommended.

Transport Information

The following international classifications apply on transportation:

Land transport ADR/RID	
Class	4.1
Packaging group	II
Hazard id. no.	40
UN number	1325
Technical name	FLAMMABLE SOLID, ORGANIC, N.O.S.
Danger releasing substance	Norbornene
Remarks	Transport not allowed by Deutsche Post AG!
Marine transport IMDG/GGVSee	
Class	4.1
Packaging group	II
UN number	1325
Proper shipping name	FLAMMABLE SOLID, ORGANIC, N.O.S.
Danger releasing substance	Norbornene
EmS	4.1-05
Air transport ICAO/IATA	
Class	4.1
Packaging group	II
UN number	1325
Proper shipping name	FLAMMABLE SOLID, ORGANIC, N.O.S.
Danger releasing substance	Norbornene