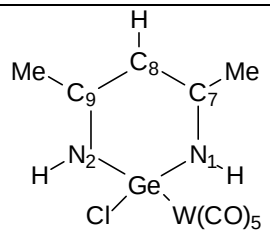
**$^{1}$H-, $^{13}$C-{$^{1}$H}- and $^{19}$F-{$^{1}$H} NMR ($C_6D_6$) and IR data for compounds 2, 3, 13**

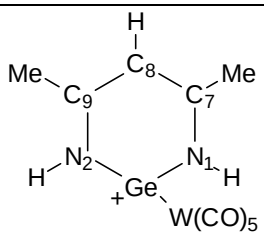
| | **2** | **3** | **13** |
|---|---|---|---|
| $^{19}$F NMR (δ, ppm) | | | |
| $CF_3SO_3$ | - 1.65 | - 2.03 | - |
| $^{1}$H NMR (δ, ppm) | | | |
| CH | 5.24, 5.85 [a] | 4.98, 5.66 [a] | 4.96, 5.38 [a] |
| $CH_3$ | 1.58, 2.11 [a] | 1.44, 2.07 [a] | 1.45, 1.88 [a] |
| $^{13}$C NMR (δ, ppm) | | | |
| CH | 103.8 | 103.5 | 101.1 [a] |
| $CH_3$ | 24.0 | 23.9 | 24.8 [a] |
| CO | 194.6, 197.4 | - | 201.0 [a] |
| IR : $\nu_{CO}$ ($cm^{-1}$); $\nu_{OTf}$ ($cm^{-1}$) | | | |
| $CHCl_3$ | 2062.4, 1973.9, 1932.3; 1973.1366.5 1366.5 | - 1378.7 | 1897.8 |
| Pyridine | 2063.8, 1934.4, 1920.5; 1379.1, 1274.0 | - 1367.4, 1271.7 | |
| $C_6D_6$ | 2079.3, 1986.2, 1943.1; 1365.4 | - 1367.7 | |

[a]: $CDCl_3$

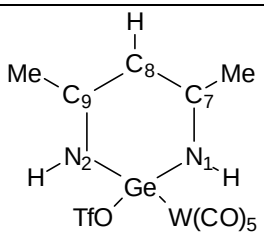
**Calculated Geometrical Parameters of 1', 2' and 2"*** (Bond Length in Angstroms and Bond angles in degrees).




**1'**




**2'**




**2''**

| | | | |
|---|---|---|---|
| GeCl | 2.359 | - | - |
| GeO | - | - | 2.027 |
| $GeN_1$ | 1.950 | 1.902 | 1.927 |
| $GeN_2$ | 1.950 | 1.902 | 1.935 |
| $N_1C_7$ | 1.353 | 1.367 | 1.358 |
| $C_7C_8$ | 1.411 | 1.408 | 1.406 |
| $C_9C_8$ | 1.410 | 1.408 | 1.413 |
| $N_2C_9$ | 1.353 | 1.367 | 1.351 |
| GeW | 2.637 | 2.538 | 2.630 |
| $N_1GeN_2$ | 86.84 | 91.8 | 91.6 |
| $N_1GeCl$ | 97.7 | - | - |
| $N_2GeCl$ | 97.7 | - | - |
| $N_1GeO$ | - | - | 90.7 |
| $N_2GeO$ | - | - | 94.1 |
| WGeCl | 121.7 | - | - |
| WGeO | - | - | 120.0 |
| $N_1GeW$ | 121.1 | 134.1 | 123.1 |
| $N_2GeW$ | 121.2 | 134.1 | 127.8 |

* In the case of **2"**, the frequencies dealing with the total movement of the molecule has a very low value.

**Total Natural Charge of 1', 2' and 2''** (NBO calculations)**.**

| | **1'** | **2'** | **2''** |
|---|---|---|---|
| Ge | 1.375 | 1.486 | 1.574 |
| $N_1$ | -0.951 | -0.978 | -0.968 |
| $N_2$ | -0.951 | -0.979 | -0.956 |
| Cl | -0.499 | - | - |
| O | - | - | -0.960 |
| $C_7$ | 0.378 | 0.393 | 0.378 |
| $C_8$ | -0.394 | -0.342 | -0.388 |
| $C_9$ | 0.377 | 0.393 | 0.383 |
| W | -1.051 | -1.119 | -1.040 |