

technical bulletin

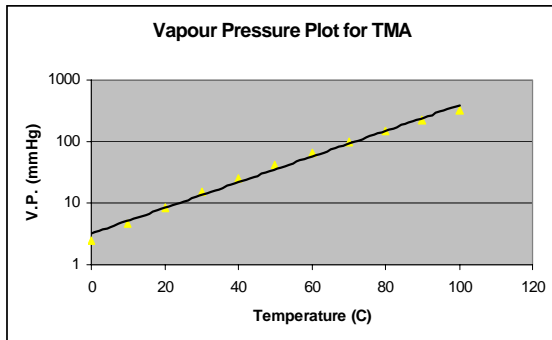
Trimethylaluminium (TMA, Me₃Al)

Trimethylaluminium (TMA) may be used as an Al source in the deposition of various semiconductor and dielectric layers. In combination with suitable oxygen sources Al₂O₃ layers can be fabricated whilst with suitable group III and group V sources a range of AlGaAs, AlInGaP, InGaN structures can be grown.

Physical Properties

TMA is a pyrophoric liquid, which is stable indefinitely if kept sealed under inert atmosphere at or below room temperature.

Formula	(CH ₃) ₃ Al
Molecular weight	72.09
Melting point	15.4 °C
Boiling point	127 °C
Density @ 20 °C	0.752 g/ml
Vapour pressure @ 20 °C	8.7 mmHg
VP equation	Log ₁₀ P(mmHg) = 8.22 – 2134/T(K)
TLV (as Al ₂ O ₃)	10 mg/m ³



Supply Options

TMA is supplied in high purity stainless steel containers in a variety of configurations and volumes from 100g individual units to multi-kilogram bulk system ampoules suited to the EpiFill™ metalorganic precursor delivery equipment.



Transportation Information

Shipping name:	Organometallic substance, Liquid, Pyrophoric, Water-Reactive, (Trimethylaluminium)
Hazard class:	4.2 (4.3)
IMO/DOT shipping label:	Spontaneously combustible and dangerous when wet
UN number:	3394
ECCN number:	3C003
Packing group:	I

Specifications

(Electronic Grade TMA)

Metals (all values in ppm)

Ag	<0.4	As	<0.5
Au	<0.5	B	<0.4
Ba	<0.1	Be	<0.02
Bi	<0.5	Cd	<0.02
Ca	<0.2	Co	<0.4
Cr	<0.4	Cu	<0.2
Fe	<0.1	Ge	<0.5
Hg	<0.5	I	<2.0
La	<0.4	Li	<0.4
Mg	<0.02	Mn	<0.03
Mo	<0.5	Na	<1.0
Nb	<0.5	Ni	<0.5
P	<0.5	Pb	<2.0
Pd	<0.5	Pt	<0.5
Rh	<0.5	S	<2.0
Sb	<1.0	Se	<1.0
Si	<2.0	Sn	<2.0
Sr	<0.1	Tb	<0.5
Te	<2.0	Ti	<0.2
V	<0.5	W	<0.5
Y	<0.02	Zn	<0.2

Organic Impurities by FT-NMR ND

100% Al₂O₃ Step Coverage on High Aspect Features

Image courtesy of Genus, Inc.



TMA Applications

- High purity liquid aluminium source for Al₂O₃ deposition using ALD technology. Applications include magnetic recording heads, Micromechanical Systems (MEMS) fabrication, DRAM capacitors, and gate structures.
- Ultra high purity aluminium source for the deposition of epitaxial films such as AlGaAs, AlGaIn, InAlGaP, and AlAsSb by MOCVD and related growth techniques. End use applications include HBLEDs, lasers, telecommunication devices, solar cells, sensor materials, etc.

Capacity Details

A recent TMA production plant expansion has allowed capacity volumes to reach tonne quantities whilst retaining high purity and process control. Dual location production facilities ensure security of supply from local international sites.



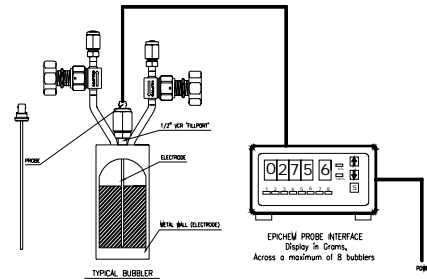
Support Activities

SAFC Hitech has a continuous product improvement policy and extensive research activities to address all areas of precursor production and supply. Furthermore, our technical engineers are working closely with customers to develop delivery systems and accessories to facilitate product use.

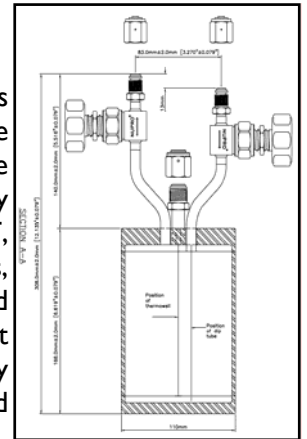
The EpiFill™ bulk delivery system has been specially developed with large volume chemical users in a production environment to minimise downtime while maximizing safety, quality and reliability.



The SAFC Hitech level indication system has been introduced to meet customer requests for an insitu means to measure product volume accurately and continuously over source lifetime. It utilises capacitance measurement from a patented probe design.



Design of ampoules to suit specific customer requirements is addressed by in-house engineering experts to provide containers of the highest integrity that meet international DOT, ADR and IMO standards. Thus, current designs can be modified to comply with equipment limitations or extra functionality and new approaches investigated to optimise performance.



Technical Information

Expert scientific information about TMA handling and usage is available from SAFC Hitech's support team. Relevant technical papers and articles can be provided to customers based on their processes.

Contact Information

For more information regarding any topic related to TMA please visit our web site www.safchitech.com and fill out a request form online. Alternatively, ring your local contact for details on your order requirements.