

TMAL

Trimethylaluminum

TMAL is an aluminium alkyl used for alkylation or Weinreb Amidation in organic synthesis

CAS number
75-24-1

EINECS/ELINCS No.
200-853-0

TSCA status
listed on inventory

Molecular weight
72.1

Characteristics

Appearance	Clear, colorless liquid
Boiling point, 1013 mbar	127 °C
Density, 30 °C	0.743 g/cm ³
Melting point	15 °C
Solubility	Soluble in aromatic and saturated aliphatic and cycloaliphatic hydrocarbons
Stability to air	Ignites upon exposure
Stability to water	Reacts violently, may ignite upon contact
Viscosity, 30 °C	0.9 mPa.s

Composition

Aluminum	^b ≥ 36.3 wt%
Hydride, as AlH ₃	^a -- wt%
Other R ₃ Al	^a ≤ 1.5 wt%
Trimethylaluminum	^a ≥ 98.5 wt%

Thermochemical properties

Heat of vaporization ΔH _v , NBP / 1 bar	^c 247 J/g (59 cal/g)
Specific heat, 57 °C	2.213 J/g.°C (0.529 cal/g.°C)
Heat of formation ΔH _f ^o , 25 °C / 1 bar	-151 kJ/mole (-36 kcal/mole)
Heat of combustion ΔH _c ^o , 25 °C	-3180 kJ/mole (-760 kcal/mole)

Notes:

^a Calculated from gas chromatographic analysis of hydrocarbons and hydrogen obtained by hydrolysis. ^b Determined by titration of aqueous hydrolyzate. ^c NBP = Normal Boiling Point i.e. temperature at which the vapor pressure is 760 mm Hg (1 bar).

Applications

TMAL is used as a cocatalyst in the Ziegler-Natta polymerization of olefins. TMAL is also used in the production of compound semiconductors used in electronic devices.

Storage

TMAL and its solutions are stable when stored under a dry, inert atmosphere and away from heat. CAUTION: Neat TMAL may undergo exothermic decomposition with gas evolution at elevated temperatures (see section on Safety & handling). Thermal decomposition products include methane and an amorphous solid containing > 50% aluminum.

Packaging and transport

TMAL and its solutions are available worldwide in cylinders and portable tanks. In North America only, TMAL is also available in tank trailers and rail cars. Containers are fabricated from carbon steel and are equipped with dip tubes for top discharge and all connections are located in the vapor space. Both packaging and transport meet the international regulations.

Safety and handling

TMAL ignites upon exposure to air and reacts violently with water. Hydrocarbon solutions of TMAL may also ignite upon exposure to air. TMAL and its solutions must be handled under a dry, inert atmosphere, e. g. nitrogen or argon. Water must be scrupulously removed from process equipment prior to putting it into metal alkyls service. Failure to do so may result in an explosion. If heated above 120°C, TMAL will undergo exothermic decomposition with evolution of flammable gas. Products of complete combustion of TMAL and its solutions are aluminum oxide, carbon dioxide and water. TMAL causes severe burns to the skin and eyes. It is imperative that proper personal protective equipment be worn when handling TMAL. Please refer to the Safety Data Sheet (SDS) for further information on the safe storage, use and handling of TMAL. This information should be thoroughly reviewed prior to acceptance of this product. The SDS is available at nouryon.com/sds-search.

Additional information

Availability: TMAL is a commercial product available as the neat pyrophoric liquid and as pyrophoric and non-pyrophoric solutions in a variety of hydrocarbon solvents. Consult your Nouryon representative for further information.

All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable. Nouryon, however, makes no warranty as to accuracy and/or sufficiency of such information and/or suggestions, as to the product's merchantability or fitness for any particular purpose, or that any suggested use will not infringe any patent. Nouryon does not accept any liability whatsoever arising out of the use of or reliance on this information, or out of the use or the performance of the product. Nothing contained herein shall be construed as granting or extending any license under any patent. Customer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes. The information contained herein supersedes all previously issued information on the subject matter covered. The customer may forward, distribute, and/or photocopy this document only if unaltered and complete, including all of its headers and footers, and should refrain from any unauthorized use. Don't copy this document to a website.

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The logo for Nouryon, featuring a stylized blue 'N' followed by the word 'ouryon' in a blue sans-serif font.