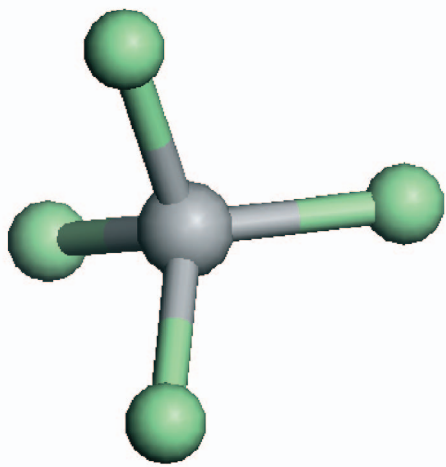


# ALOHA



AL Precursors global offer - TiN

Titanium Tetrachloride

TiCl<sub>4</sub>

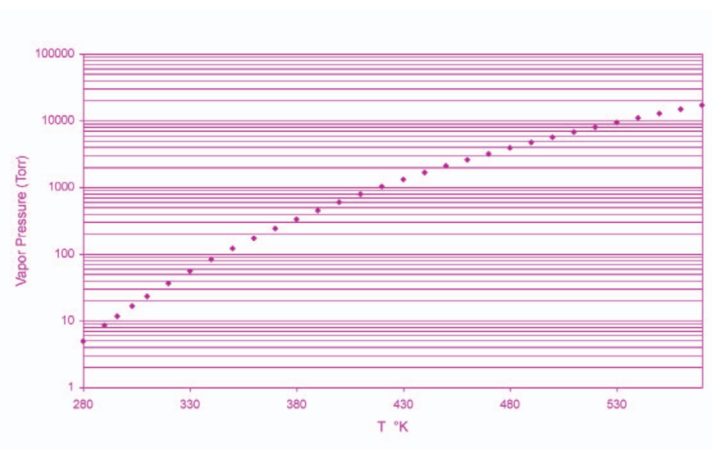
CAS n° 7550-45-0

- TiN is widely used as a diffusion barrier layer or as an inorganic ARC for lithography on top of aluminum metal.
- TiCl<sub>4</sub> in conjunction with ammonia is the most common TiN precursor for contact layer barrier prior to CVD W metallization and for capacitor electrode in DRAM devices.
- TiCl<sub>4</sub> is volatile liquid at room temperature and can be delivered either by bubbler or direct liquid injection for LP-CVD or ALD processes.
- Air Liquide's high purity TiCl<sub>4</sub> has extremely tight metal specification for higher yield and process performance.

**Main application:** LP-CVD and ALD of Titanium nitride

### Physical-chemical properties

Physical Property	
Molecular Weight	189.7 g.mol <sup>-1</sup>
Physical State	Liquid
Melting point	-24°C
Boiling Point	136.5°C
Vapor Pressure	9 Torr at 20°C
Liquid Density	1.73 g.cm <sup>-3</sup> at 0°C
Viscosity	0.83 cSt at 20°C

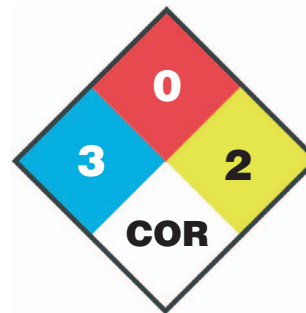


## AL Specifications

Element	Unit (ppb)	Element	Unit (ppb)
Ag	<1	Mn	<1
Al	<2	Mo	<1
Au	<1	Na	<2
Ba	<1	Ni	<1
Be	<1	Pb	<1
Bi	<1	Sb	<1
Ca	<1	Sn	<1
Cd	<1	Sr	<1
Co	<1	V	<1
Cr	<1	Zn	<5
Cu	<2	Zr	<1
Fe	<3	As	<2
Ga	<1	Hg	<1
K	<1	Th	<1
Li	<1	U	<2
Mg	<2		

## Hazard Rating

HMIS: Health: 3 Flammability: 0 Reactivity: 2



## Handling

- $TiCl_4$  is a corrosive, non flammable, stable liquid and does not thermally decomposes under inert atmosphere at room temperature. It reacts spontaneously and vigorously with water or trace moisture, with evolution of HCl. Extreme care must be taken to completely dry the distribution systems and canister connexions before and after exposure to  $TiCl_4$ .
- $TiCl_4$  can be distributed in UHP stainless steel distribution systems. Sealing materials that is compatible with  $TiCl_4$  are PCTFE, PTFE, PVDF, PFA, FEP. Kalrez (O-ring) should be avoided.

## Packaging & Dispensing system

- $TiCl_4$  is typically delivered using a liquid dispensing system such as Air Liquide's CANDI system on most OEM platforms. CANDI has distinctive, patent pending features, such as a "last drop usage" function that avoids the usage of an internal liquid level sensing system.
- $TiCl_4$  is available in SEMIF66-1101 and F 96-0704 compliant canisters of 5 Gallons and 2 Gallons (18,9L and 7,6L) equipped with manually or pneumatically valves actuated valves. Custom packages are also available on request.



## Transport information

Proper shipping name: Titanium tetrachloride  
 CAS n° 7550-45-0  
 UN Number: 1838  
 Class/Division: 8  
 Package group: II  
 Label ADR: 8



July 2005

Air Liquide ALOHA provides a complete advanced precursor solution.  
 AL ALOHA portfolio covers low k, high k, barrier, metal gate, electrode, including some proprietary solutions.

For more information please contact: [aloha@airliquide.com](mailto:aloha@airliquide.com) or your local Air Liquide representative

"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"

