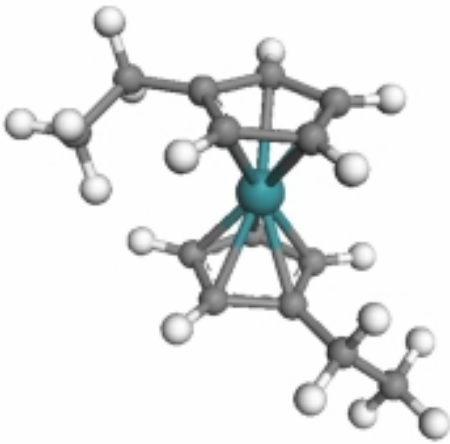


# ALOHA™ CVD/ALD Materials



## RuEtCp<sub>2</sub>

Bis(ethylcyclopentadienyl)Ruthenium

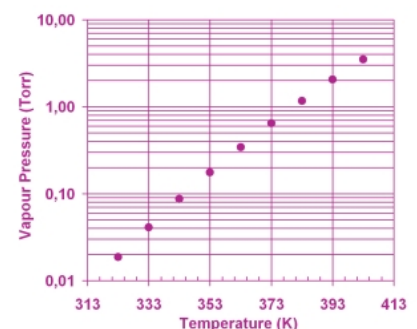
$\text{Ru}[(\text{C}_2\text{H}_5)\text{C}_5\text{H}_4]_2$

CAS n° 32992-96-4

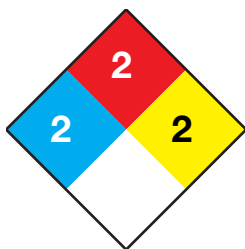
- Bis(ethylcyclopentadienyl)Ruthenium is a commonly used precursor for the CVD and ALD (or PE-ALD) or ruthenium metal or ruthenium containing films, either conductive or dielectric.
- The molecule is designed with ethyl groups on the Pi-bonded cyclopentadienyl (Cp) ligands, in order to reduce the molecular weight of this compound, and lower its melting point to below room temperature (for reference, the MP of Ru(Cp)<sub>2</sub> is 200°C).
- The CVD of Ru film from RuEtCp<sub>2</sub> usually enticed the usage of oxygen as a co-reactant to burn the ligands and avoid heavy carbon incorporation, increased resistivity and poor adhesion. PEALD with H<sub>2</sub> or NH<sub>3</sub> has also been reported.
- RuEtCp<sub>2</sub> is a free flowing yellow liquid, and like many metallocenes compounds, is only very little air or moisture sensitive. It also exhibits a very good thermal stability.
- RuEtCp<sub>2</sub> cost is strongly tied to the Ru metal cost, which itself has fluctuated widely in the past years.
- Like for most of the ALOHA advanced products, each canister of RuEtCp<sub>2</sub> is supplied with a BALAZS CofA ensuring strict compliance with the specifications. Please consult [www.balazs.com](http://www.balazs.com) for more information.

### Physical Chemical Properties

Physical Property	
Molecular Weight	287.4 g.mol <sup>-1</sup>
Physical State	Liquid
Melting Point	6°C
Colour	Yellow
Viscosity	7 cP @ 25°C
Vapour Pressure	~ 0.2 torr @ 85°C
Heat of Vaporization	17 kcal.mol <sup>-1</sup>
Specific Gravity	1.341 g.cm <sup>-3</sup>



## Hazard Rating



### HMIS

Health: 2  
Flammability: 2  
Reactivity: 2  
Incompatibility: Water

EU Classification: Xi (Irritant)  
EU Risk Phrases: R14/15; R36/37/38  
EU Safety Phrases: S26; S43

Please consult the ALOHA MSDS of RuEtCp<sub>2</sub> for additional handling data and personal protective equipments recommendation.

## Packaging & Dispensing System

- RuEtCp<sub>2</sub> can be packaged in a variety of canisters depending on the application.
- For on-board applications, RuEtCp<sub>2</sub> is usually supplied in 1200, 1400, 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. RuEtCp<sub>2</sub> can also be filled in properly documented customer-supplied canisters.
- Since RuEtCp<sub>2</sub> 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, Octane or THF are suitable for RuEtCp<sub>2</sub> purge. These solvents undergo a proprietary drying and filtering process for this application.
- The ALOHA R&D team has also developed a proprietary thermal chamber cleaning process for Ru and RuO<sub>2</sub> to facilitate the usage of Ru in the semiconductor industry. Please contact ALOHA for more details.



## Transport Information

- Proper shipping name: Organometallic substance, liquid, water reactive, n.o.s. (bis(ethylcyclopentadienyl)ruthenium)
- CAS n° 32992-96-4
- EINECS : Not Listed
- UN Number: 3398
- Class/division: 4.3 (Dangerous When Wet)
- Package group: II
- DOT Hazard Labels: Class 4.3 (Dangerous When Wet)

