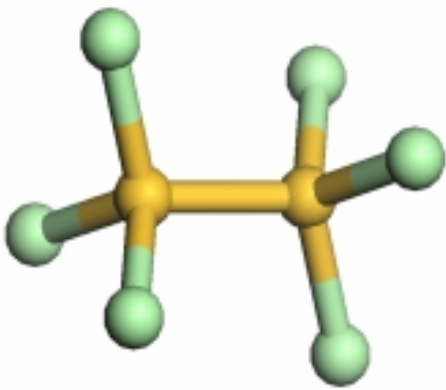


ALOHA™ CVD/ALD Materials



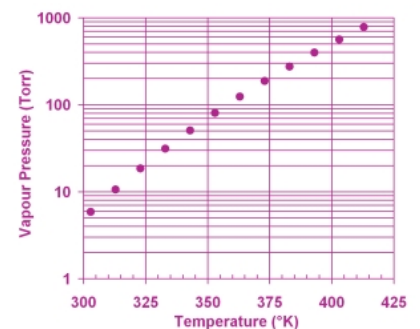
HCDS

Hexachlorodisilane
 $\text{Cl}_3\text{Si-SiCl}_3$ (Si_2Cl_6)
 CAS n°13465-77-5

- Hexachlorodisilane is used mostly for the deposition of silicon nitride at low temperature (~ 550°C) by LPCVD, along with ammonia, and for the deposition of silicon dioxide by CVD or ALD.
- HCDS is a corrosive, water reactive colorless liquid, that requires extreme handling care due to the shock sensitive nature of some partial hydrolysis products ("poppy gels").
- The usual synthetic route to HCDS involves the reaction of chlorine on silicon alloys, which is likely to yield metal contamination. Titanium is notably difficult to separate due to the close BP of TiCl_4 and HCDS.
- ALOHA's HCDS is made from semiconductor grade silane disproportionation process, which ensure the best purity and lowest specification on the market.
- Backed by strong technical support and proprietary process improvements, ALOHA's HCDS is the most widely accepted product at both end users and OEMs.

Physical Chemical Properties

| Physical Property | |
|--------------------------|-------------------------------|
| Molecular Weight | 268.88 g/mol |
| Physical State | Liquid |
| Colour | Colourless |
| Melting Point | -1°C |
| Boiling Point | 144-145°C |
| Vapour Pressure | 100 torr @ 85°C |
| Enthalpy of vaporization | 11.1 kcal/mole |
| Specific Gravity | 1.58 g/cm ³ at 0°C |
| Decomposition Point | > 250°C |
| Specific Properties | Deoxygenating agent |

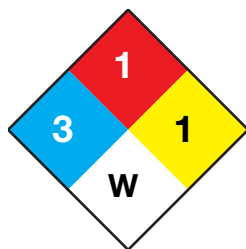


ALOHA Specifications

| Parameter | Unit | Specification |
|---------------------------------------|------|---------------|
| Assay | % | >99,7% |
| Water Content | ppm | Reacts |
| Si ₂ Cl ₆ O | % | <0,05% |
| SiHCl ₃ +SiCl ₄ | % | < 0,2% |

| Metals | ppb |
|--------|--------|
| Ti | <= 20 |
| Al | <= 20 |
| Fe | <= 20 |
| Ni | <= 20 |
| K | <= 20 |
| Na | <= 20 |
| Cr | <= 20 |
| Mn | <= 20 |
| Mg | <= 20 |
| Cu | <= 20 |
| Ca | <= 20 |
| Total | <= 100 |

Hazard Rating



HMIS

Health: 3

Flammability: 1

Reactivity: 1

Incompatibility : Water, O-conatining compounds

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

All materials in contact with HCDS should be compatible for service in corrosives/acids.

Special Process Improvements

- Air Liquide and SELETE have jointly developed some process improvements to the usual SiN LPCVD process with special additives to improve the leakage current and the etch selectivity at low temperature. The IP rights to exploit this process can be associated with the product purchase.

Packaging & Dispensing System

- For remote bulk delivery and point of use boiler refilling, HCDS is usually supplied in special 7L canisters with a special five-valve configuration.
- For on-board applications, HCDS is usually supplied in 1200, 1800 or 2500 ml canisters with various valving and dip-tube configurations. ALOHA's on-board canisters have all-metal construction and are cleaned and dried by state of the art techniques. HCDS can also be filled in properly documented customer-supplied canisters.
- Since HCDS has a relatively high vapour pressure at room temperature, the solvent purge option for the Air Liquide CANDI system is not required.



Transport Information

- Proper shipping name: Chlorosilanes, n.o.s. (Hexachlorodisilane)
- CAS n° 13465-77-5
- UN Number: 2987
- Class/division: 8
- Package group: II
- Hazard Labels required (DOT) : Corrosive

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.

