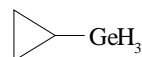


| r_s | Å | θ_s | deg |
|------------|----------|---|-----------|
| C(1)–C(2) | 1.520(1) | C(2)–C(1)–C(2') | 59.3(1) |
| C(1)–Ge | 1.918(1) | M–C(1)–Ge ^{a)} | 124.5(1) |
| Ge–H(1) | 1.538(1) | C(1)–Ge–H(1) | 105.4(1) |
| Ge–H(2) | 1.531(1) | C(1)–Ge–H(2) | 110.9(1) |
| C(1)–H(3) | 1.093(1) | M–C(1)–H(3) ^{a)} | 117.4(1) |
| C(2)–H(4) | 1.096(1) | C(1)–C(2)–H(4) | 116.9(1) |
| C(2)–H(5) | 1.085(1) | C(1)–C(2)–H(5) | 118.2(1) |
| C(2)–C(2') | 1.504(1) | C(1)–C(2)–C(2') | 60.4(1) |
| | | C(2)–C(1)–Ge | 119.5(1) |
| | | C(2)–C(1)–H(3) | 113.5(1) |
| | | Ge–C(1)–H(3) | 118.1(1) |
| | | H(4)–C(2)–H(5) | 115.1(1) |
| | | C(2')–C(2)–H(4) | 117.5(1) |
| | | C(2')–C(2)–H(5) | 118.0(1) |
| | | τ (H(2)–Ge–C(1)–M) ^{a) b)} | 119.6(1) |
| | | τ (C(2')–C(1)–C(2)–H(4)) ^{b)} | –107.9(1) |
| | | τ (C(2')–C(1)–C(2)–H(5)) ^{b)} | 107.9(1) |



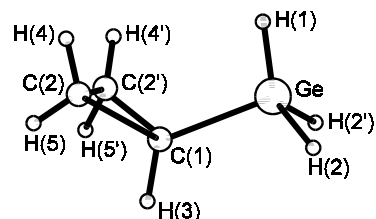
| r_m^p °) | Å | θ_m^p °) | deg |
|------------|------------|---|-------------|
| C(1)–C(2) | 1.5164(27) | C(2)–C(1)–C(2') | 59.33(8) |
| C(1)–Ge | 1.9183(33) | M–C(1)–Ge ^{a)} | 124.40(8) |
| Ge–H(1) | 1.5339(22) | C(1)–Ge–H(1) | 105.39(9) |
| Ge–H(2) | 1.5259(21) | C(1)–Ge–H(2) | 110.87(7) |
| C(1)–H(3) | 1.0885(17) | M–C(1)–H(3) ^{a)} | 117.58(22) |
| C(2)–H(4) | 1.0920(18) | C(1)–C(2)–H(4) | 116.96(11) |
| C(2)–H(5) | 1.0825(23) | C(1)–C(2)–H(5) | 117.75(26) |
| C(2)–C(2') | 1.5010(22) | C(1)–C(2)–C(2') | 60.34(4) |
| | | C(2)–C(2)–Ge | 119.40(7) |
| | | C(2)–C(1)–H(3) | 113.72(18) |
| | | Ge–C(1)–H(3) | 118.03(17) |
| | | H(4)–C(2)–H(5) | 115.46(22) |
| | | C(2')–C(2)–H(4) | 117.42(8) |
| | | C(2')–C(2)–H(5) | 117.83(10) |
| | | τ (H(2)–Ge–C(1)–M) ^{a) b)} | 119.68(9) |
| | | τ (C(2')–C(1)–C(2)–H(4)) ^{b)} | –107.75(10) |
| | | τ (C(2')–C(1)–C(2)–H(5)) ^{b)} | 107.90(4) |

^{a)} M is the midpoint of C(2) and C(2').

^{b)} τ is the torsional (dihedral) angle.

^{c)} Multiple isotope substitution structure.

Epple, K.J., Rudolph, H.D.: J. Mol. Spectrosc. **152** (1992) 355.



ED, *ab initio* calculations (HF/3-21G*, HF/4-21G*, HF/STO-3G)

| r_a | Å ^{a)} | θ_a | deg ^{a)} |
|------------|---------------------|--|---------------------|
| C(1)–C(2) | 1.521(7) | C–Ge–H(1) | 108.8(12) |
| C(2)–C(2') | 1.502(9) | C–Ge–H(2,2') | 113.9 ^{b)} |
| C–Ge | 1.924(2) | H–C–H | 118.2(23) |
| Ge–H | 1.530 ^{c)} | $\alpha^d)$ | 55.5(16) |
| C–H | 1.091(3) | $\eta^e)$ | 57.3(19) |
| | | $\phi^f)$ | 30.0 ^{c)} |
| | | tilt (GeH ₃) ^{g)} | 3.4(20) |

Local C_{3v} symmetry for the GeH_3 group was assumed.
The nozzle temperature was 20 °C.

- ^{a)} Three times the estimated standard errors.
- ^{b)} Calculated from angles C–Ge–H(1) and tilt angle.
- ^{c)} Assumed.
- ^{d)} Angle between the Ge–C bond and the ring plane.
- ^{e)} Angle between the C(1)–H(3) bond and the ring plane.
- ^{f)} Angle between the C(2)–C(2') bond and the H(4)C(2)H(5) plane.
- ^{g)} Tilt angle of the germynl group toward the ring plane.

Dakkouri, M.: J. Am. Chem. Soc. **113** (1991) 7109.