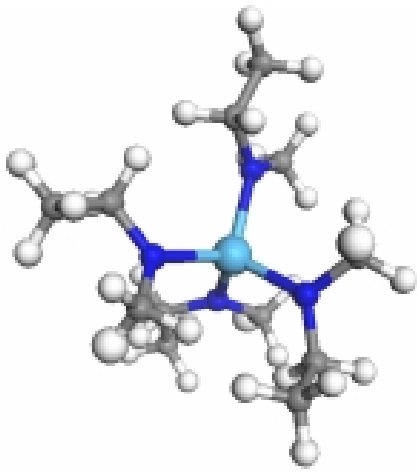


ALOHA™ CVD/ALD Materials



TEMAHf

Tetrakis[EthylMethylAmino]Hafnium

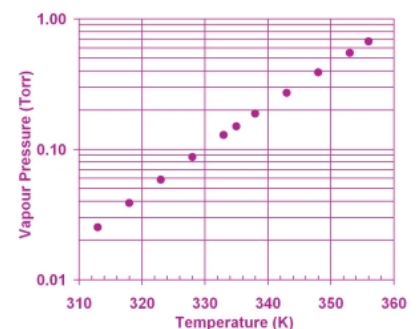
$\text{Hf}[\text{N}(\text{CH}_3)(\text{C}_2\text{H}_5)]_4$

CAS n° 352535-01-4

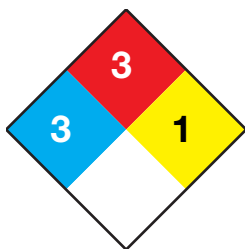
- TEMAHf is used essentially for the deposition of pure HfO_2 or in conjunction with silicon sources or aluminum sources to form silicates and aluminate respectively.
- TEMAHf can be used both in ALD or MOCVD mode for the deposition of high-k films, with O_2 , O_3 and H_2O being the most common co-reactants.
- For Hafnium silicates, TEMAHf can be used in conjunction with ALOHA's 3DMAS, 4DMAS or SAM.24™.
- TEMAHf is a clear liquid that reacts immediately upon contact with water or moisture, with the evolution of ethylmethylamine and hafnium oxide/hydroxide formation. Handling in perfectly dried piping and components is mandatory for high-performance, particle-free processing.
- TEMAHf has an increased volatility vs TDEAHf, and does not suffer from being a solid at room temperature as TDMAHf.
- Like for most of the ALOHA advanced products, each canister of TEMAHf is supplied with a BALAZS CofA ensuring strict compliance with the specifications. Please consult www.balazs.com for more information.

Physical Chemical Properties

Physical Property	
Molecular Weight	411.89
Physical State	Liquid
Colour	Colourless
Boiling Point	79°C @ 0.1 Torr
Melting Point	< -20°C
Vapour Pressure	~ 0.1 Torr @ 70°C
Specific Gravity	1.324 g/cm ³



Hazard Rating



HMIS

Health: 3
Flammability: 3
Reactivity: 1

The product should be handled considering that the major by-product in case of air exposure is ethylmethanamine. Please consult the ALOHA MSDS of TEMAHf for additional data.

All materials in contact with TEMAHf should be compatible with amines. Please consult ALOHA for detailed materials recommendation.

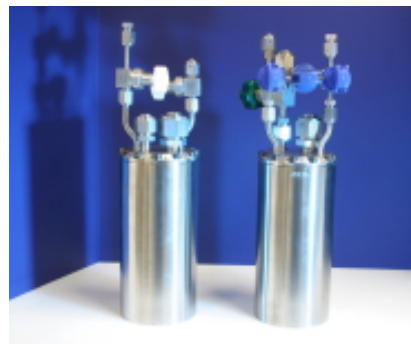
Packaging & Dispensing System

- TEMAHf can be packaged in a variety of canisters depending on the application.
- For on-board applications, TEMAHf is usually supplied in 1200, 1800 or 2500 ml canisters with various valving and dip-tube configurations. Multipoint or continuous level sensing systems can also be customized to meet each specific requirements. ALOHA's on-board canisters have all-metal construction and are cleaned and dried by state of the art techniques. TEMAHf can also be filled in properly documented customer-supplied canisters.
- Since TEMAHf has a very low vapour pressure at room temperature, the solvent purge option for the Air Liquide CANDI system is mandatory for remote delivery. ALOHA's UHP Hexane or Octane undergo a proprietary drying process for this application. For the cleaning of on-board manifold and direct exhaust to the tool, a new and harmless high volatility solvent can be proposed.



Transport Information

- Proper shipping name: Organometallic substance, water reactive, flammable, n.o.s. (Tetrakis(ethylmethanamine) Hafnium)
- CAS n° 352535-01-4
- UN Number: 3399
- Class/division: 4.3
- Package group: II
- Hazard Labels required : Class 4.3 (Dangerous When Wet), Class 3 (Flammable)



Air Liquide ALOHA is providing a complete advanced precursor solution. ALOHA portfolio covers low k, high k, barrier, metal gate, electrode, including some proprietary solutions for SiN, metals and High k. Manufacturing electronic devices with this material may be claimed in certain patents and seller hereby disclaims any liability as to the use of this material made by buyer.

For more information please contact: aloha@airliquide.com or your local Air Liquide representative.

DISCLAIMER: Not available in the United States



ALOHA
ELECTRONICS PERFORMANCE MATERIALS