Supplementary Information

A Convenient Route to Mixed Cationic Group 13/14/15 Compounds

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1 Experimental section

1.1 General procedures

All manipulations were performed under an atmosphere of dry argon in a Braun glovebox or using standard Schlenk techniques. All solvents are degassed and purified by standard procedures. The NMR spectra were recorded on a Bruker Avance 400 spectrometer (^{1}H: 400.13 MHz, ^{31}P: 161.976 MHz, ^{11}B: 128.378 MHz, ^{19}F: 376.498 MHz) with δ [ppm] referenced to external $SiMe_4$ (^{1}H, ^{13}C), H_3PO_4 (^{31}P), $BF_3{\cdot}Et_2O$ (^{11}B), $CFCl_3$(^{19}F). Mass spectra were recorded on a ThermoQuest Finnigan TSQ 7000 (ESI-MS), a Waters/Micromass ESI LCT-TOF spectrometer (ESI-MS) or an Agilent 6220 Series TOF (ESI-MS). Elemental analyses were determined with a Vario micro cube apparatus or by the Analytical and Instrumentation Laboratory at the University of Alberta.

The compounds $NHC{\cdot}BH_2I$,[1] $NaPH_2$,[2] $KAsH_2$,[3] IDipp·GeH_2BH_2OTf (**1**),[4] $Ph_2PBH_2{\cdot}NMe_3$,[5] $Ph_2AsBH_2{\cdot}NMe_3$,[6] $H_2PBH_2{\cdot}NMe_3$,[7] $H_2AsBH_2{\cdot}NMe_3$,[7] and H_2PBH_2·IDipp[8] were prepared according to literature procedures.

1.2 Synthesis of IMes·BH_2PH_2

IMes·BH_2I (666 mg, 1.50 mmol, 1 eq) and $NaPH_2$ (84 mg, 1.5 mmol, 1 eq) were combined in 20 mL THF at -80 °C. The reaction mixture was stirred for 2 hours at room temperature. The solvent of the resulting solution was removed *in vacuo* and the residue was suspended in 2x 25 mL toluene. After filtration over diatomaceous earth all volatiles were removed *in vacuo* and the residue washed with 3x 5 mL *n*-hexane. IMes·BH_2PH_2 could be isolated as a pale-yellow powder (388 mg, 74%).

^{1}H NMR (C_6D_6, 298 K): δ = 1.40 (dm, 2H, $^1J_{H,P}$ = 177 Hz, PH_2), 1.93 (br, 2H, BH_2), 2.08 (s, 18H, ArCH_3), 5.93 (s, 2H, N-C*H*), 7.61 (s, 4H, Ar*H*). **^{31}P NMR** (C_6D_6, 298 K): δ = -210.4 (t, br, $^1J_{P,H}$ = 177 Hz, PH_2). **^{31}P{^{1}H}** NMR (C_6D_6, 298 K): δ = -210.4 (br, PH_2). **^{11}B NMR** (C_6D_6, 298 K): δ = -34.2 (t, br, $^1J_{B,H}$ = 94 Hz, BH_2). **^{11}B{^{1}H}** NMR (C_6D_6, 298 K): δ = -34.2 (br, BH_2).

1.3 Synthesis of IDipp·BH_2AsH_2

IDipp·BH_2I (265 mg, 0.502 mmol, 1 eq) and $KAsH_2$ (87 mg, 0.75 mmol, 1.5 eq) were combined in 20 mL THF at -80 °C. The reaction mixture was stirred for 15 hours at room temperature. The solvent of the resulting solution was removed *in vacuo* and the residue was suspended in 25 mL toluene. After filtration over diatomaceous earth all volatiles were removed *in vacuo* and the residue washed with 5 mL *n*-hexane. IDipp·BH_2AsH_2 could be isolated as a beige-white powder (140 mg, 53%). Colorless crystals could be obtained from a concentrated toluene/*n*-hexane solution at -30 °C.

^{1}H NMR (C_6D_6, 298 K): δ = 0.47 (t, 2H, $^3J_{H,H}$ = 7.7 Hz, AsH_2), 1.01 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.39 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.95 (br, 2H, BH_2), 2.79 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, C*H*(CH_3)$_2$), 6.39 (s, 2H, N-C*H*), 7.09 (d, 4H, $^3J_{H,H}$ = 7.7 Hz, ArH)**,** 7.22 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B}** NMR (C_6D_6, 298 K): δ = 0.47 (t, 2H, $^3J_{H,H}$ = 7.7 Hz, AsH_2), 1.01 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.39 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.95 (t, 2H, $^3J_{H,H}$ = 7.7 Hz, BH_2), 2.79 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, C*H*(CH_3)$_2$), 6.39 (s, 2H, N-C*H*), 7.09 (d, 4H, $^3J_{H,H}$ = 7.7 Hz, ArH)**,** 7.22 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{11}B NMR** (C_6D_6, 298 K): δ = -35.0 (t, br, $^1J_{B,H}$ = 99 Hz, BH_2). **^{11}B{^{1}H}** NMR (C_6D_6, 298 K): δ = -35.0 (s, br, BH_2). **Elemental analysis** (%) calculated for $C_{27}H_{40}BAsN_2$: C: 67.79, H: 8.43, N: 5.86; found: C: 67.98, H: 8.61, N: 5.64.

1.4 Synthesis of [IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3][OTf] (2a)

Ph_2PBH_2·NMe_3 (26 mg, 0.10 mmol, 1 eq) and IDipp·GeH_2BH_2OTf (**1**) (63 mg, 0.10 mmol, 1 eq) were combined in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 15 hours upon which the product precipitates as a white powder. The mother liquor was

decanted away and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the product [IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3][OTf] (**2a**) could be isolated as a white powder (83 mg, 94%). Colorless crystals could be obtained by layering a THF solution with a 3-fold amount of *n*-hexane at room temperature.

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.87 (br, 2H, BH_2), 1.17 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.25 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.37 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.44 (s, 9H, NMe_3), 2.44 (br, 2H, BH_2), 3.21 (m, 2H, GeH_2), 7.20 – 7.33 (m, 10H, ArH)**,** 7.36 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.52 (s, 2H, N-CH), 7.59 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B}** NMR (CD_2Cl_2, 298 K): δ = 0.87 (m, 2H, BH_2), 1.17 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.25 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.37 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.44 (s, 9H, NMe_3), 2.44 (br, 2H, BH_2), 3.21 (m, 2H, GeH_2), 7.20 – 7.33 (m, 10H, ArH)**,** 7.36 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.52 (s, 2H, N-CH), 7.59 (t, 2H, $^3J_{H,H}$ = 7.9 Hz, ArH). **^{31}P NMR** (CD_2Cl_2, 298 K): δ = -24.9 (br). **^{31}P{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -24.9 (br). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -7.8 (br, BH_2), -38.2 (br, BH_2). **^{11}B{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -7.8 (br, BH_2), -38.2 (br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.90 (s, 3F, OTf). **ESI-MS** (THF): *m/z* = 734.4 (100%, [IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3]$^+$). **Elemental analysis** (%) calculated for $C_{43}H_{61}B_2F_3GeN_3O_3PS$: C: 58.54, H: 6.97, N: 4.76; found: C: 58.64, H: 6.99, N: 4.73.

1.5 Synthesis of [IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3][OTf] (2b)

Ph_2AsBH_2·NMe_3 (60 mg, 0.20 mmol, 1 eq) and IDipp·GeH_2BH_2OTf (**1**) (125 mg, 0.200 mmol, 1 eq) were combined in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 15 hours upon which the product precipitates as a white powder. The mother liquor was decanted away, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the product [IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3][OTf] (**2b**) could be isolated as a white powder (172 mg, 93%). Colorless crystals could be obtained by layering a THF solution with a 3-fold amount of *n*-hexane at room temperature.

^{1}H NMR (CD_2Cl_2, 298 K): δ = 1.02 (br, 2H, BH_2), 1.18 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.26 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.39 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.54 (s, 9H, NMe_3), 2.56 (br, 2H, BH_2), 3.32 (m, 2H, GeH_2), 7.20 – 7.26 (m, 8H, ArH)**,** 7.27 – 7.34 (m, 2H, ArH)**,** 7.37 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.56 (s, 2H, N-CH), 7.61 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B} NMR** (CD_2Cl_2, 298 K): δ = 1.02 (s, br, 2H, BH_2), 1.18 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.26 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.39 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.54 (s, 9H, NMe_3), 2.56 (br, 2H, BH_2), 3.32 (m, 2H, GeH_2), 7.20 – 7.26 (m, 8H, ArH)**,** 7.27 – 7.34 (m, 2H, ArH)**,** 7.37 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.56 (s, 2H, N-CH), 7.61 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -6.4 (br, BH_2), -37.2 (br, BH_2). **^{11}B{^{1}H} NMR** (CD_2Cl_2, 298 K): δ = -

6.4 (s, br, BH_2), -37.2 (s, br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.80 (s, 3F, OTf). **ESI-MS** (THF): *m/z* = 778.3 (100%, [IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3]$^+$). **Elemental analysis** (%) calculated for $C_{43}H_{61}B_2F_3GeN_3O_3AsS$: C: 55.76, H: 6.64, N: 4.54; found: C: 55.95, H: 6.20, N: 4.51.

1.6 Synthesis of [IDipp·$GeH_2BH_2PH_2BH_2$·NMe_3][OTf] (3a)

H_2PBH_2·NMe_3 (21 mg, 0.20 mmol, 1 eq) was added to a slurry of IDipp·GeH_2BH_2OTf (**1**) (125 mg, 0.200 mmol, 1 eq) in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 15 hours upon which the product precipitates as a white powder. The mother liquor was decanted away, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the product [IDipp·$GeH_2BH_2PH_2BH_2$·NMe_3][OTf] (**3a**) could be isolated as a white powder (100 mg, 68%).

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.40 (br, 2H, BH_2), 1.19 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.31 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.95 (br, 2H, BH_2), 2.40 (septet, 4H, $^3J_{H,H}$ = 6.8 Hz, C*H*(CH$_3$)$_2$), 2.64 (s, 9H, NMe_3), 3.05 (dm, 2H, $^1J_{H,P}$ = 340 Hz, PH_2), 3.53 (dt, 2H, $^3J_{H,P}$ = 5.3 Hz, $^3J_{H,H}$ = 5.1 Hz, GeH_2), 7.39 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.54 (s, 2H, N-C*H*), 7.61 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{31}P} NMR** (CD_2Cl_2, 298 K): δ = 0.40 (br, 2H, BH_2), 1.19 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.31 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.95 (br, 2H, BH_2), 2.40 (septet, 4H, $^3J_{H,H}$ = 6.8 Hz, C*H*(CH$_3$)$_2$), 2.64 (s, 9H, NMe_3), 3.05 (m, 2H, PH_2), 3.53 (t, 2H, $^3J_{H,H}$ = 4.6 Hz, GeH_2), 7.39 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.54 (s, 2H, N-C*H*), 7.61 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B} NMR** (CD_2Cl_2, 298 K): δ = 0.40 (s, 2H, BH_2), 1.19 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.31 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(C*H*$_3$)$_2$), 1.95 (s, 2H, BH_2), 2.40 (septet, 4H, $^3J_{H,H}$ = 6.8 Hz, C*H*(CH$_3$)$_2$), 2.64 (s, 9H, NMe_3), 3.05 (dm, 2H, $^1J_{H,P}$ = 340 Hz, PH_2), 3.53 (dt, 2H, $^3J_{H,P}$ = 5.4 Hz, $^3J_{H,H}$ = 5.1 Hz, GeH_2), 7.39 (d, 4H, $^3J_{H,H}$ = 7.9 Hz, ArH)**,** 7.54 (s, 2H, N-C*H*), 7.61 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{31}P NMR** (CD_2Cl_2, 298 K): δ = -116.6 (t, br, $^1J_{P,H}$ = 340 Hz, PH_2). **^{31}P{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -116.6 (br, PH_2). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -10.8 (m, br, BH_2), -43.5 (m, br, BH_2). **^{11}B{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -10.8 (d, br, $^1J_{B,P}$ = 60 Hz, BH_2), -43.5 (d, br, $^1J_{B,P}$ = 55 Hz, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.86 (s, 3F, OTf). **ESI-MS** (THF): *m/z* = 389.3 (100%, [IDipp·H]$^+$), 582.3 (23%, [IDipp·$GeH_2BH_2PH_2BH_2$·NMe_3]$^+$).

1.7 Synthesis of [IDipp·$GeH_2BH_2AsH_2BH_2$·NMe_3][OTf] (3b)

H_2AsBH_2·NMe_3 (30 mg, 0.20 mmol, 1 eq) was added to a slurry of IDipp·GeH_2BH_2OTf (**1**) (125 mg, 0.200 mmol, 1 eq) in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 15 hours upon which the product precipitates as a white powder. The mother liquor was decanted away, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in*

vacuo and the product [IDipp·$GeH_2BH_2AsH_2BH_2$·NMe_3][OTf] (**3b**) could be isolated as a white powder (115 mg, 74%).

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.69 (br, 2H, BH_2), 1.20 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.31 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.00 (m, 2H, AsH_2), 2.23 (br, 2H, BH_2), 2.40 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.66 (s, 9H, NMe_3), 3.57 (t, 2H, $^3J_{H,H}$ = 4.8 Hz, GeH_2), 7.39 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.56 (s, 2H, N-CH), 7.61 (t, 2H, $^3J_{H,H}$ = 7.9 Hz, ArH). **^{1}H{^{11}B} NMR** (CD_2Cl_2, 298 K): δ = 0.69 (s, 2H, BH_2), 1.20 (d, 12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 1.31 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.00 (m, 2H, AsH_2), 2.23 (s, 2H, BH_2), 2.40 (septet, 4H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 2.66 (s, 9H, NMe_3), 3.57 (t, 2H, $^3J_{H,H}$ = 4.8 Hz, GeH_2), 7.39 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.56 (s, 2H, N-CH), 7.61 (t, 2H, $^3J_{H,H}$ = 7.9 Hz, ArH). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -8.8 (t, br, $^1J_{B,H}$ = 110 Hz, BH_2), -40.0 (t, br, $^1J_{B,H}$ = 105 Hz, BH_2). **^{11}B{^{1}H} NMR** (CD_2Cl_2, 298 K): δ = -8.8 (s, br, BH_2), -40.0 (s, br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.85 (s, 3F, OTf). **ESI-MS** (CH_2Cl_2): *m/z* = 626.3 (100%, [IDipp·$GeH_2BH_2AsH_2BH_2$·NMe_3]$^+$).

1.8 Synthesis of [IDipp·$GeH_2BH_2PH_2BH_2$·IMes][OTf] (4)

H_2PBH_2·IMes (53 mg, 0.15 mmol, 1 eq) and IDipp·GeH_2BH_2OTf (**1**) (94 mg, 0.15 mmol, 1 eq) were combined in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 1.5 hours upon which the product precipitates as a white powder. The mother liquor was decanted, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the product [IDipp·$GeH_2BH_2PH_2BH_2$·IMes][OTf] (**4**) could be isolated as a white powder (100 mg, 68%).

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.11 (br, 2H, BH_2), 0.89 (br, 2H, BH_2), 1.15 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.21 (d,12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.94 (s, 12H, ArCH_3), 2.31 (septet, 4H, $^3J_{H,H}$ = 6.8 Hz, CH(CH$_3$)$_2$), 2.35 (s, 6H, ArCH_3), 2.42 (dm, 2H, $^1J_{H,P}$ = 335 Hz, PH_2), 3.23 (m, 2H, GeH_2), 6.98 (s, 4H, ArH), 7.13 (s, 2H, N-CH), 7.33 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH), 7.47 (s, 2H, N-CH), 7.57 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{31}P NMR** (CD_2Cl_2, 298 K): δ = -112.1 (t, br, $^1J_{P,H}$ = 335 Hz, PH_2). **^{31}P{^{1}H} NMR** (CD_2Cl_2, 298 K): δ = -112.1 (br, PH_2). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -35.3 (br, BH_2), -42.8 (br, BH_2). **^{11}B{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -35.3 (br, BH_2), -42.8 (br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.91 (s, 3F, OTf).

1.9 Synthesis of [IDipp·$GeH_2BH_2PH_2BH_2$·IDipp][OTf] (5a)

H_2PBH_2·IDipp (65 mg, 0.15 mmol, 1 eq) and IDipp·GeH_2BH_2OTf (**1**) (94 mg, 0.15 mmol, 1 eq) were combined in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 1.5 hours upon which the product precipitates as a white powder. The mother liquor was decanted away, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the

product [IDipp·$GeH_2BH_2PH_2BH_2$·IDipp][OTf] (**5a**) could be isolated as a white powder (145 mg, 91%). Colorless crystals could be obtained by layering a CH_2Cl_2 solution with a 3-fold amount of *n*-hexane at room temperature.

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.05 (br, 2H, BH_2), 0.99 (br, 2H, BH_2), 1.17 (d, 36H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.21 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.32 (m, 8H, $^3J_{H,H}$ = 7.1 Hz, CH(CH$_3$)$_2$), 2.48 (dm, 2H, $^1J_{H,P}$ = 334 Hz, PH_2), 3.20 (m, 2H, GeH_2), 7.24 (s, 2H, N-CH), 7.30 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.33 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.50 (s, 2H, N-CH), 7.54 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH), 7.58 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B} NMR** (CD_2Cl_2, 298 K): δ = 0.05 (s, br, 2H, BH_2), 0.99 (s, br, 2H, BH_2), 1.13 (d, 36H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.17 (d,12H, $^3J_{H,H}$ = 6.8 Hz, CH(CH_3)$_2$), 2.29 (m, 8H, $^3J_{H,H}$ = 7.1 Hz, CH(CH$_3$)$_2$), 2.45 (dm, 2H, $^1J_{H,P}$ = 334 Hz, PH_2), 3.17 (m, 2H, GeH_2), 7.21 (s, 2H, N-CH), 7.27 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.30 (d, 4H, $^3J_{H,H}$ = 7.8 Hz, ArH)**,** 7.46 (s, 2H, N-CH), 7.50 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH), 7.54 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{31}P NMR** (CD_2Cl_2, 298 K): δ = -112.8 (t, br, $^1J_{P,H}$ = 334 Hz, PH_2). **^{31}P{^{1}H} NMR** (CD_2Cl_2, 298 K): δ = -112.8 (br, PH_2). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -34.8 (m, br, BH_2), -42.5 (br, BH_2). **^{11}B{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -34.8 (d, br, $^1J_{B,P}$ = 61 Hz, BH_2), -42.5 (br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.87 (s, 3F, OTf). **ESI-MS** (CH_3CN): *m/z* = 389.2 (100%, [IDipp·H]$^+$), 911.4 (20%, [IDipp·$GeH_2BH_2PH_2BH_2$·IDipp]$^+$). **Elemental analysis** (%) calculated for $C_{55}H_{80}B_2F_3GeN_4O_3PS(CH_2Cl_2)_{0.14}$: C: 61.80, H: 7.55, N: 5.23; found: C: 61.79, H: 7.39, N: 5.18.

1.10 Synthesis of [IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp][OTf] (5b)

H_2AsBH_2·IDipp (72 mg, 0.15 mmol, 1 eq) and IDipp·GeH_2BH_2OTf (**1**) (94 mg, 0.15 mmol, 1 eq) were combined in 10 mL Et_2O at room temperature. The reaction mixture was stirred for 5 hours upon which the product precipitates as a white powder. The mother liquor was decanted away, and the precipitate washed with 5 mL Et_2O. All volatiles were removed *in vacuo* and the product [IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp][OTf] (**5b**) could be isolated as a white powder (144 mg, 69%). Colorless crystals could be obtained by layering a CH_2Cl_2 solution with a 3-fold amount of *n*-hexane at room temperature.

^{1}H NMR (CD_2Cl_2, 298 K): δ = 0.36 (br, 2H, BH_2), 1.13 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.14 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.16 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.16 (br, 2H, BH_2), 1.18 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.39 (m, 2H, AsH_2), 2.30 (m, 8H, $^3J_{H,H}$ = 6.9 Hz, CH(CH$_3$)$_2$), 3.24 (m, 2H, GeH_2), 7.21 (s, 2H, N-CH), 7.28 (d, 4H, $^3J_{H,H}$ = 7.3 Hz, ArH)**,** 7.30 (d, 4H, $^3J_{H,H}$ = 7.3 Hz, ArH)**,** 7.47 (s, 2H, N-CH), 7.51 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH), 7.54 (t, 2H, $^3J_{H,H}$ = 7.8 Hz, ArH). **^{1}H{^{11}B} NMR** (CD_2Cl_2, 298 K): δ = 0.36 (s, br, 2H, BH_2), 1.13 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.14 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.16 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.16 (br, 2H, BH_2), 1.18 (d, 12H, $^3J_{H,H}$ = 6.9 Hz, CH(CH_3)$_2$), 1.39 (m, 2H, AsH_2),

2.30 (m, 8H, $^{3}J_{H,H}$ = 6.9 Hz, C*H*(CH_3)$_2$), 3.24 (m, 2H, GeH_2), 7.21 (s, 2H, N-C*H*), 7.28 (d, 4H, $^{3}J_{H,H}$ = 7.3 Hz, ArH), 7.30 (d, 4H, $^{3}J_{H,H}$ = 7.3 Hz, ArH), 7.47 (s, 2H, N-C*H*), 7.51 (t, 2H, $^{3}J_{H,H}$ = 7.8 Hz, ArH), 7.54 (t, 2H, $^{3}J_{H,H}$ = 7.8 Hz, ArH). **^{11}B NMR** (CD_2Cl_2, 298 K): δ = -33.3 (t, br, $^{1}J_{B,H}$ = 88 Hz, BH_2), -39.6 (br, BH_2). **^{11}B{^{1}H}** NMR (CD_2Cl_2, 298 K): δ = -33.3 (s, br, BH_2), -39.6 (s, br, BH_2). **^{19}F NMR** (CD_2Cl_2, 298 K): δ = -78.82 (s, 3F, OTf). **ESI-MS** (CH_2Cl_2): *m/z* = 955.5 (100%, [IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp]$^{+}$). **Elemental analysis** (%) calculated for $C_{55}H_{80}B_2F_3GeN_4O_3AsS(CH_2Cl_2)_{0.20}$: C: 59.17, H: 7.23, N: 5.00; found: C: 59.10, H: 7.36, N: 5.00.

2 NMR data

IMes·BH_2PH_2

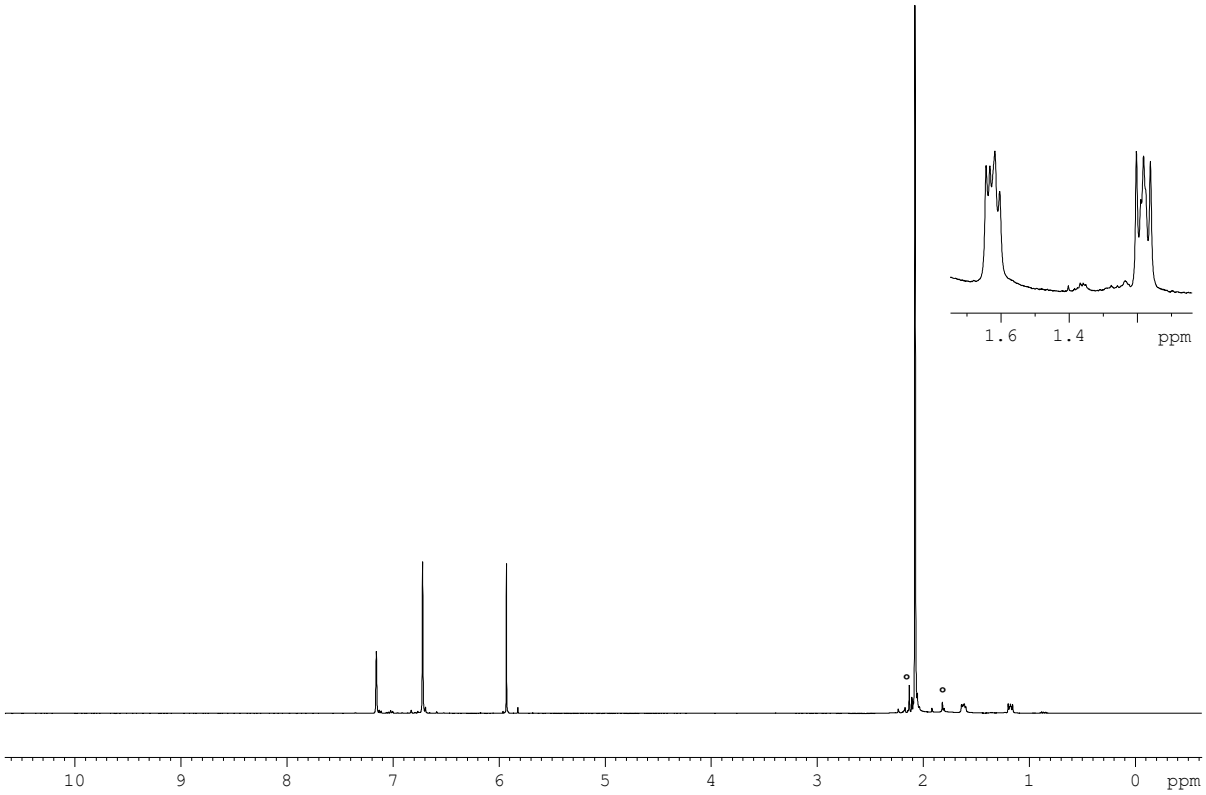


Figure S1: ^{1}H NMR spectrum of IMes·BH_2PH_2 in C_6D_6 at 298 K. ° = unidentified impurity.

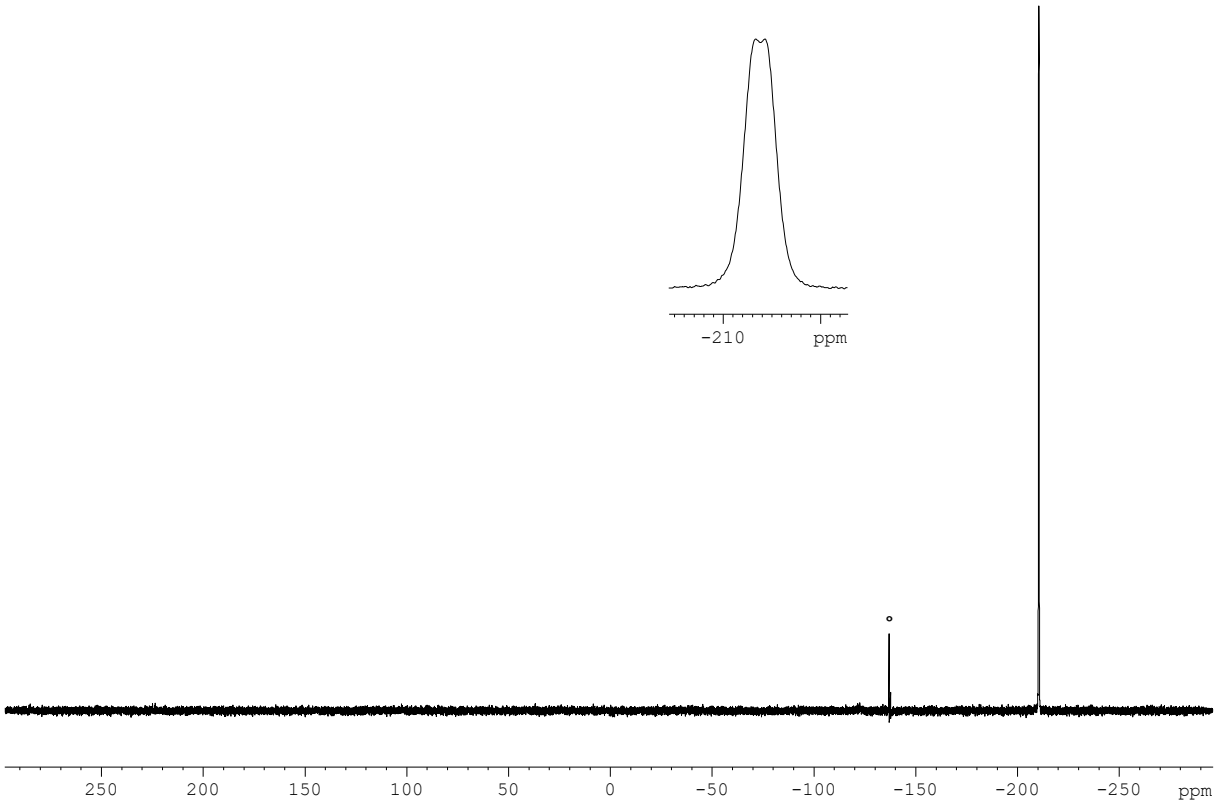


Figure S2: $^{31}P\{^{1}H\}$ NMR spectrum of IMes·BH_2PH_2 in C_6D_6 at 298 K. ° = unidentified impurity.

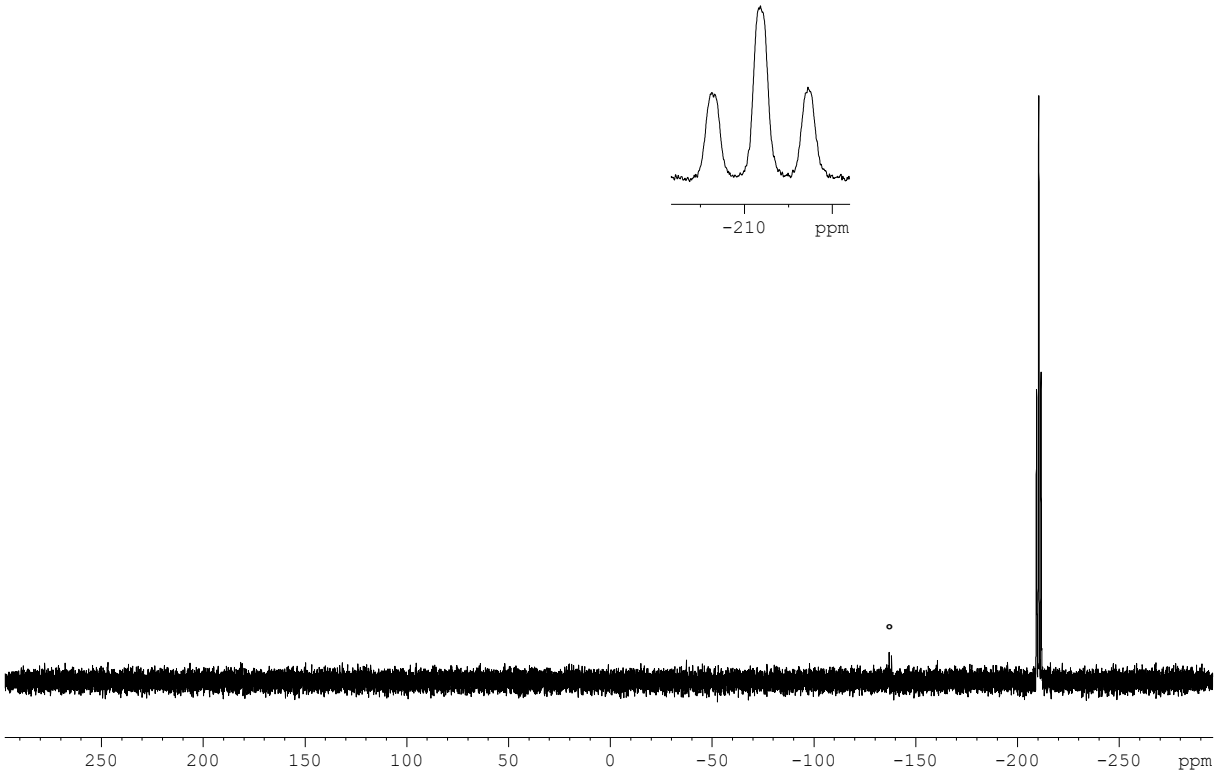


Figure S3: ^{31}P NMR spectrum of IMes·BH_2PH_2 in C_6D_6 at 298 K. ° = unidentified impurity.

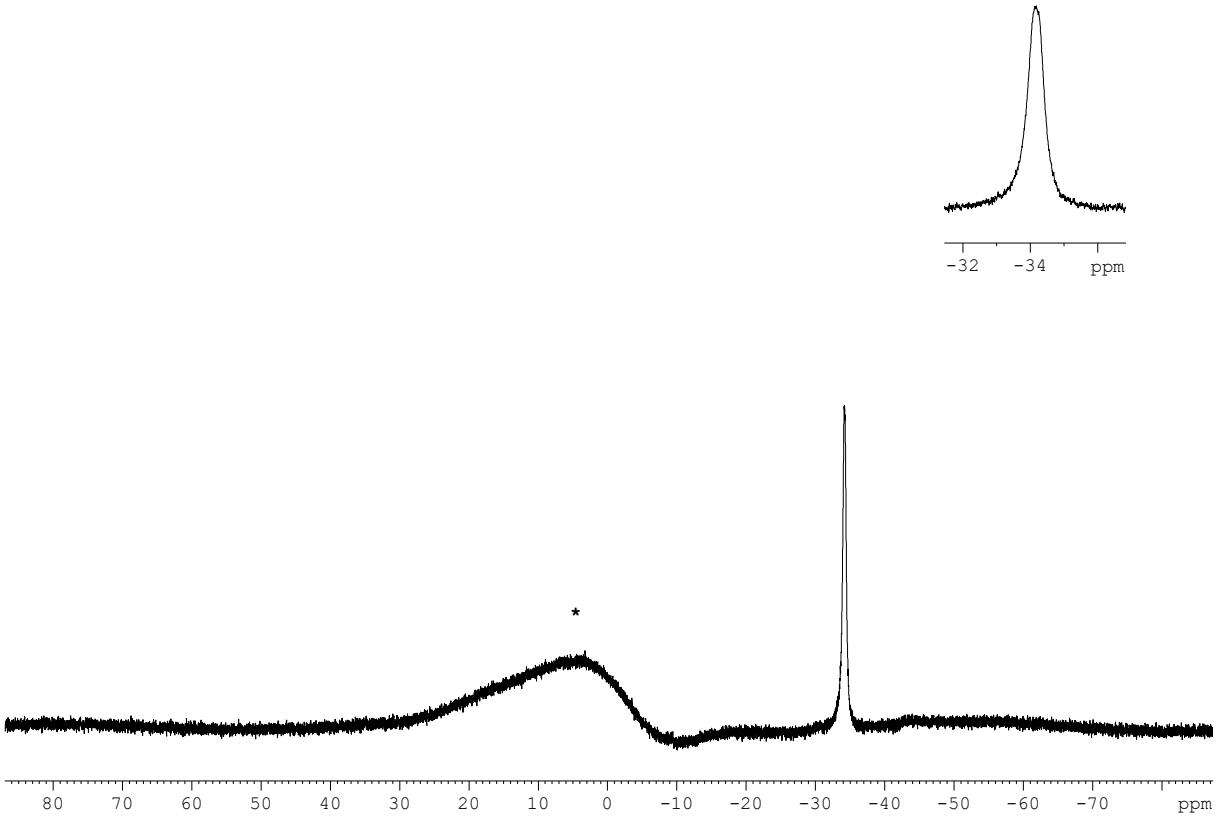


Figure S4: $^{11}B\{^1H\}$ NMR spectrum of IMes·BH_2PH_2 in C_6D_6 at 298 K. * = signal from the NMR probe.

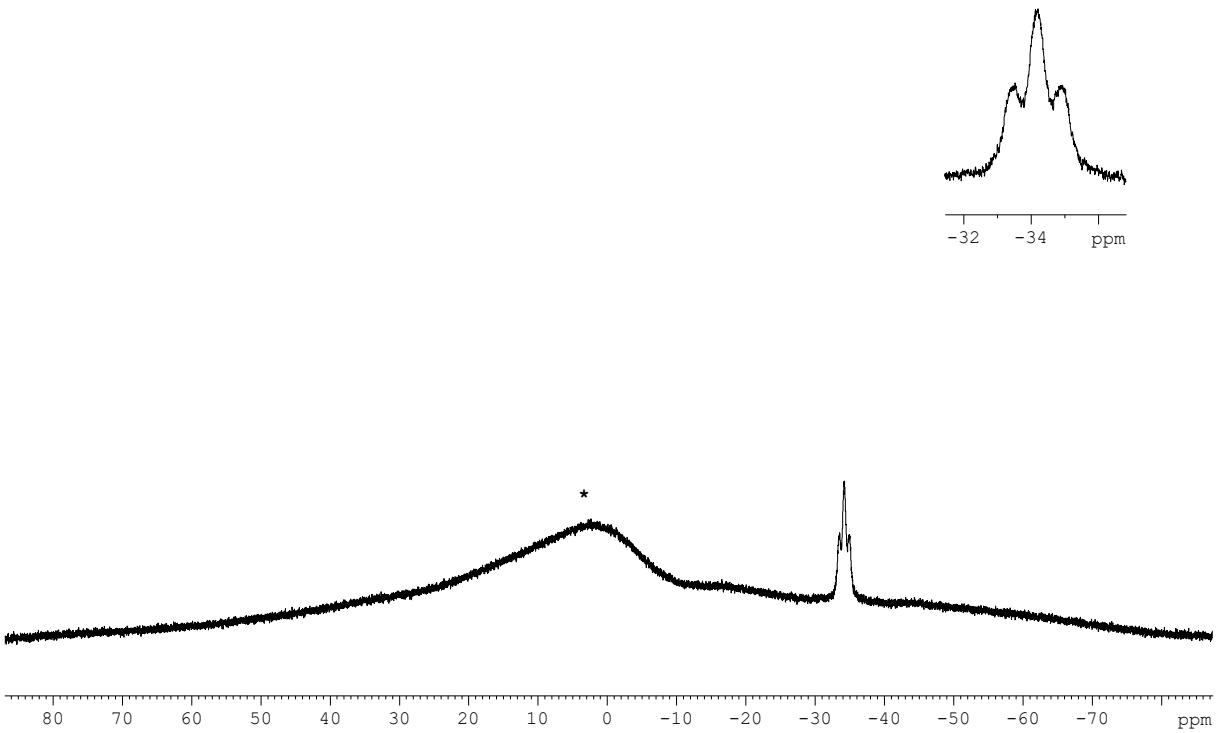


Figure S5: ^{11}B NMR spectrum of IMes·BH_2PH_2 in C_6D_6 at 298 K. * = signal from the NMR probe.

IDipp·BH_2AsH_2

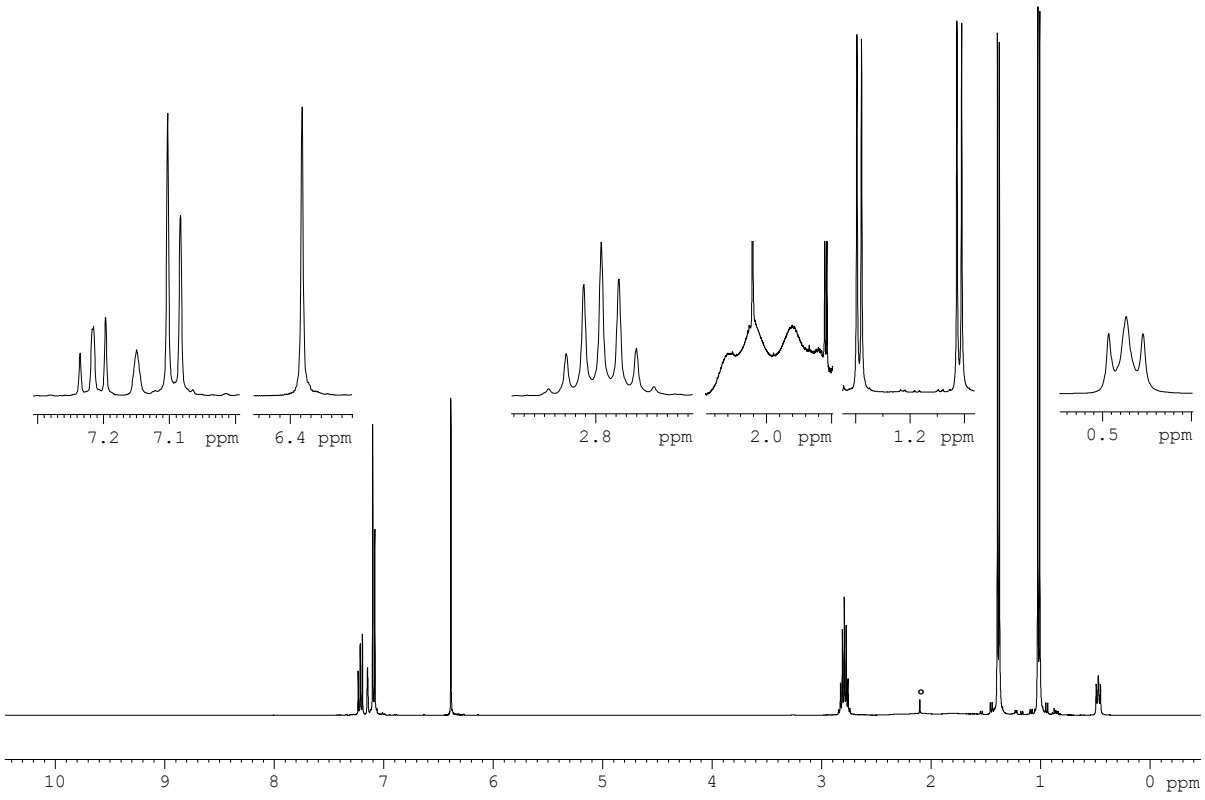


Figure S6: ^{1}H NMR spectrum of IDipp·BH_2AsH_2 in C_6D_6 at 298 K. ° = unidentified impurity.

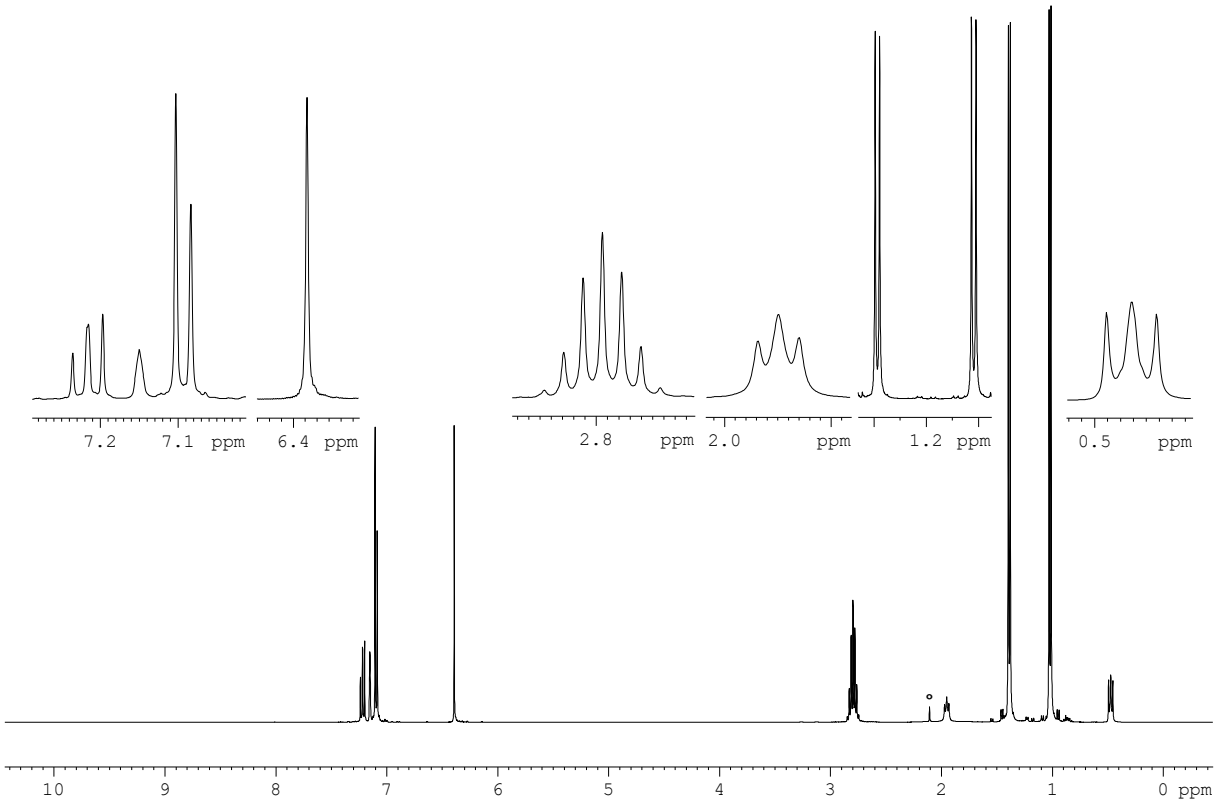


Figure S7: $^{1}H\{^{11}B\}$ NMR spectrum of IDipp·BH_2AsH_2 in C_6D_6 at 298 K. ° = unidentified impurity.

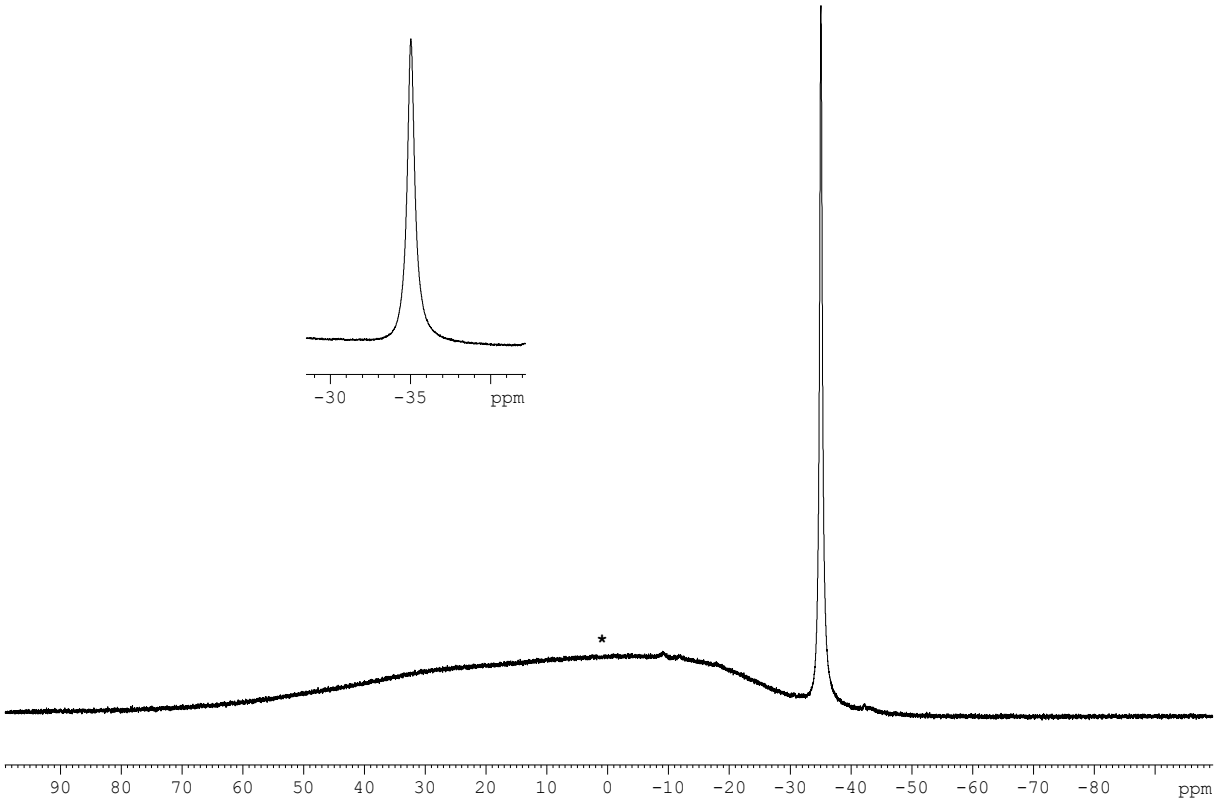


Figure S8: $^{11}B\{^{1}H\}$ NMR spectrum of IDipp·BH_2AsH_2 in C_6D_6 at 298 K. * = signal from the NMR probe.

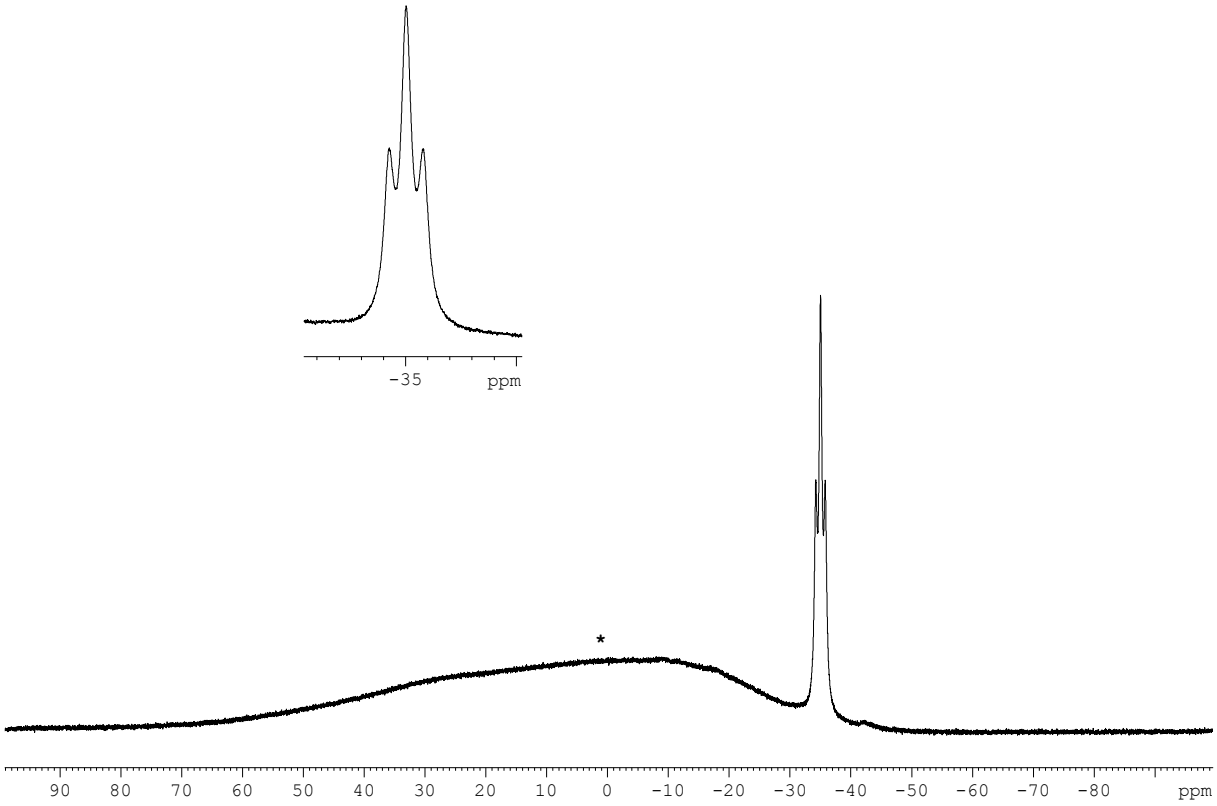


Figure S9: ^{11}B NMR spectrum of IDipp·BH_2AsH_2 in C_6D_6 at 298 K. * = signal from the NMR probe.

[IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3][OTf] (**2a**)

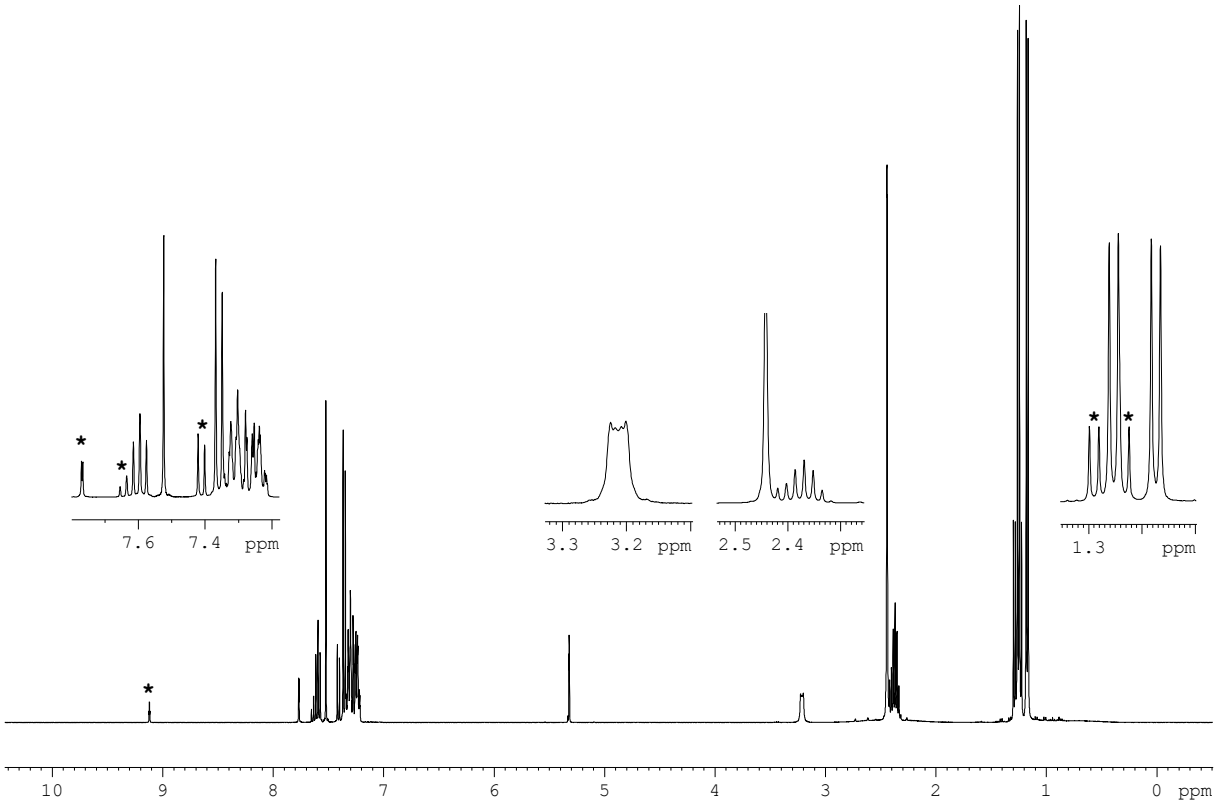


Figure S10: ^1H NMR spectrum of **2a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

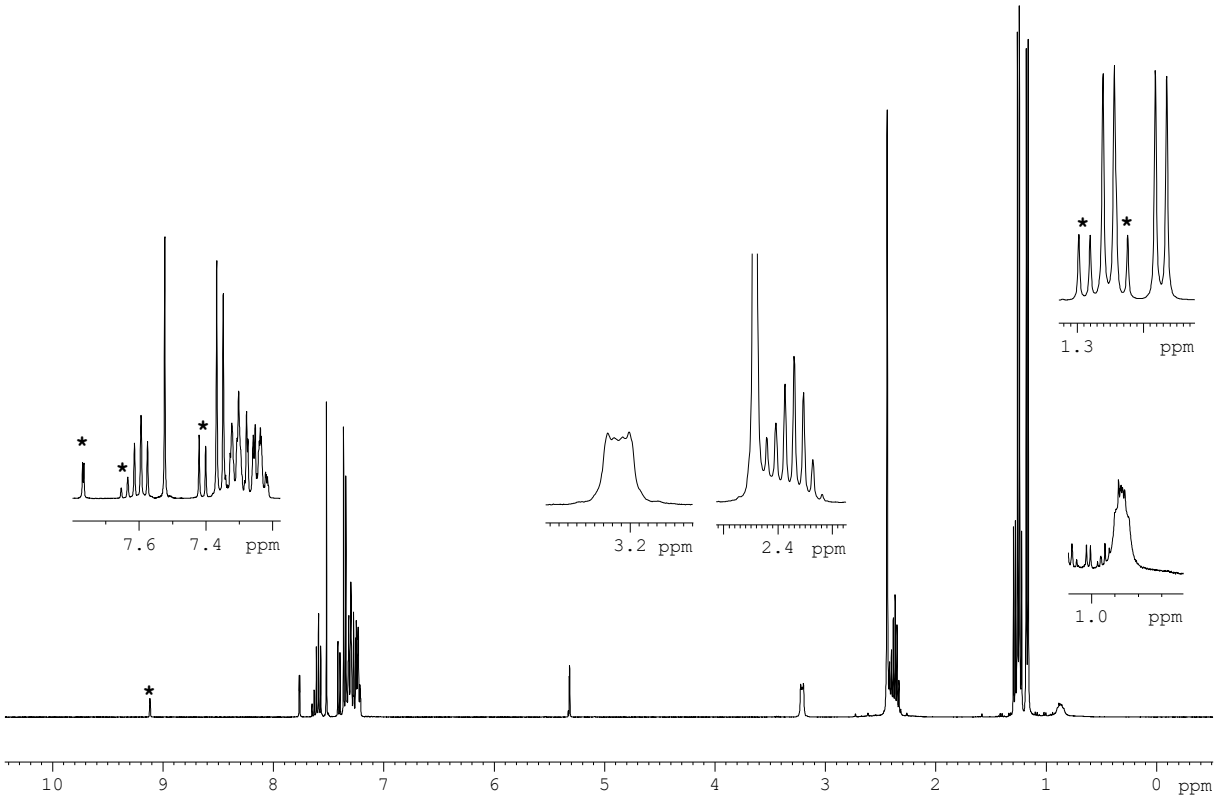


Figure S11: $^{1}H\{^{11}B\}$ NMR spectrum of **2a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

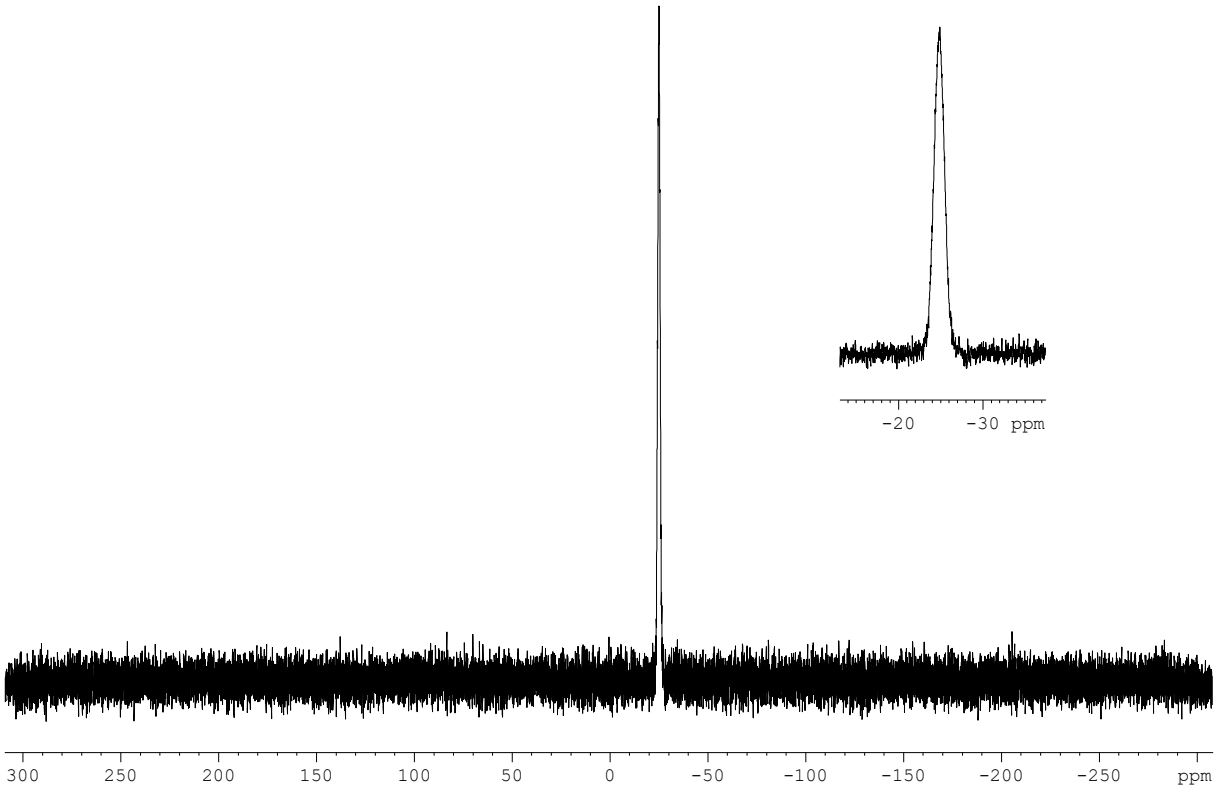


Figure S12: $^{31}P\{^{1}H\}$ NMR spectrum of **2a** in CD_2Cl_2 at 298 K.

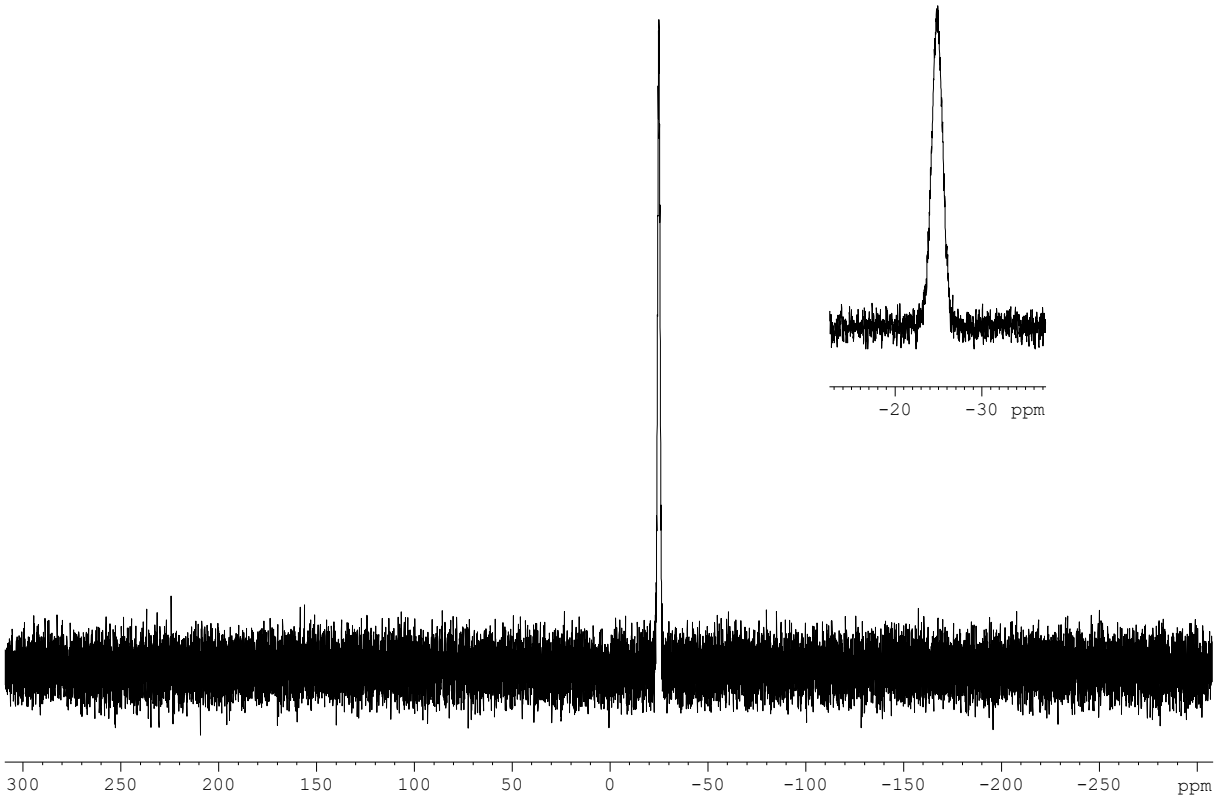


Figure S13: ^{31}P NMR spectrum of **2a** in CD_2Cl_2 at 298 K.

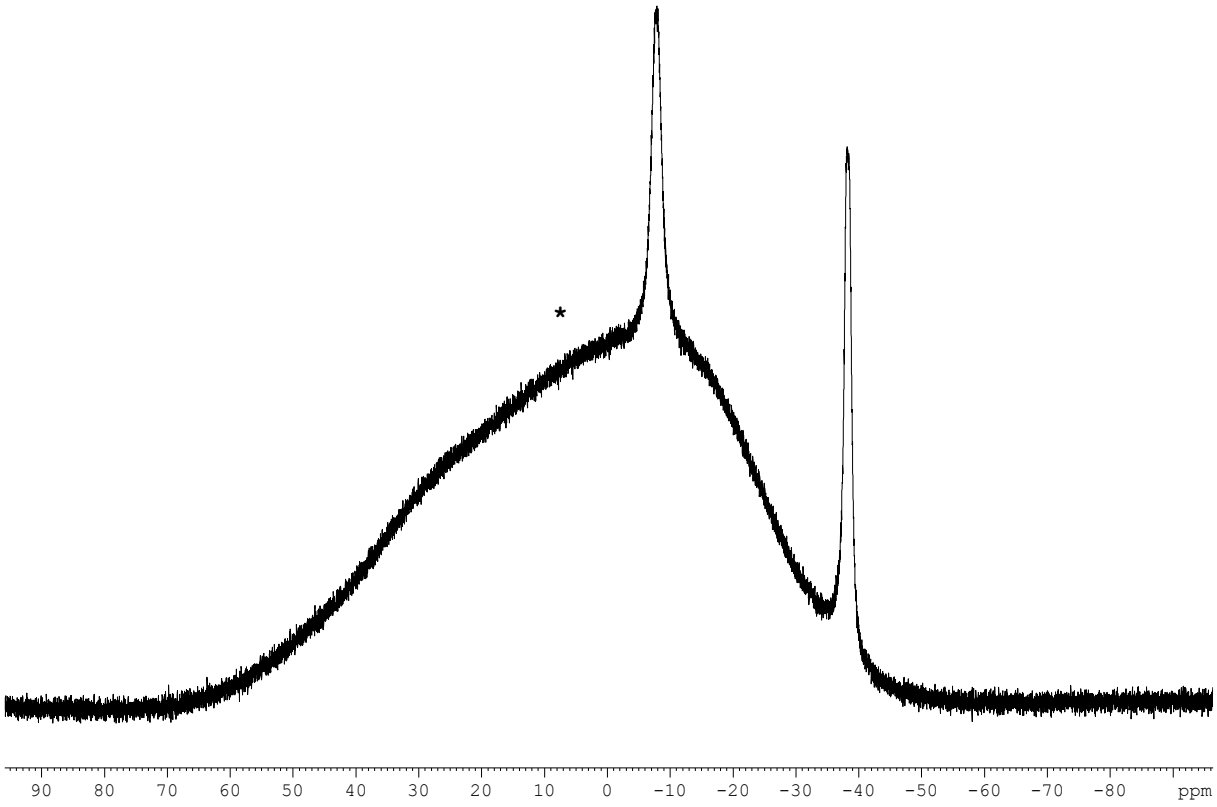


Figure S14: $^{11}B\{^1H\}$ NMR spectrum of **2a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

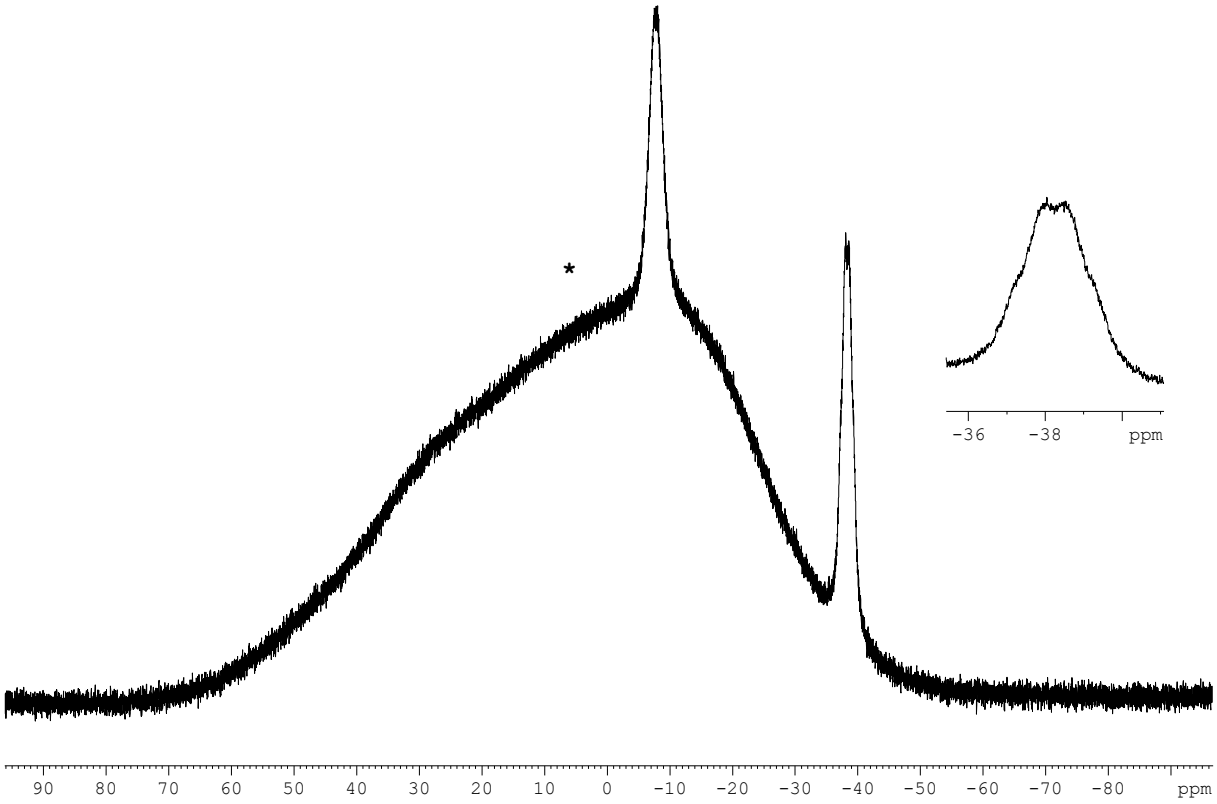


Figure S15: ^{11}B NMR spectrum of **2a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

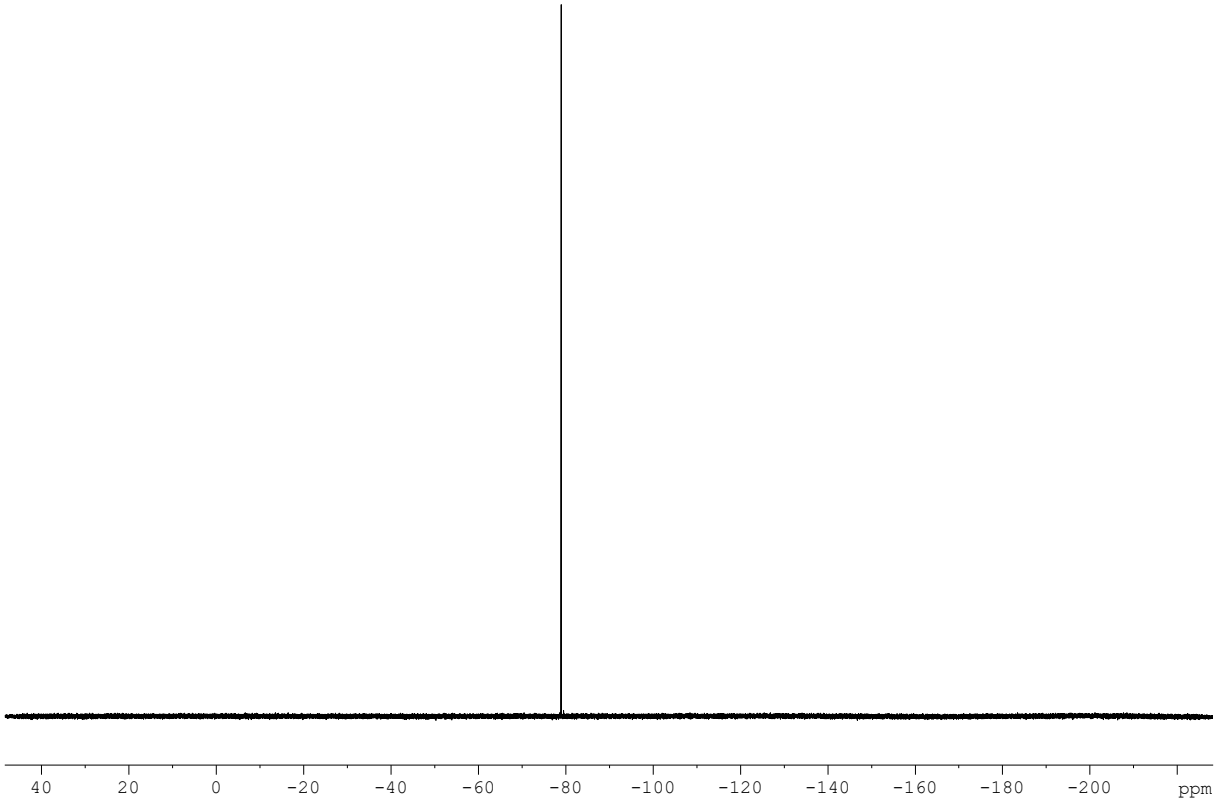


Figure S16: ^{19}F NMR spectrum of **2a** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3][OTf] (**2b**)

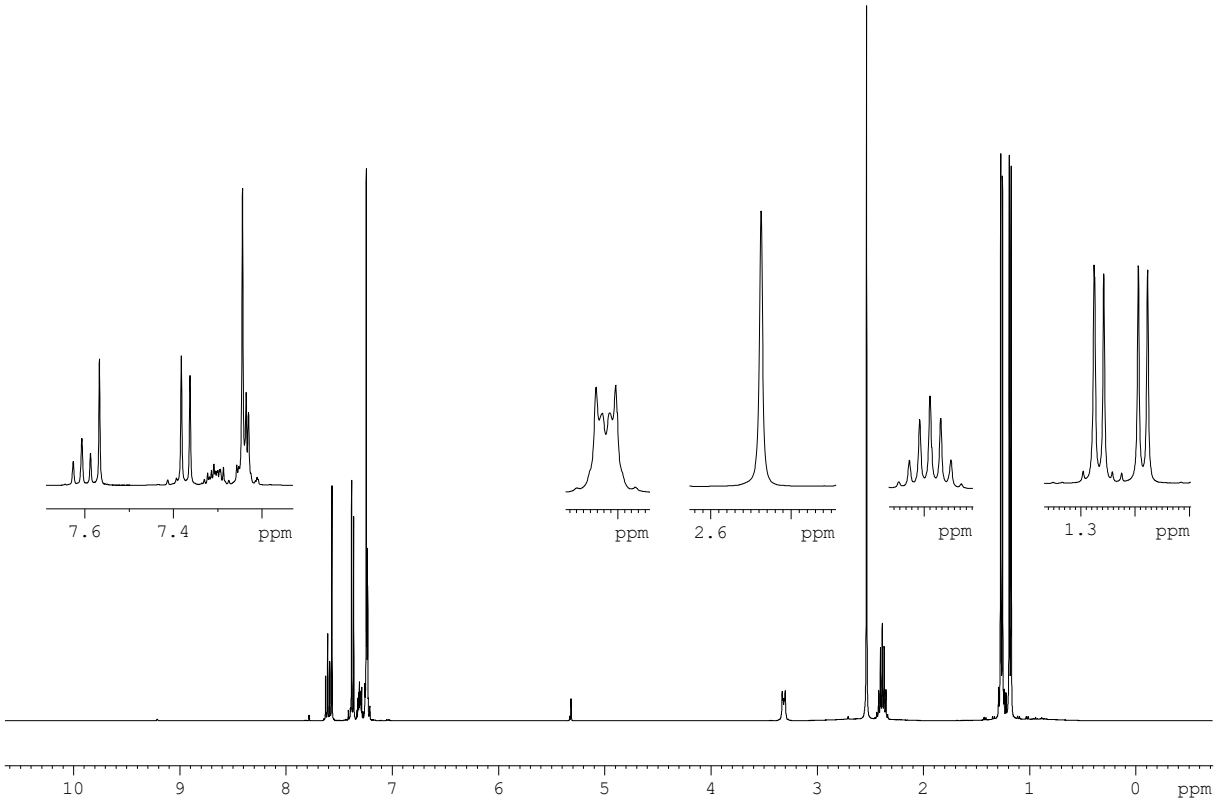


Figure S17: ^1H NMR spectrum of **2b** in CD_2Cl_2 at 298 K.

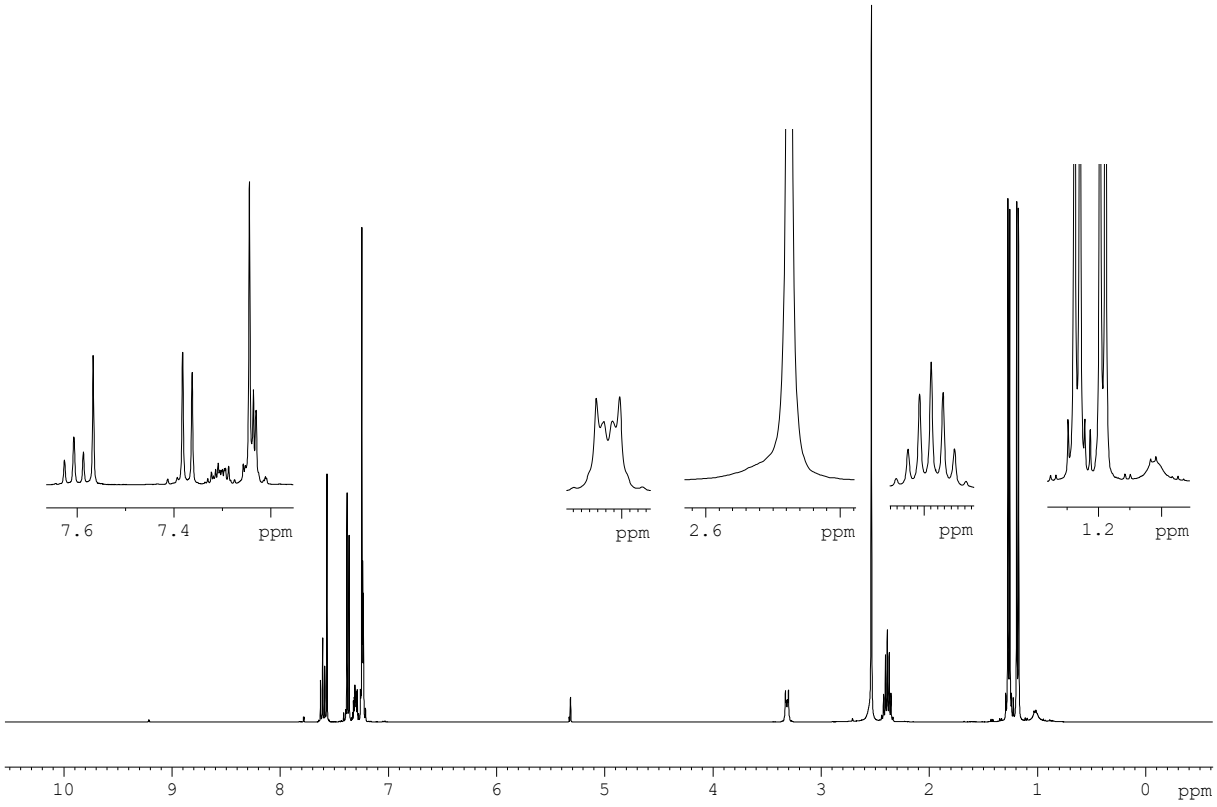


Figure S18: $^1H\{^{11}B\}$ NMR spectrum of **2b** in CD_2Cl_2 at 298 K.

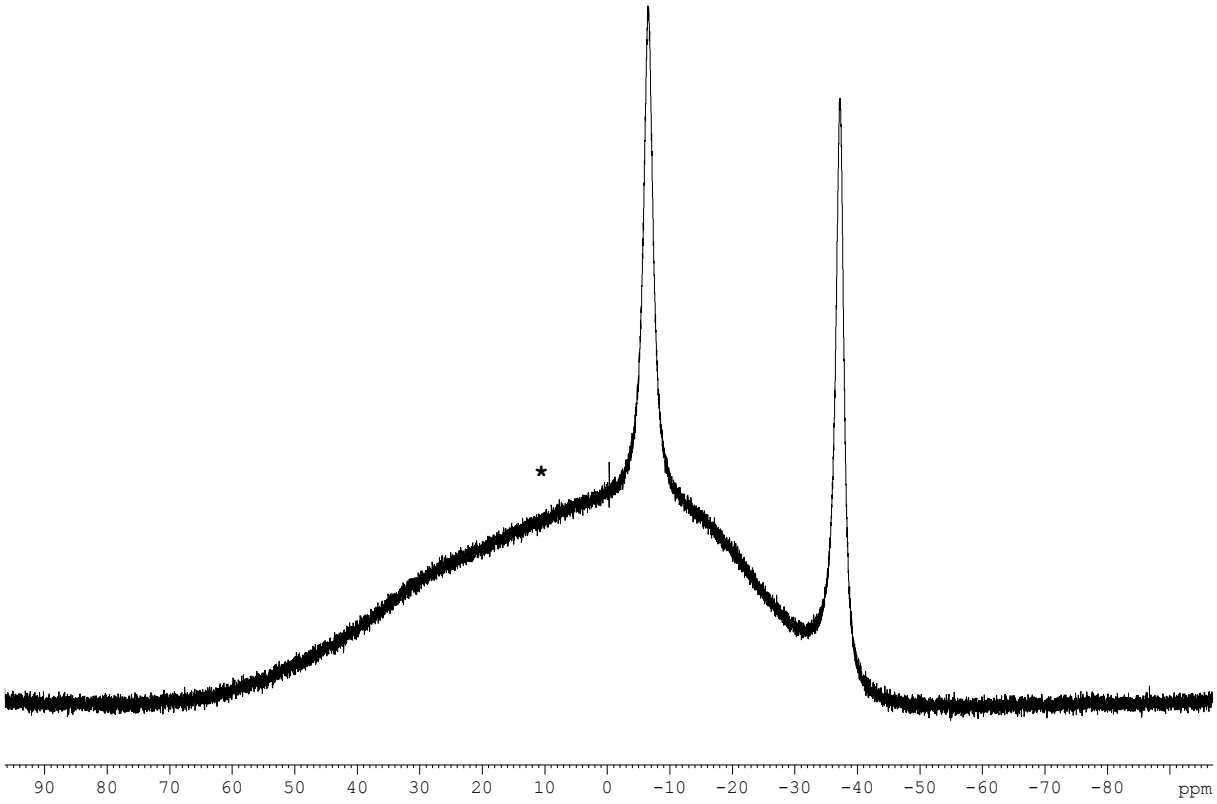


Figure S19: $^{11}B\{^{1}H\}$ NMR spectrum of **2b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

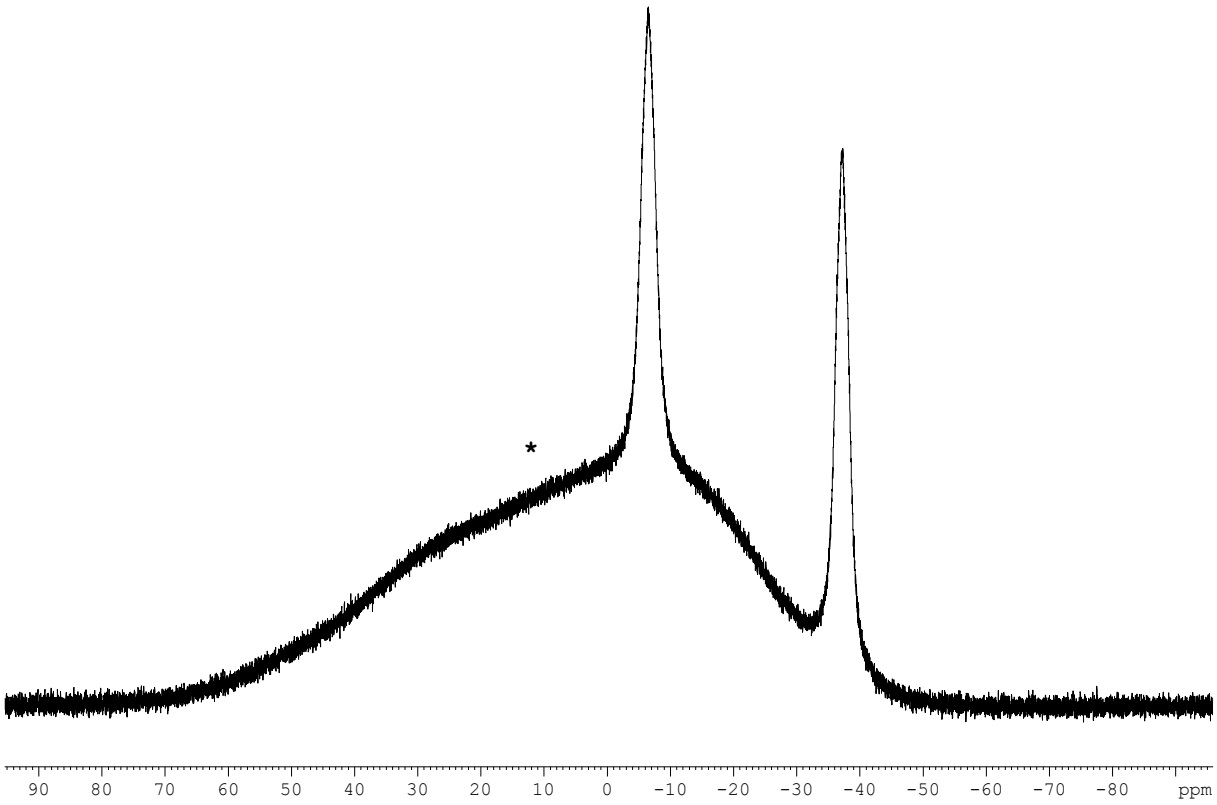


Figure S20: ^{11}B NMR spectrum of **2b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

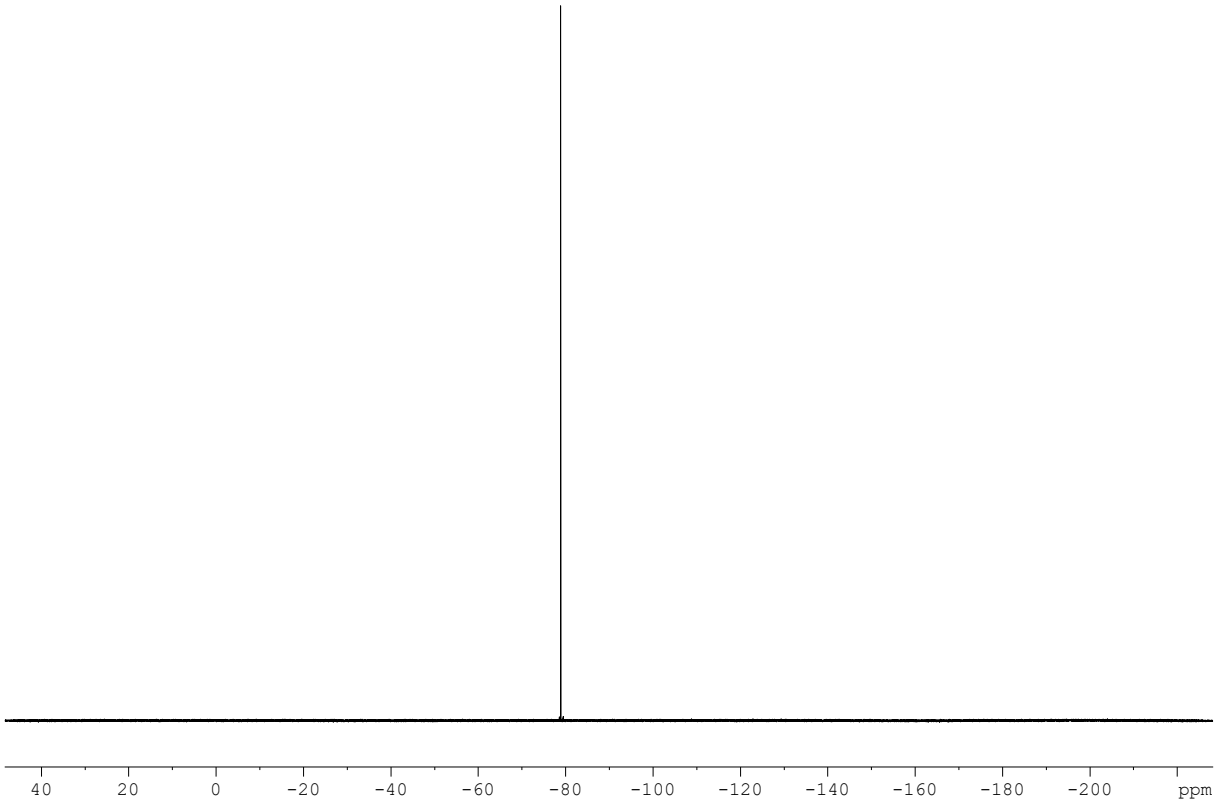


Figure S21: ^{19}F NMR spectrum of **2b** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2PH_2BH_2$·NMe_3][OTf] (**3a**)

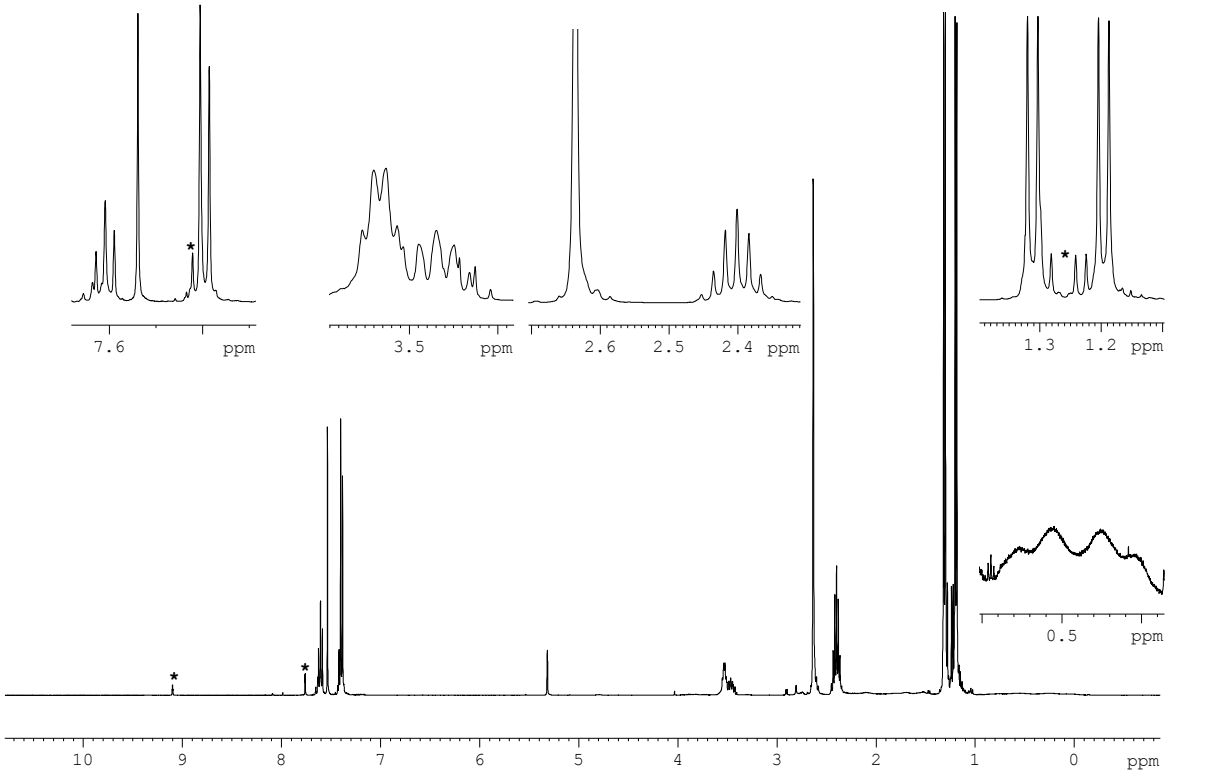


Figure S22: ^1H NMR spectrum of **3a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

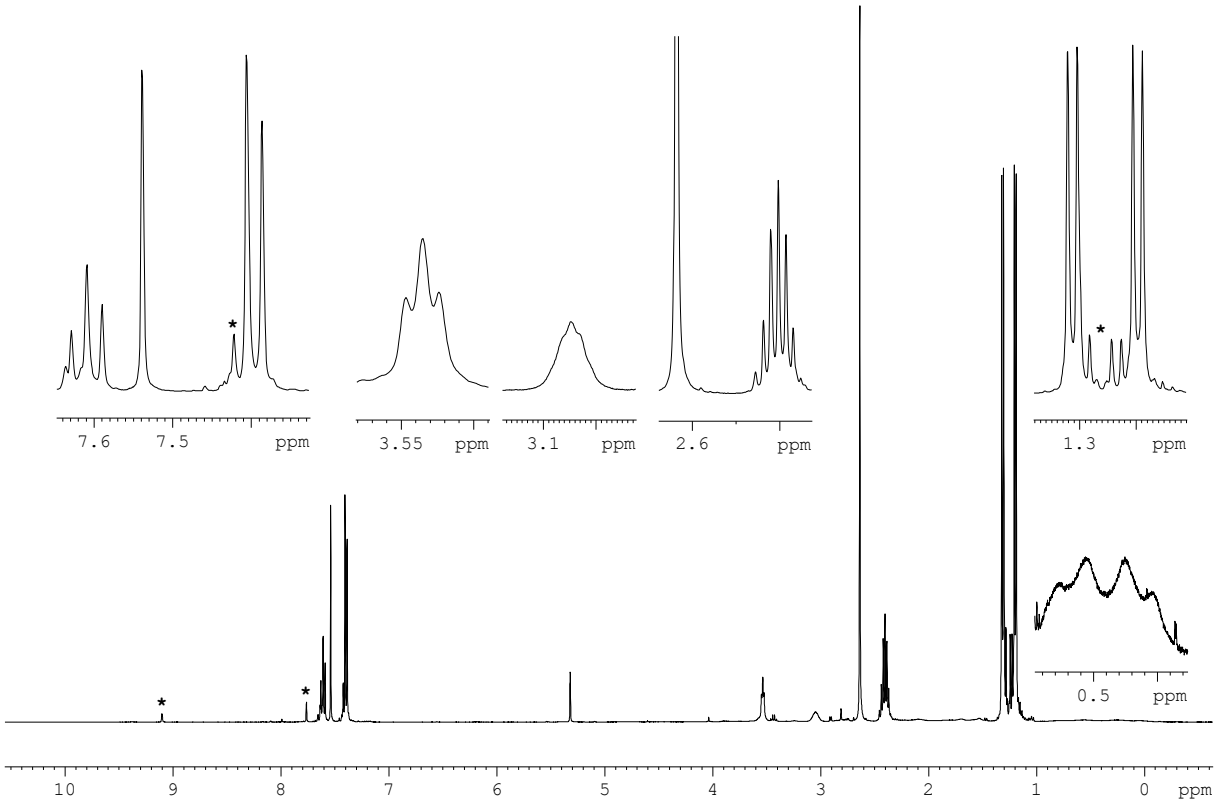


Figure S23: $^{1}H\{^{31}P\}$ NMR spectrum of **3a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

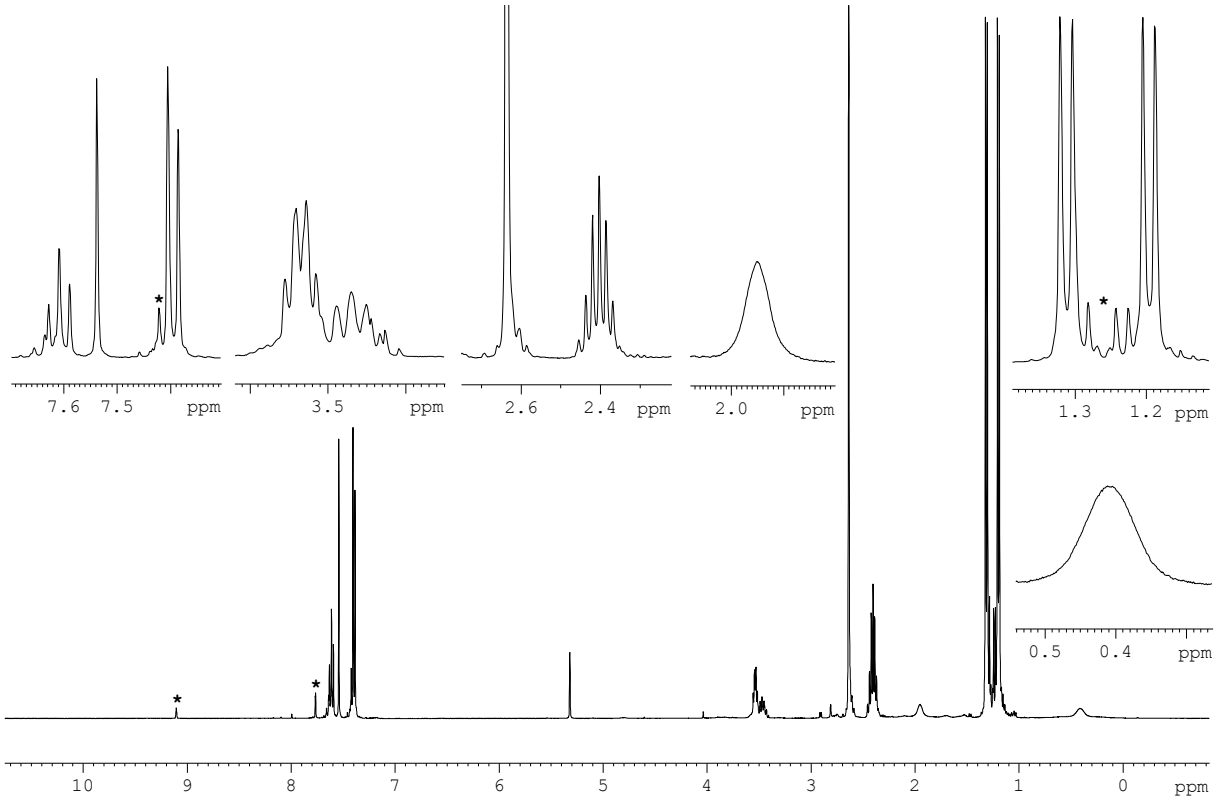


Figure S24: $^{1}H\{^{11}B\}$ NMR spectrum of **3a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

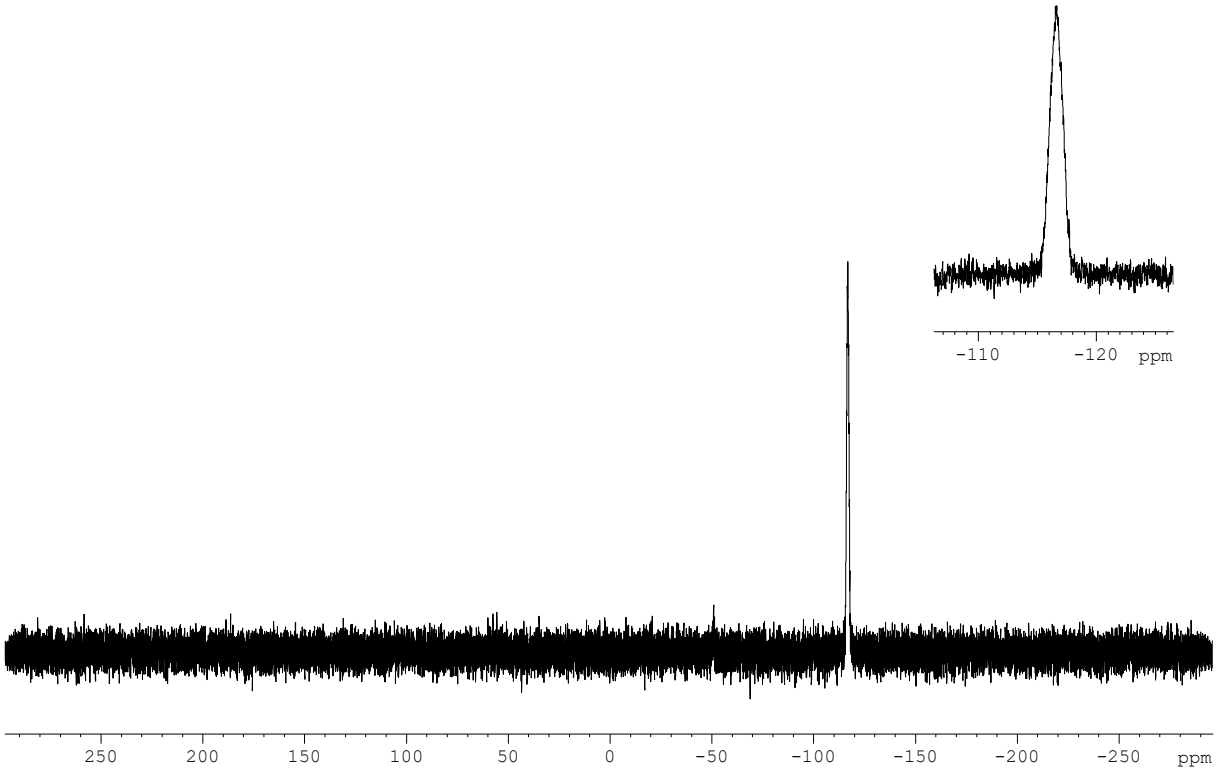


Figure S25: $^{31}P\{^{1}H\}$ NMR spectrum of **3a** in CD_2Cl_2 at 298 K.

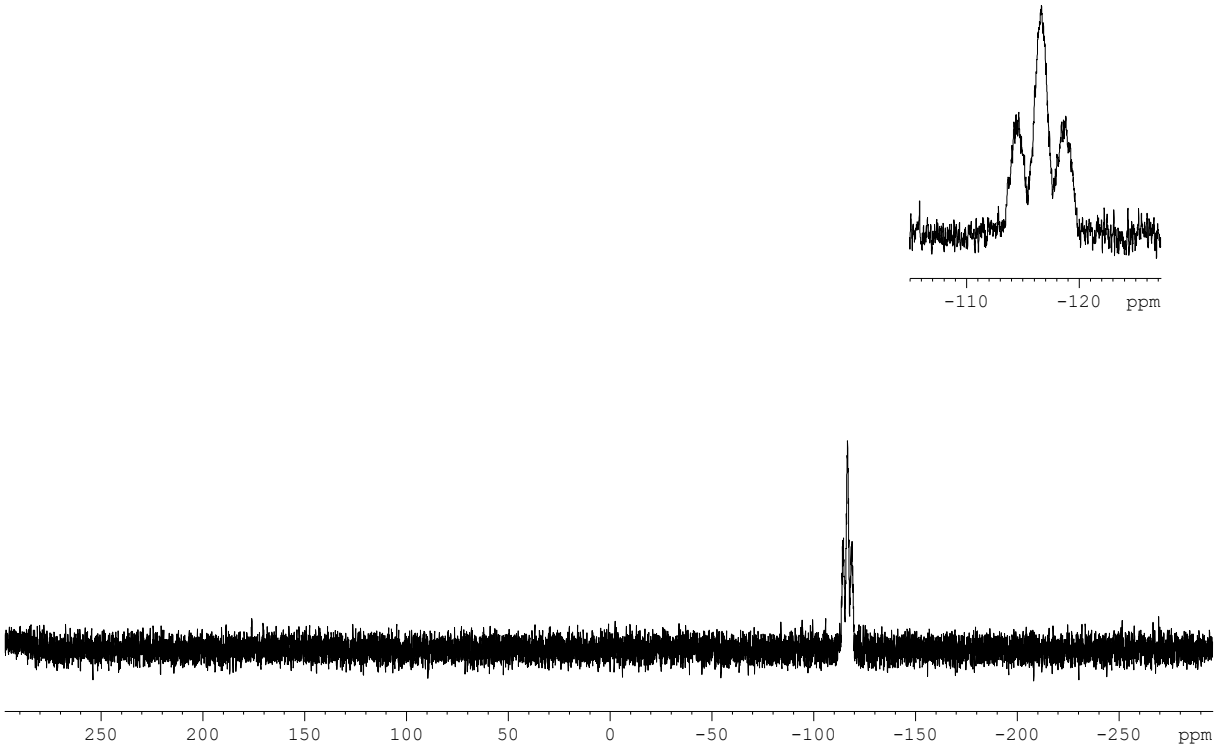


Figure S26: ^{31}P NMR spectrum of **3a** in CD_2Cl_2 at 298 K.

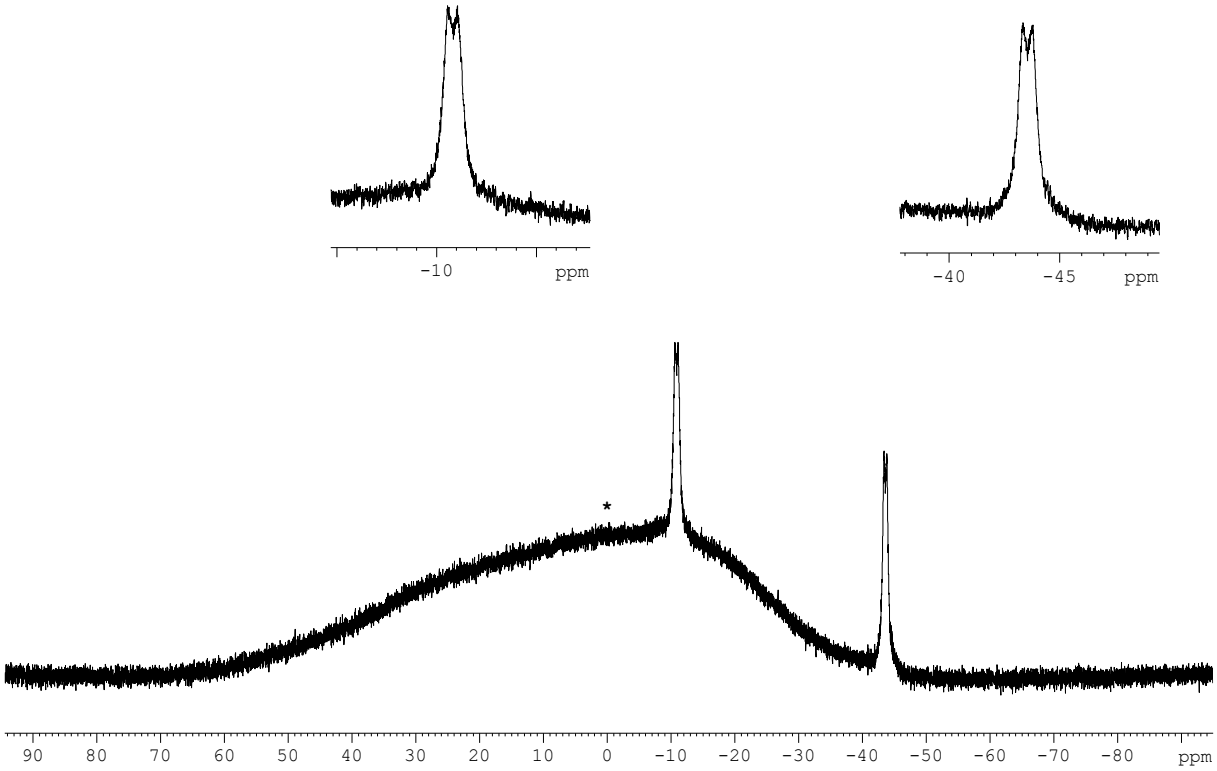


Figure S27: $^{11}B\{^{1}H\}$ NMR spectrum of **3a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

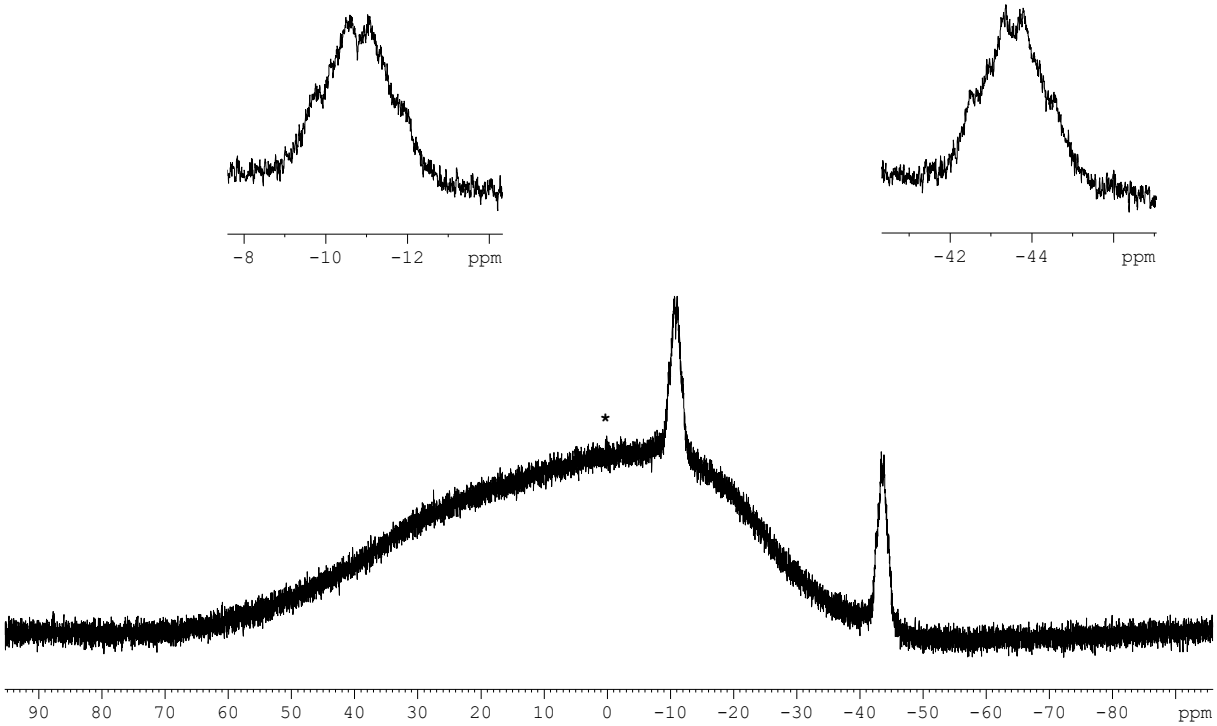


Figure S28: $^{11}B\{^{1}H\}$ NMR spectrum of **3a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

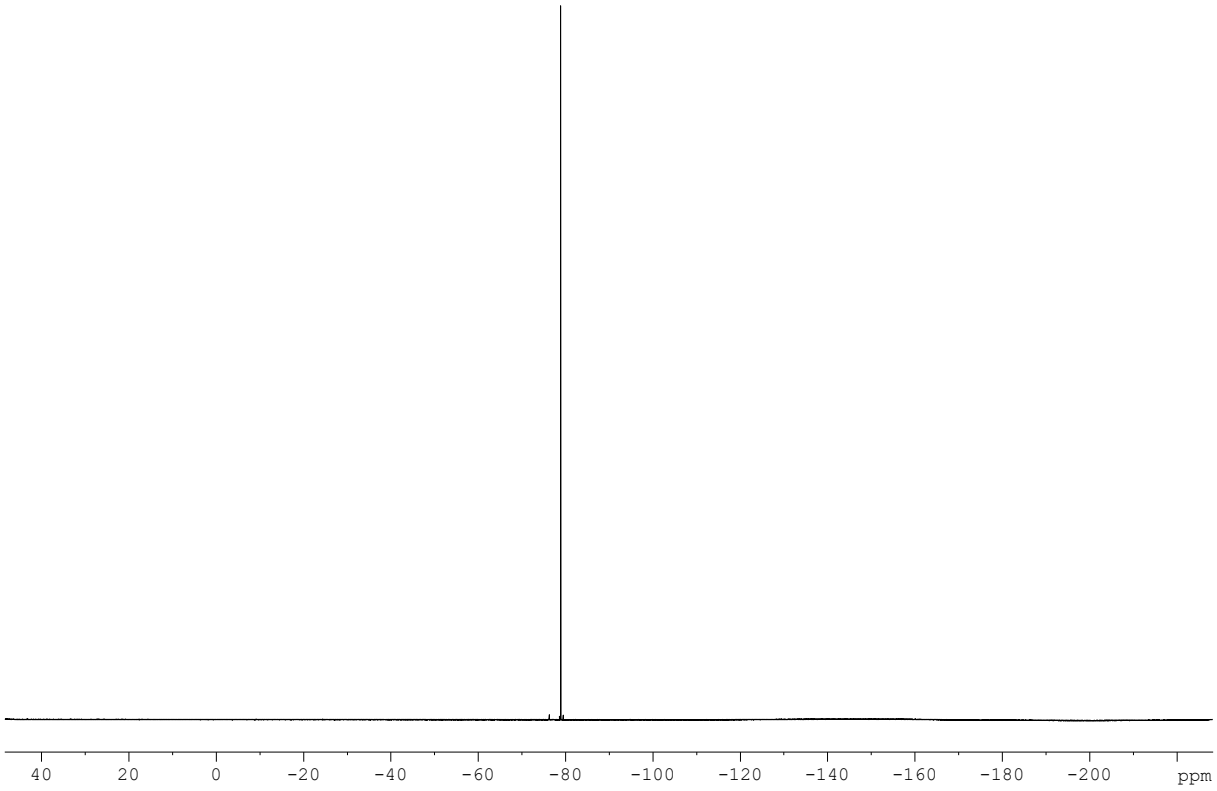


Figure S29: ^{19}F NMR spectrum of **3a** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2AsH_2BH_2$·NMe_3][OTf] (**3b**)

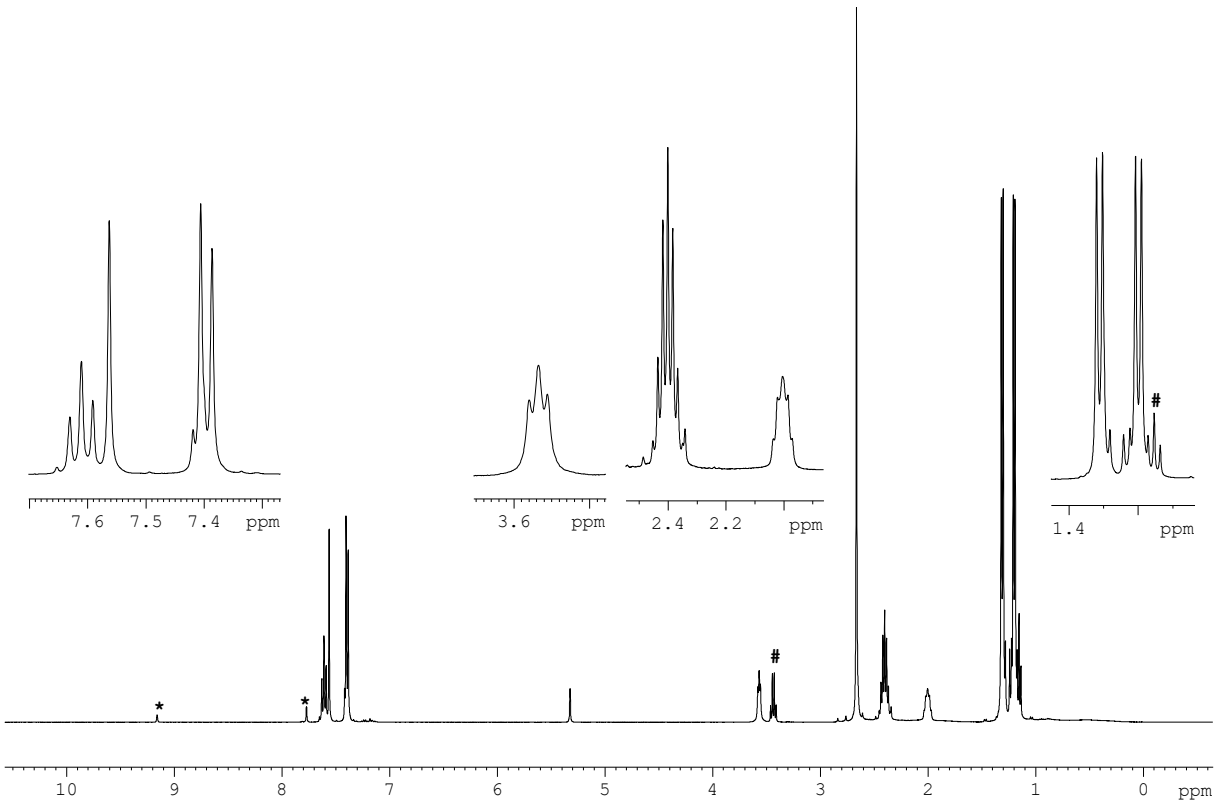


Figure S30: ^1H NMR spectrum of **3b** in CD_2Cl_2 at 298 K. * = [IDippH][OTf]. # = Et_2O.

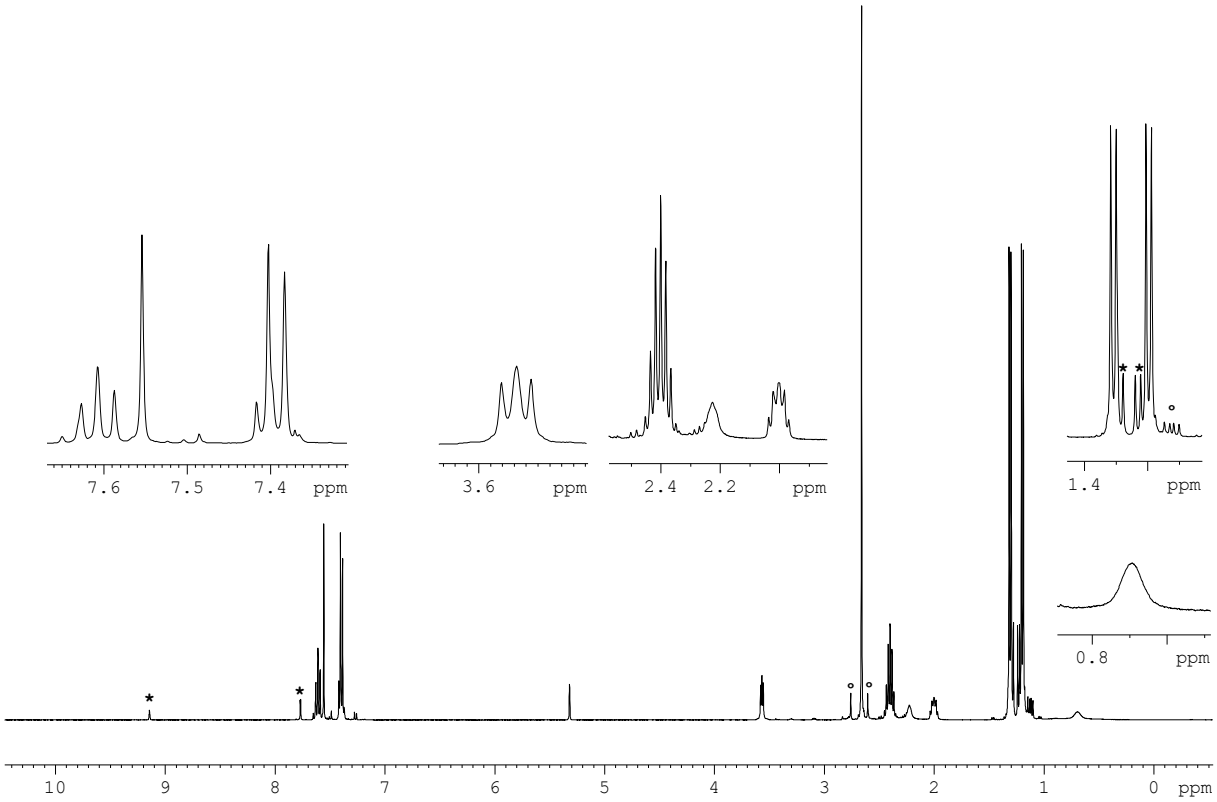


Figure S31: $^{1}H\{^{11}B\}$ NMR spectrum of **3b** in CD_2Cl_2 at 298 K. ° = unidentified impurity. * = [IDippH][OTf].

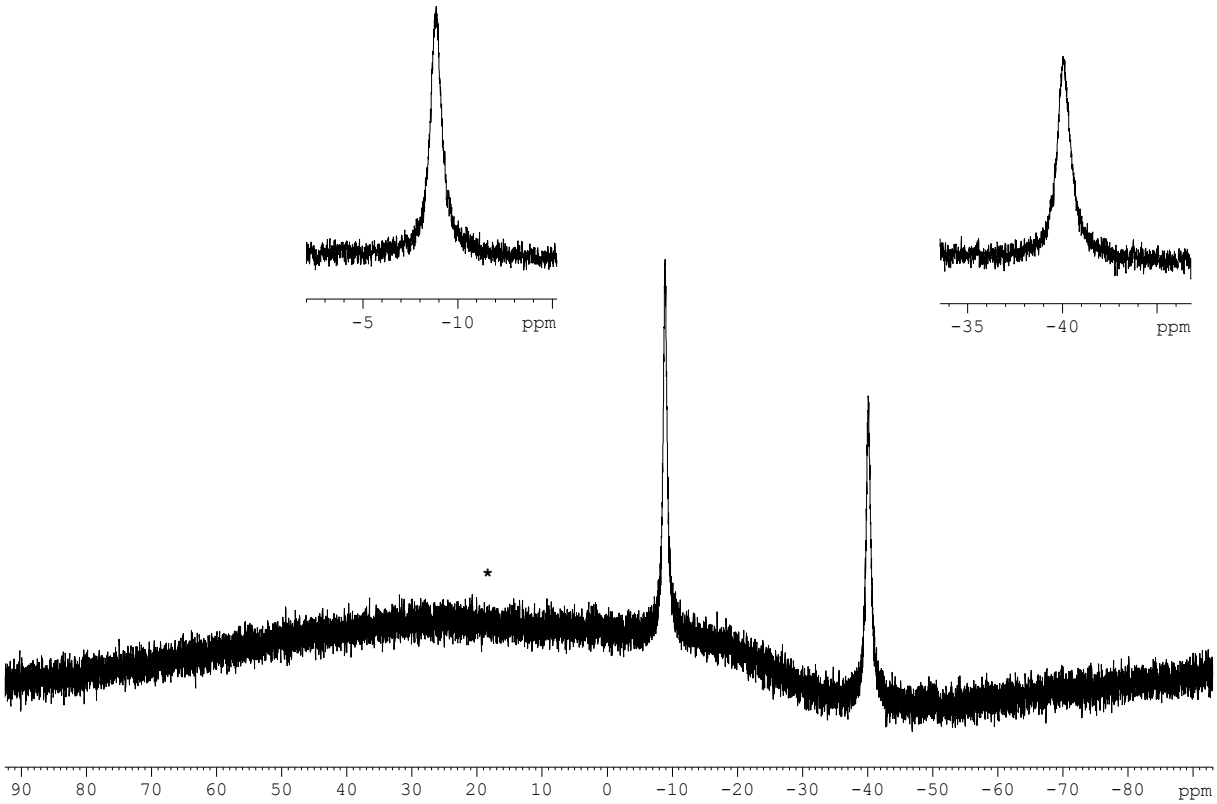


Figure S32: $^{11}B\{^{1}H\}$ NMR spectrum of **3b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

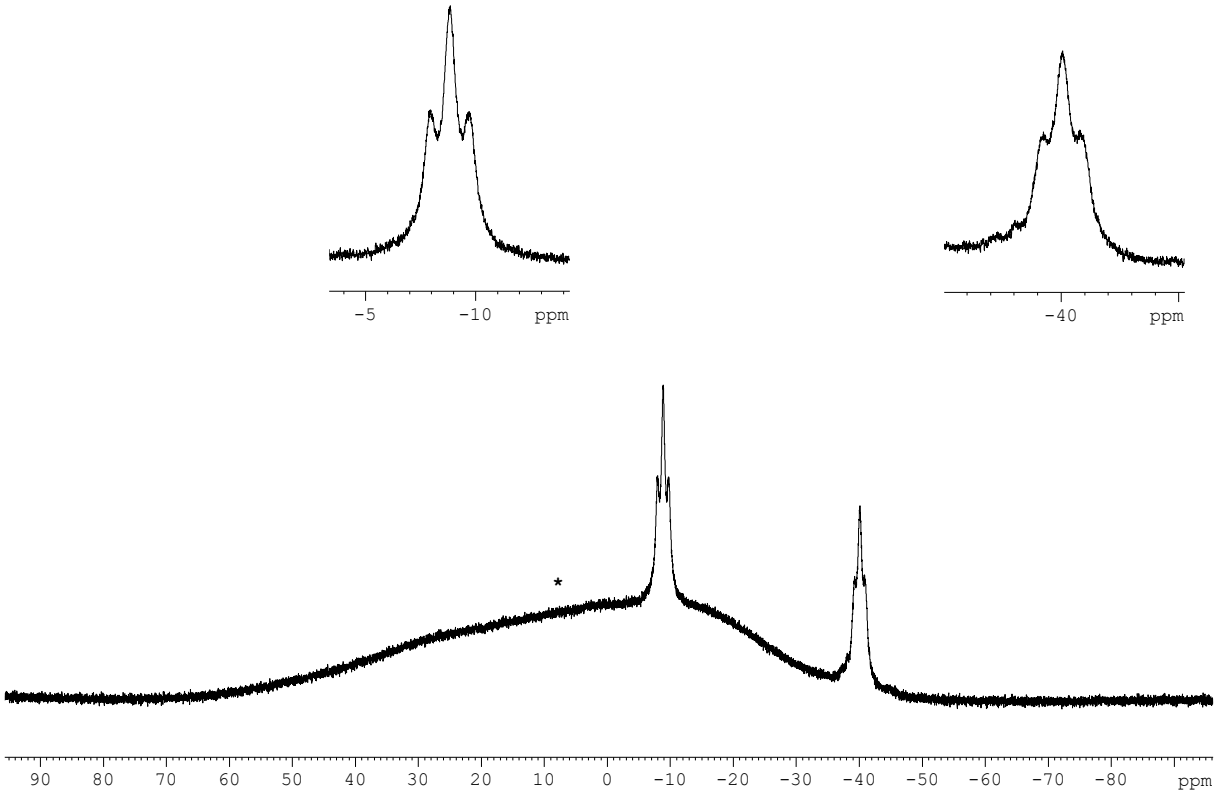


Figure S33: ^{11}B NMR spectrum of **3b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

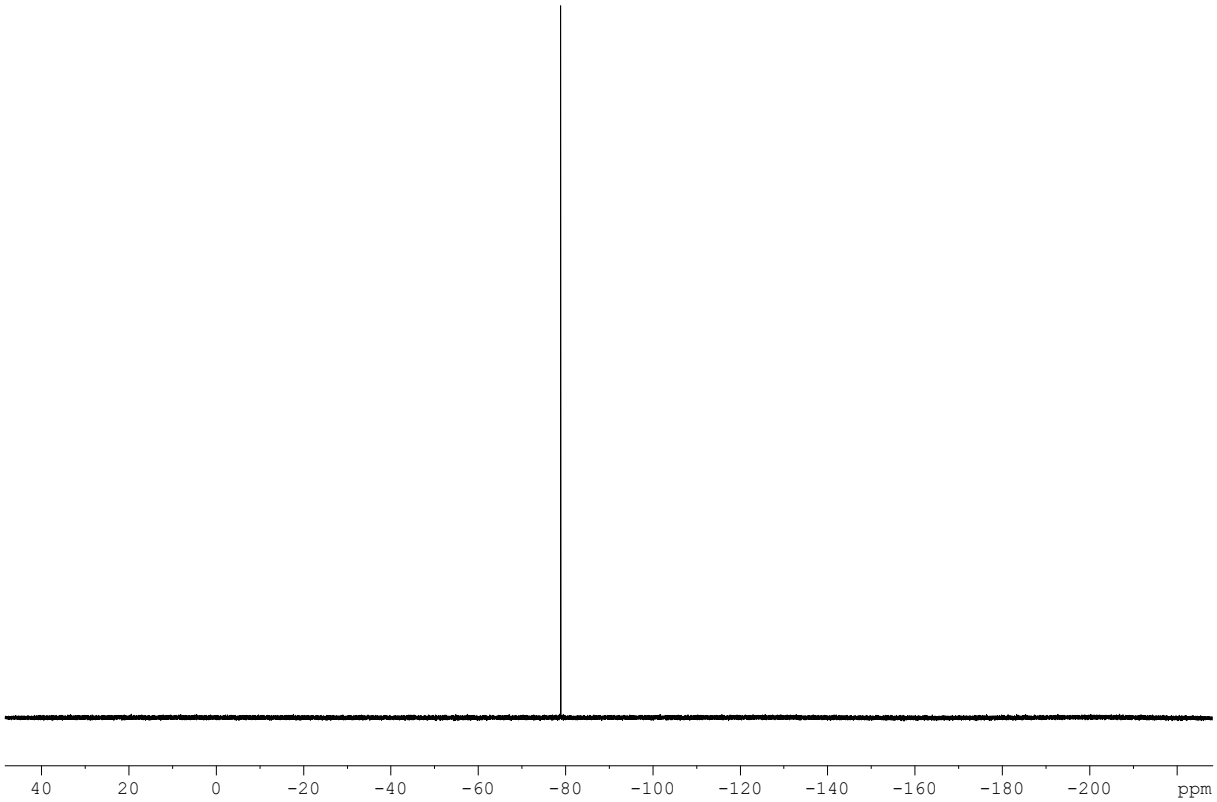


Figure S34: ^{19}F NMR spectrum of **3b** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2PH_2BH_2$·IMes][OTf] (**4**)

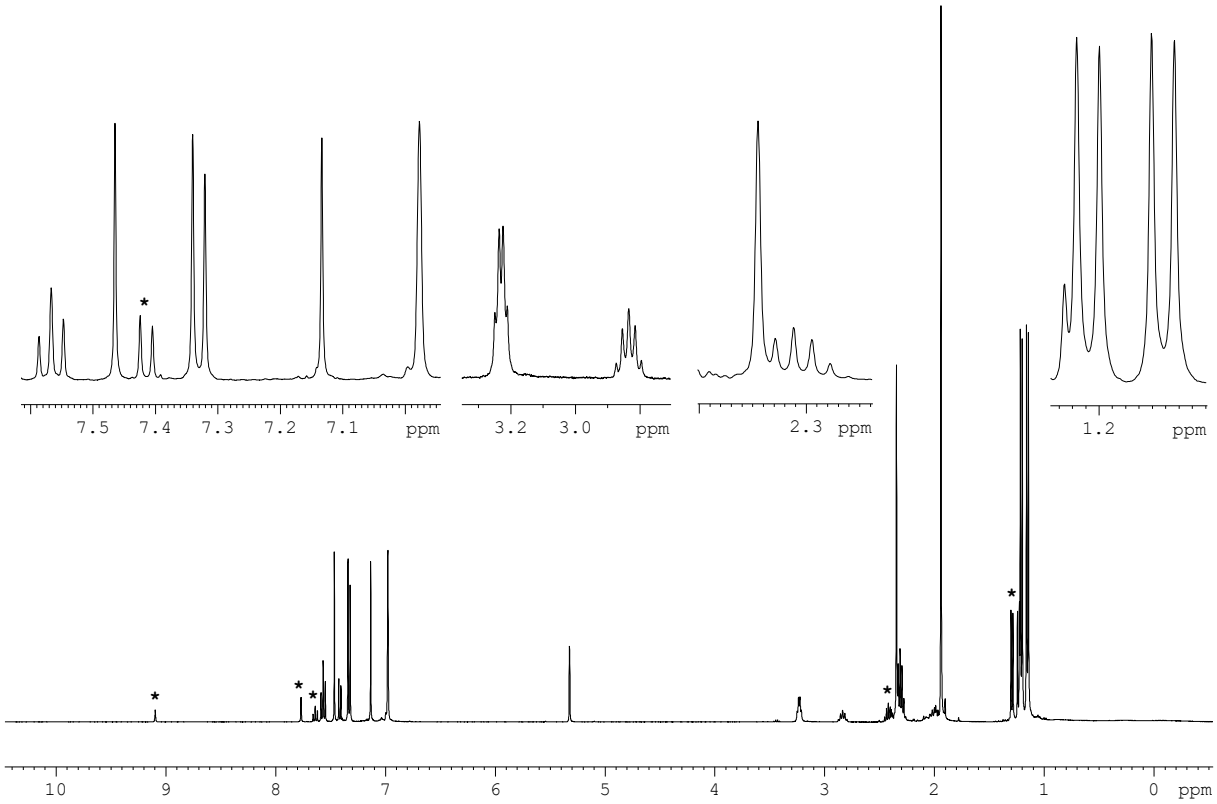


Figure S35: ^{1}H NMR spectrum of **4** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

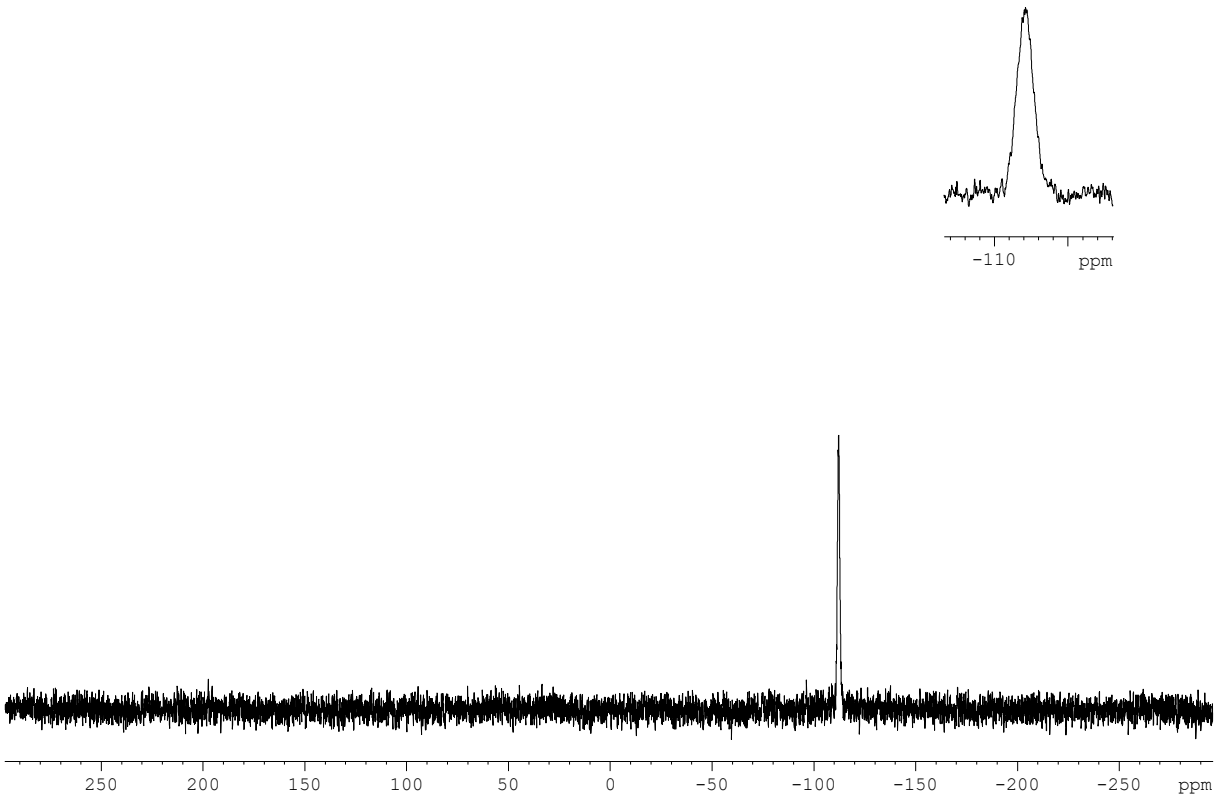


Figure S36: $^{31}P\{^{1}H\}$ NMR spectrum of **4** in CD_2Cl_2 at 298 K.

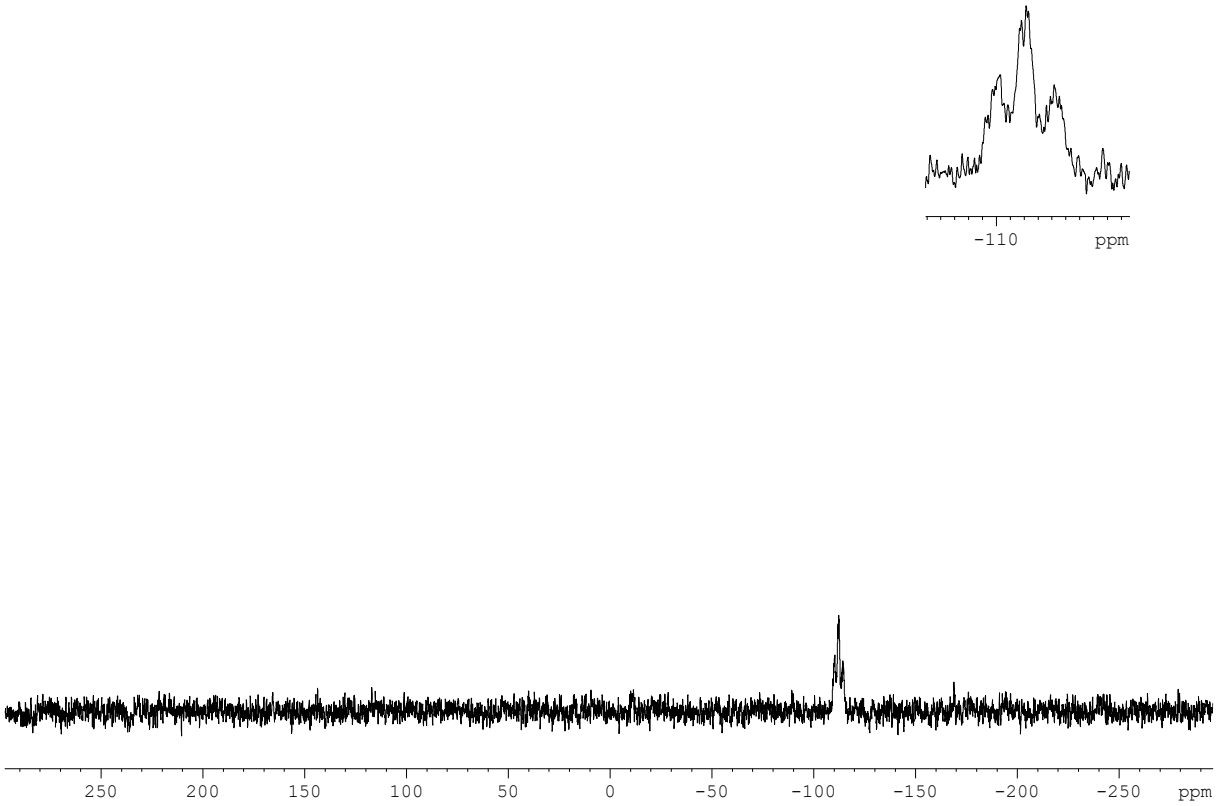


Figure S37: ^{31}P NMR spectrum of **4** in CD_2Cl_2 at 298 K.

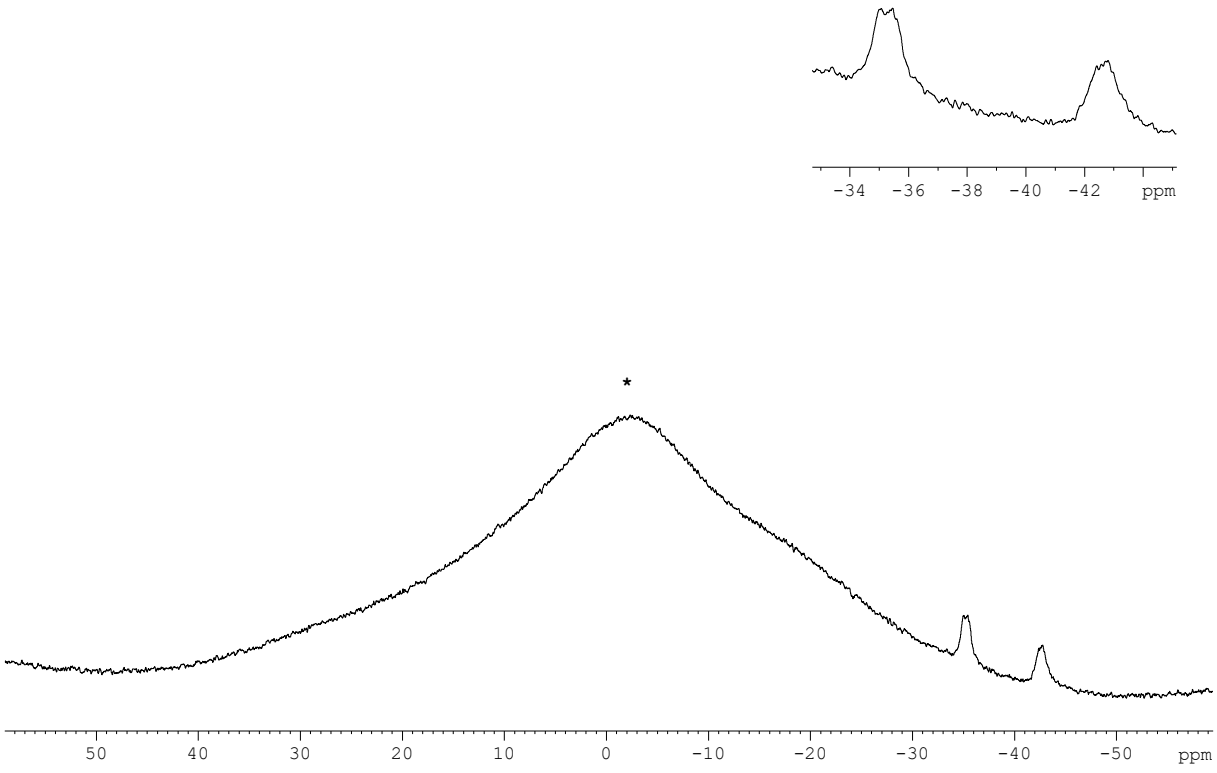


Figure S38: $^{11}B\{^1H\}$ NMR spectrum of **4** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

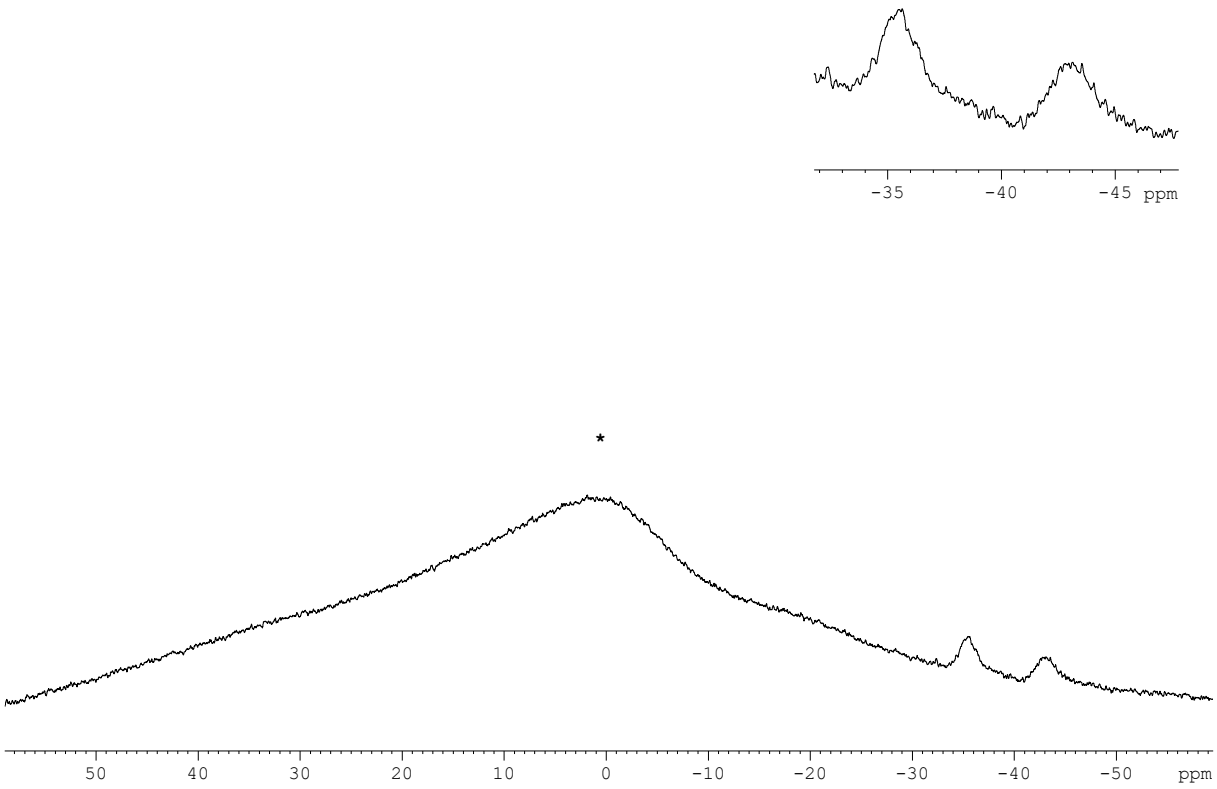


Figure S39: ^{11}B NMR spectrum of **4** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

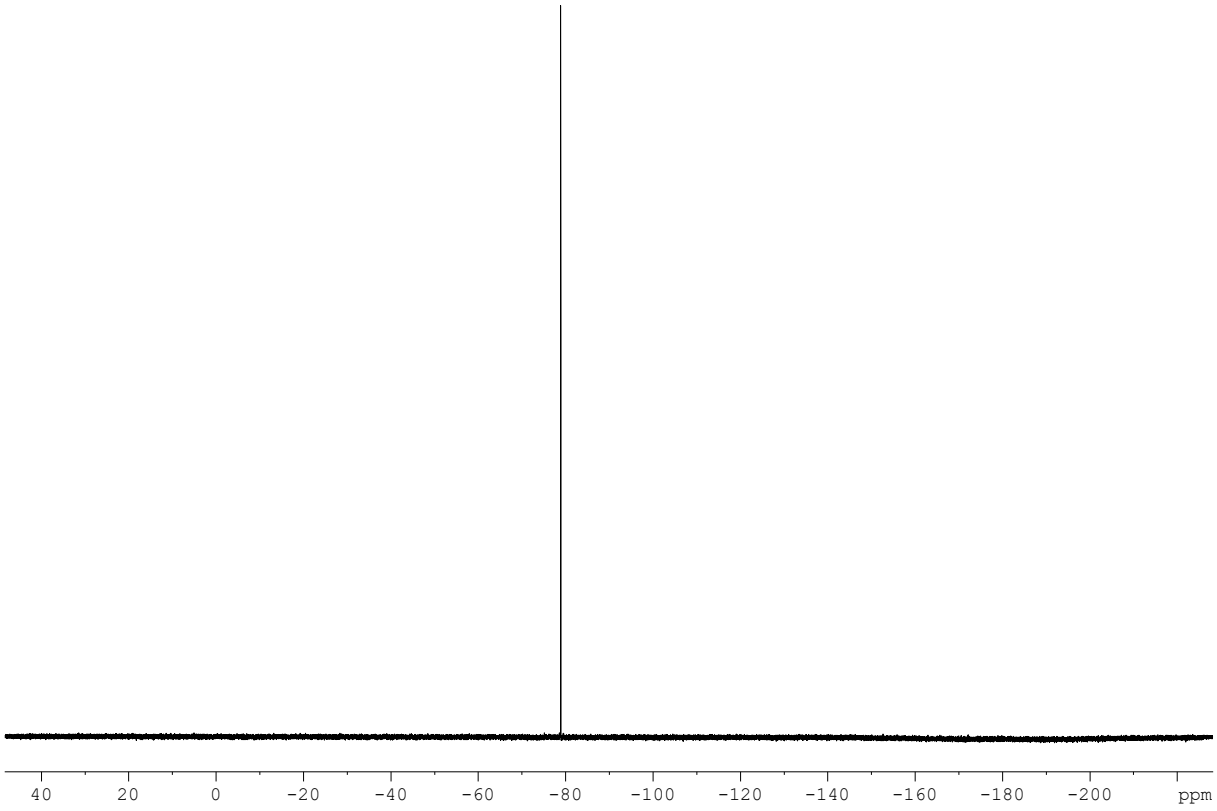


Figure S40: ^{19}F NMR spectrum of **4** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2PH_2BH_2$·IDipp][OTf] (**5a**)

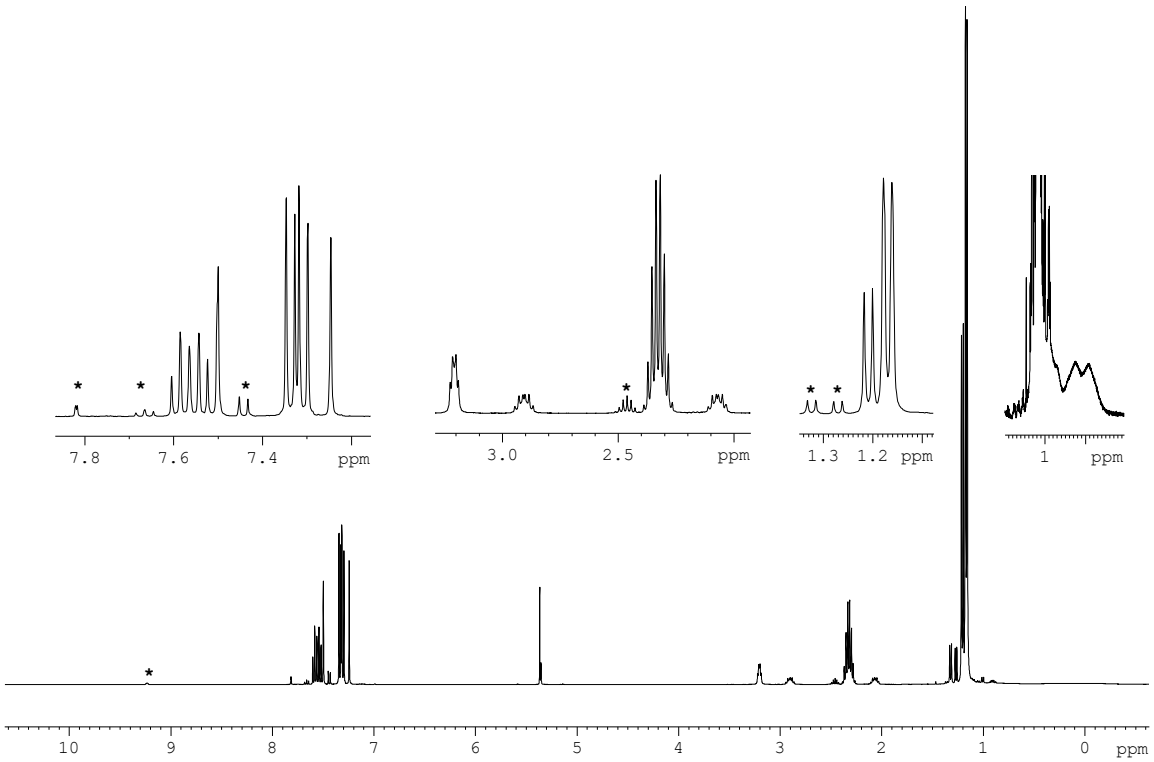


Figure S41: ^1H NMR spectrum of **5a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

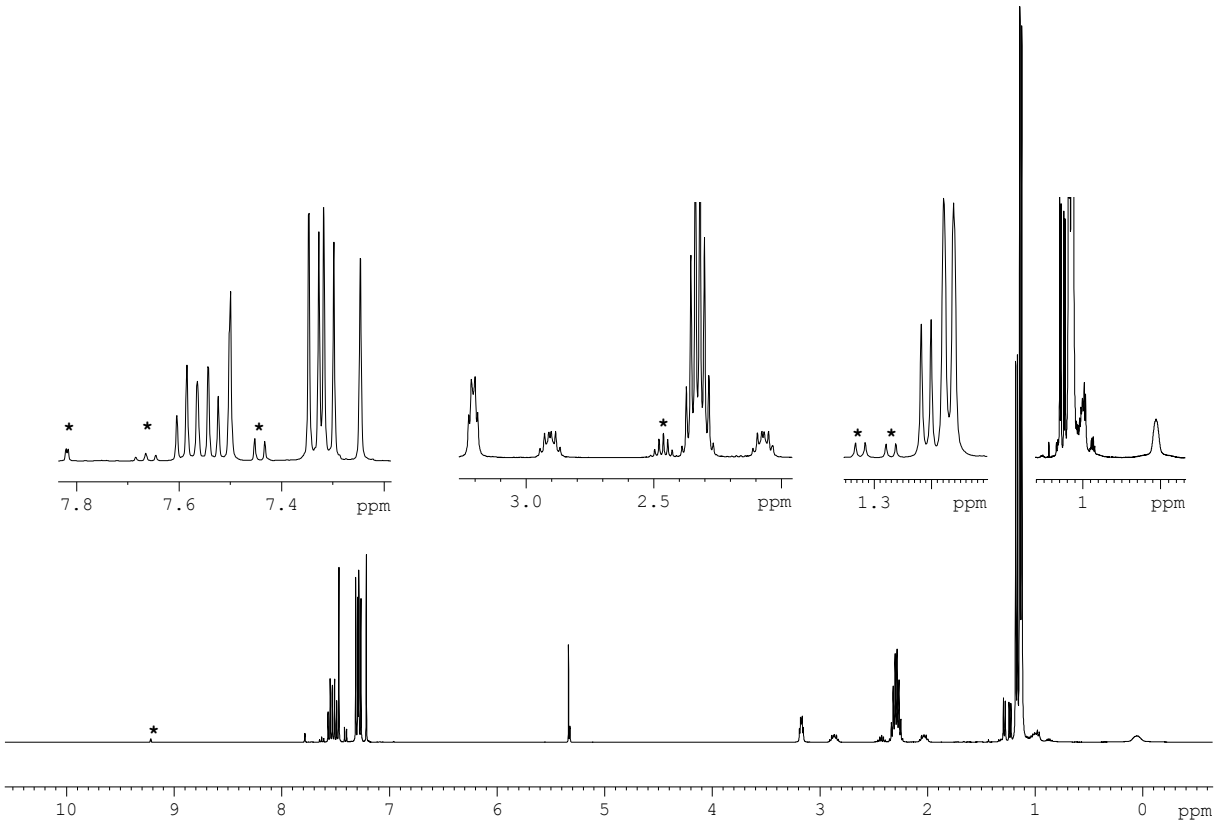


Figure S42: $^1H\{^{11}B\}$ NMR spectrum of **5a** in CD_2Cl_2 at 298 K. * = [IDippH][OTf].

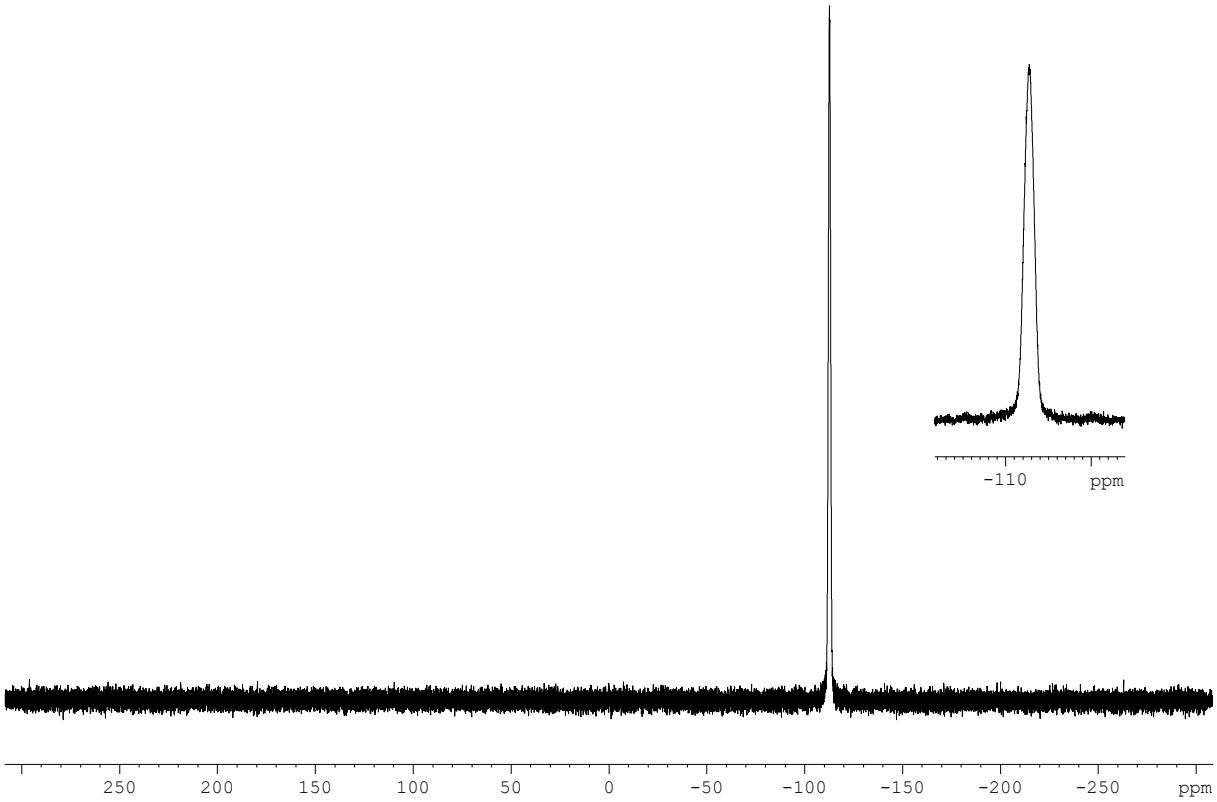


Figure S43: $^{31}P\{^{1}H\}$ NMR spectrum of **5a** in CD_2Cl_2 at 298 K.

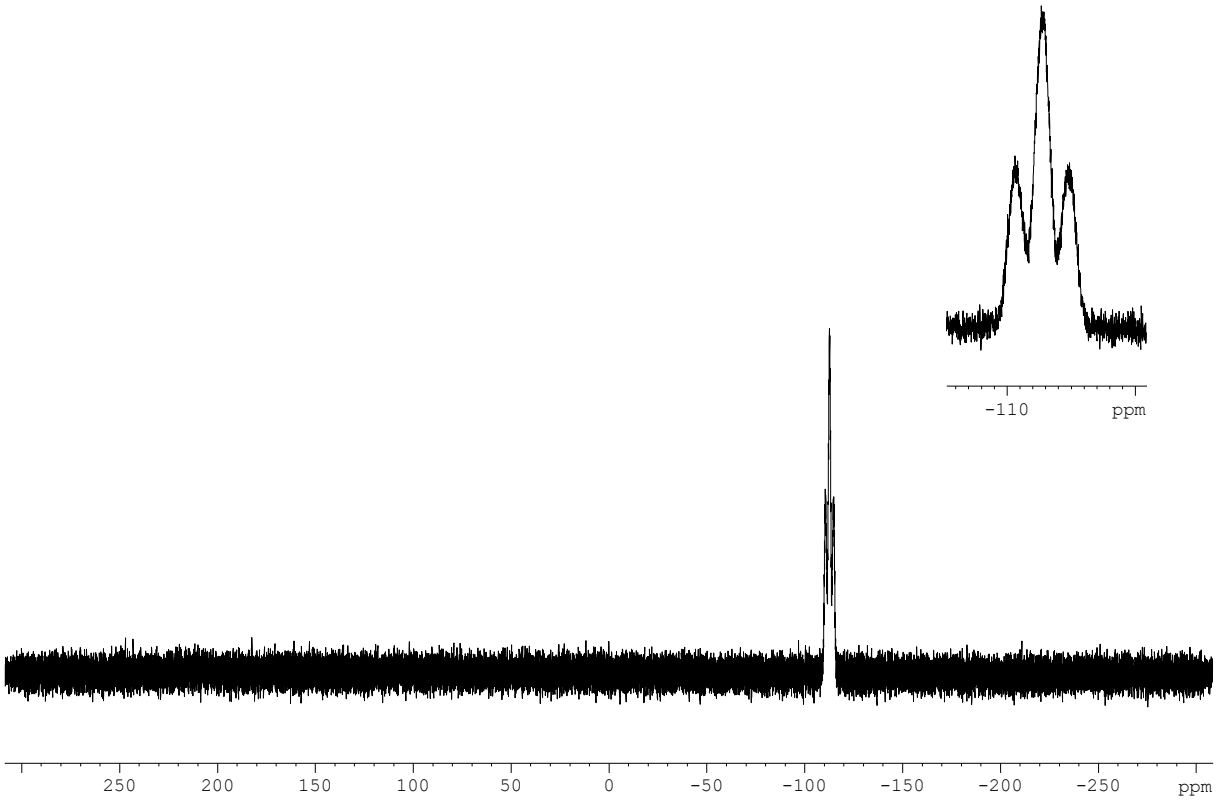


Figure S44: ^{31}P NMR spectrum of **5a** in CD_2Cl_2 at 298 K.

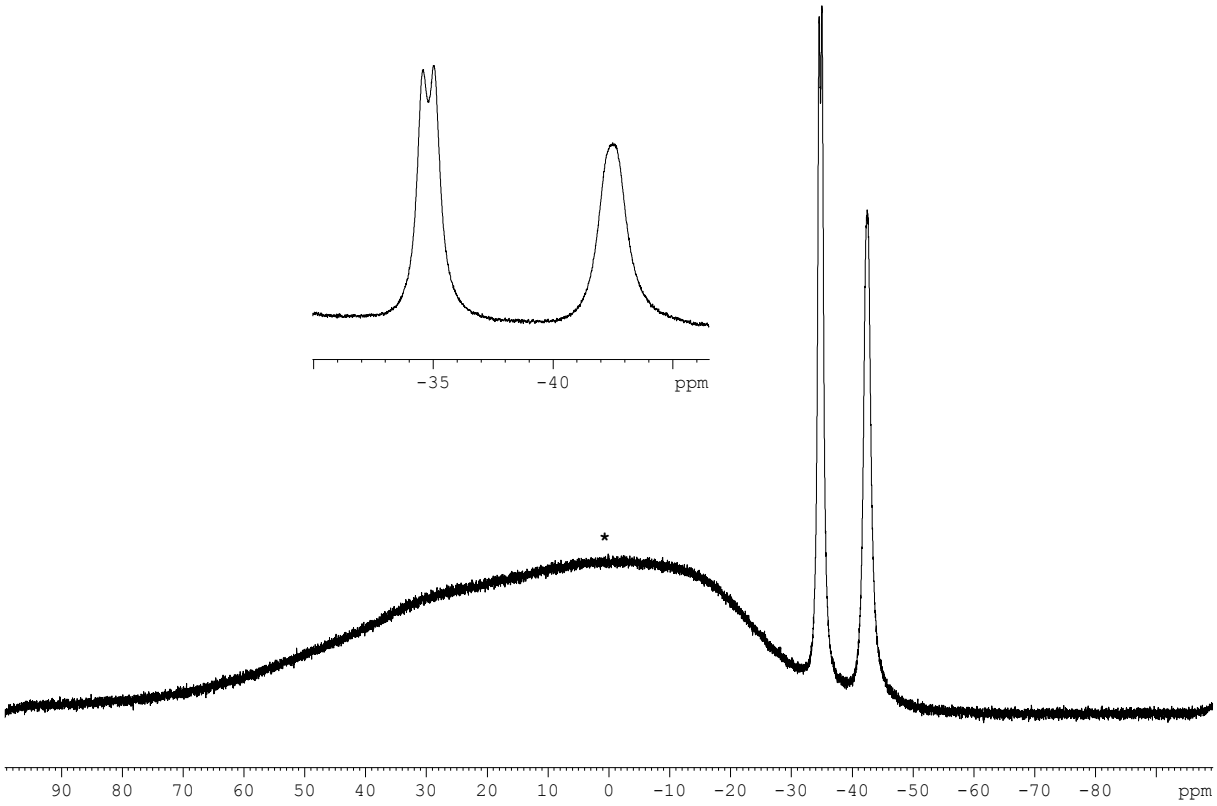


Figure S45: $^{11}B\{^{1}H\}$ NMR spectrum of **5a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

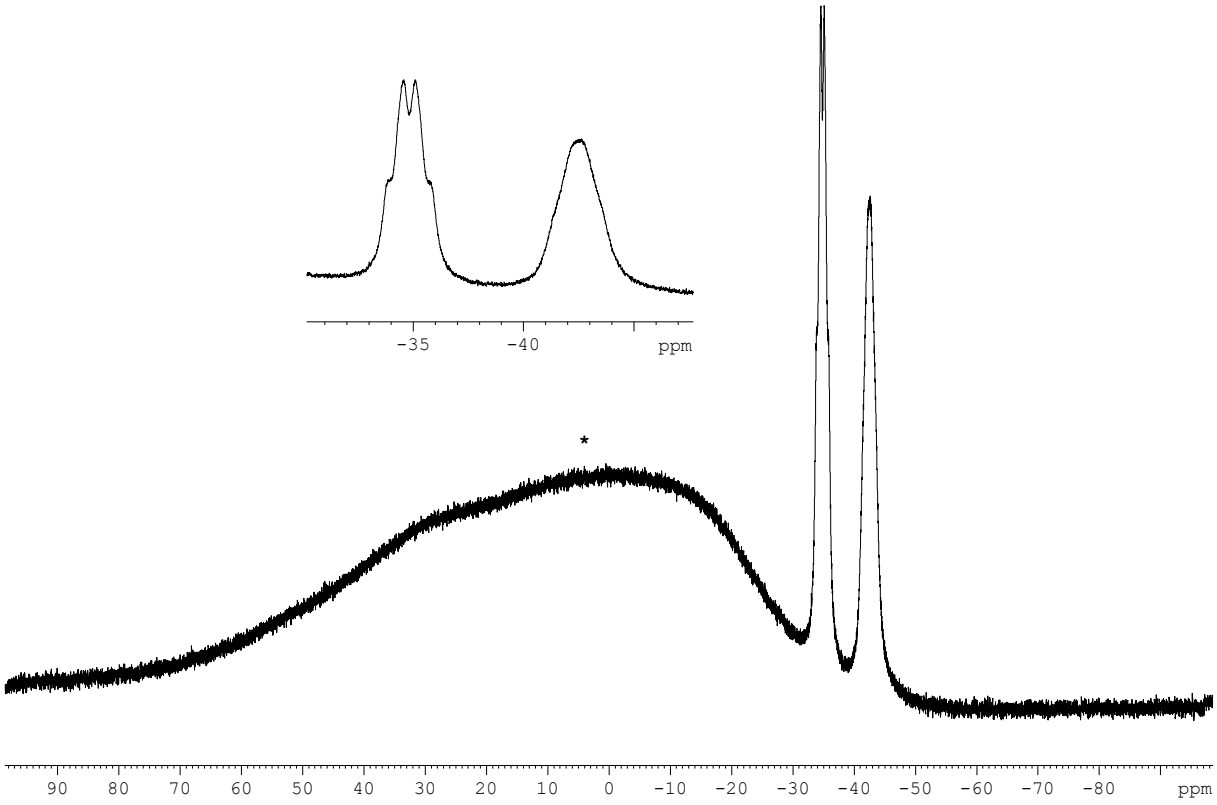


Figure S46: ^{11}B NMR spectrum of **5a** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

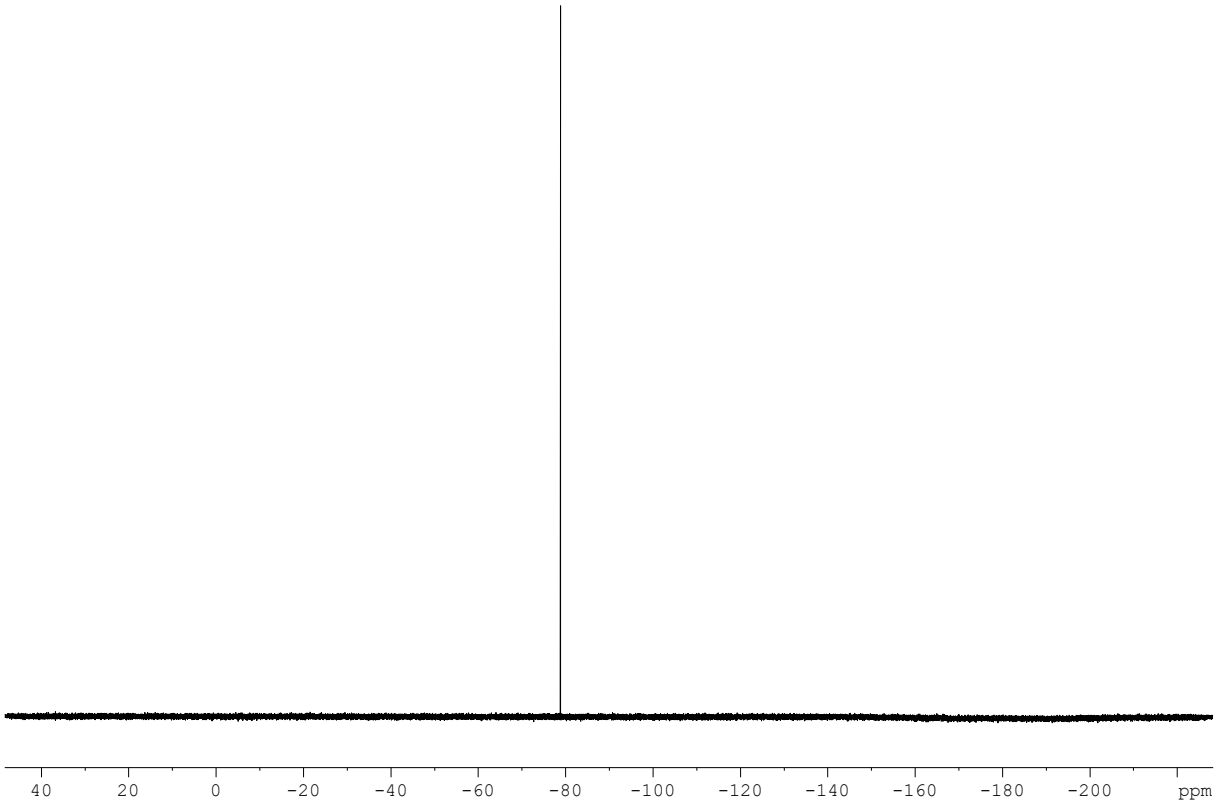


Figure S47: ^{19}F NMR spectrum of **5a** in CD_2Cl_2 at 298 K.

[IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp][OTf] (**5b**)

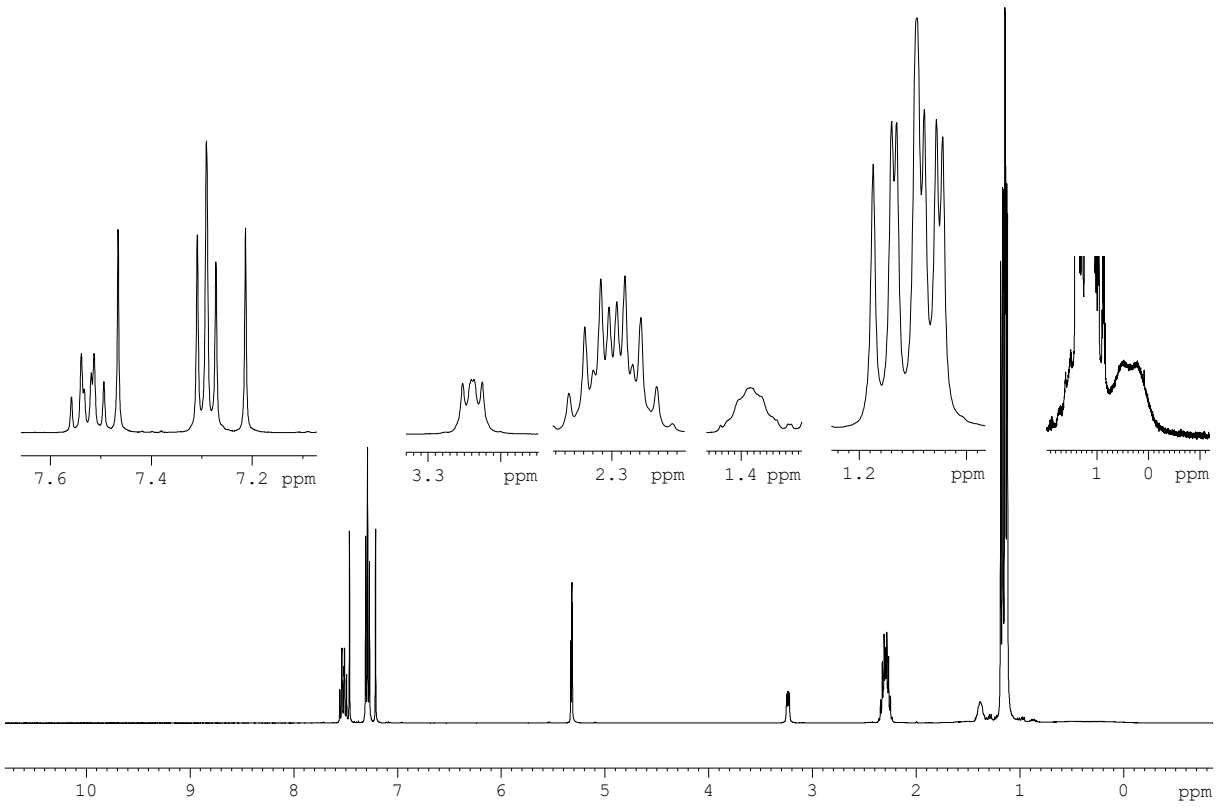


Figure S48: ^{1}H NMR spectrum of **5b** in CD_2Cl_2 at 298 K.

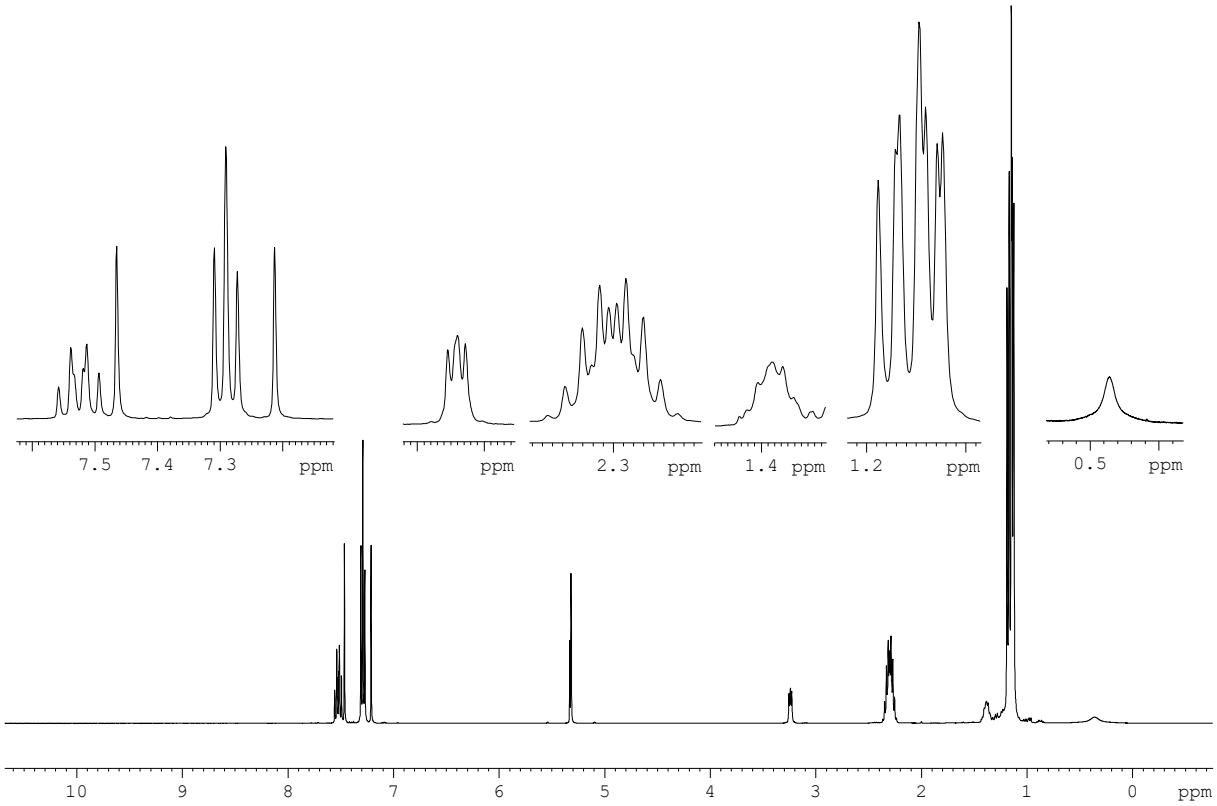


Figure S49: $^{1}H\{^{11}B\}$ NMR spectrum of **5b** in CD_2Cl_2 at 298 K.

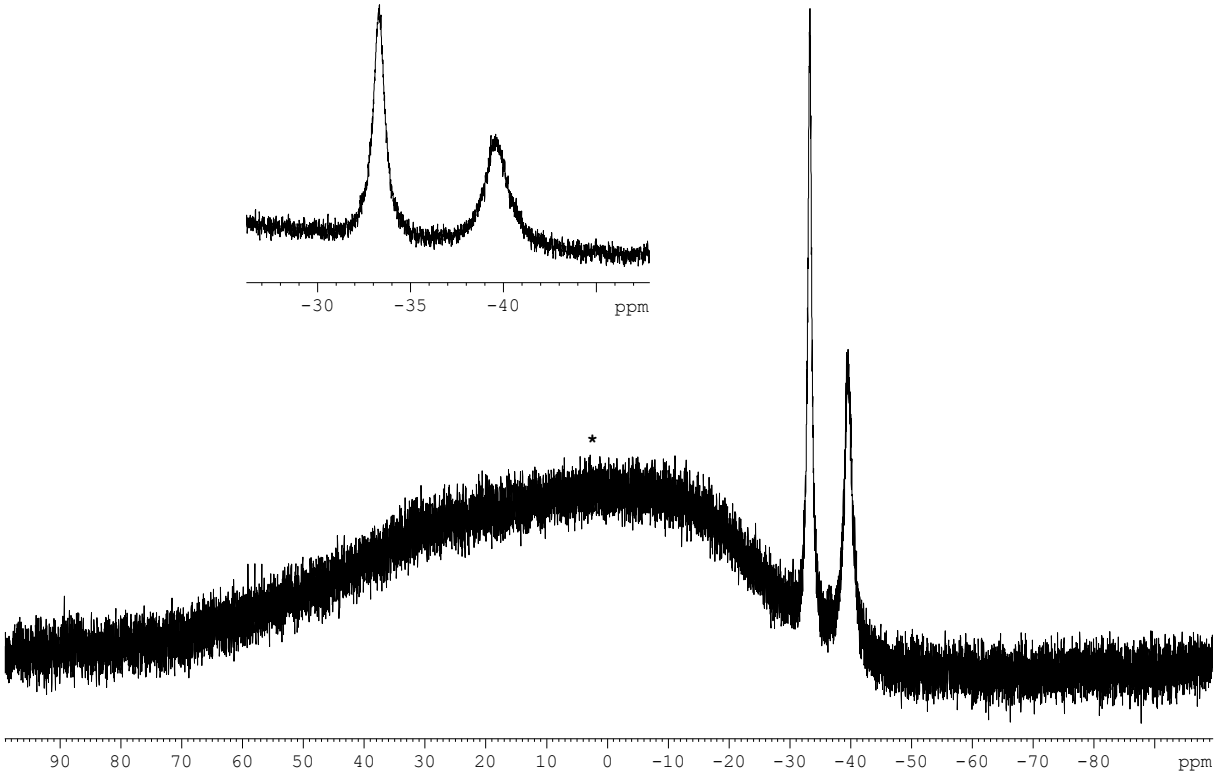


Figure S50: $^{11}B\{^{1}H\}$ NMR spectrum of **5b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

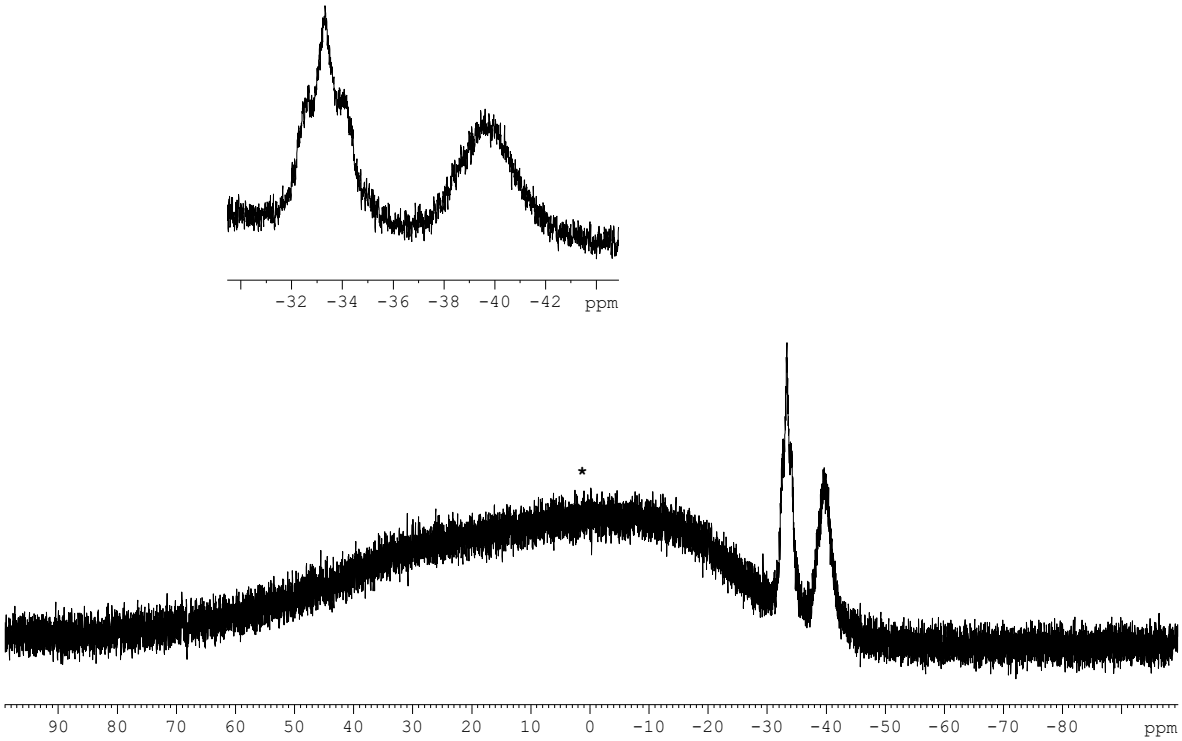


Figure S51: ^{11}B NMR spectrum of **5b** in CD_2Cl_2 at 298 K. * = signal from the NMR probe.

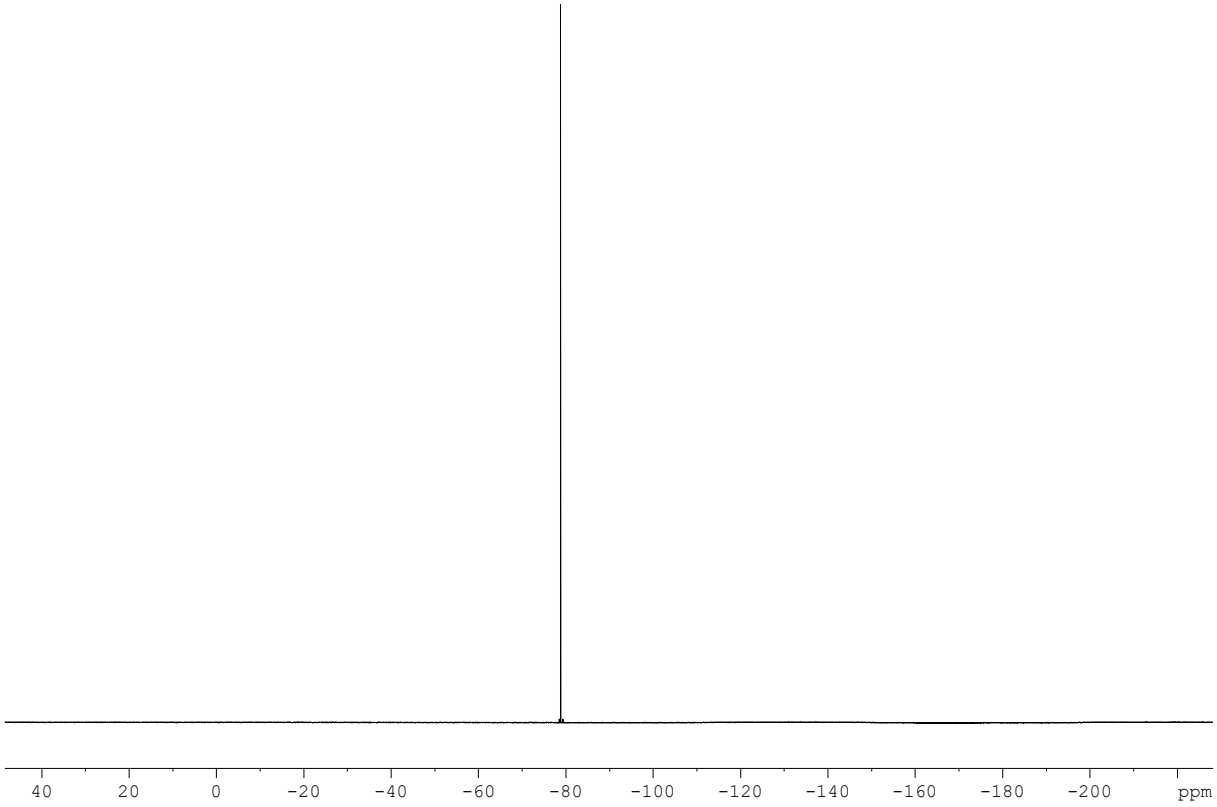


Figure S52: ^{19}F NMR spectrum of **5b** in CD_2Cl_2 at 298 K.

3 Crystallographic data

Single-crystal X-ray diffraction experiments were performed on a Bruker D8 diffractometer equipped with an APEX II CCD detector (**2a**, **2b**) and on a XtaLAB Synergy R DW system (Rigaku) equipped with a HyPix-Arc 150 detector (**5a, 5b**). Data were collected using Cu-K_α radiation (λ = 1.54178 Å) (**2b**, **5a**, **5b**) or Mo-K_α radiation (λ = 0.71073 Å) (**2a**), respectively. The crystals were kept in a cold nitrogen stream at a steady temperature of 193 K (**2a**), 173 K (**2b**), 100 K (**5a**, **5b**) during the measurement. Data reduction was performed using Bruker SAINT[9] or CrysAlisPro (Rigaku),[10] respectively. An absorption correction based on a gaussian integration over a multifaceted crystal was applied. Using Olex2[11] as the graphical interface, the structures were solved with ShelXT[12] using dual methods. The models were refined with ShelXL[13] using full matrix least squares minimisation on F^2.

Crystallographic data and details of the experiments are given in Tables S1 and S2.

CIF files with comprehensive information on the details of the diffraction experiments and full tables of bond lengths and angles are deposited in Cambridge Crystallographic Data Centre under the deposition codes CCDC 2219857-2219860. These data can be obtained free of charge at www.ccdc.cam.ac.uk/conts/retrieving.html (or from the Cambridge Crystallographic Data Centre, 12 Union Road, Cambridge CB2 1EZ, UK; Fax: + 44-1223-336-033; e-mail: deposit@ccdc.cam.ac.uk).

Table S1: Crystallographic data for compounds **2a** and **2b**.

Compound	**2a**	**2b**
Internal naming	riv1959	riv1963
CCDC number	2219857	2219858
Formula	$C_{43}H_{61}B_2N_3O_3F_3SGeP$	$C_{43}H_{61}B_2N_3O_3F_3SGeAs$
Dcalc	1.231	1.285
μ/mm^{-1}	0.771	2.453
Formula Weight	882.18	926.13
Color	colorless	colorless
Shape	rod-shaped	block-shaped
Size/mm^3	0.75×0.17×0.15	0.39×0.08×0.06
T/K	193.15	173.15
Crystal System	monoclinic	monoclinic
Space Group	$P2_1/c$	$P2_1/c$
a/Å	9.9956(10)	10.0247(4)
b/Å	14.6178(15)	14.6574(6)
c/Å	32.816(3)	32.8291(14)
α/°	90	90
β/°	96.941(2)	97.0402(17)
γ/°	90	90
V/Å^3	4759.8(8)	4784.4(3)
Z	4	4
Z'	1	1
Wavelength/Å	0.71073	1.54178
Radiation type	MoK_α	CuK_α
θ_{min}/°	1.527	2.712
θ_{max}/°	27.171	72.635
Measured Refl's.	128412	32668
Indep't Refl's	10494	9484
Refl's I≥2 σ(I)	7761	9005
R_{int}	0.0774	0.0334
Parameters	549	538
Restraints	0	0
Largest Peak	0.488	0.825
Deepest Hole	-0.365	-1.080
GooF	1.036	1.059
wR_2 (all data)	0.1216	0.1072
wR_2	0.1077	0.1054
R_1 (all data)	0.0661	0.0411
R_1	0.0438	0.0397

Table S2: Crystallographic data for compounds **5a** and **5b**.

Compound	**5a** · 1.65 CH_2Cl_2	**5b** · 0.8 CH_2Cl_2
Internal naming	MA295	MA376
CCDC number	2219859	2219860
Formula	$C_{111.65}H_{163.3}B_4F_6Ge_2N_8O_6P_2S_2Cl_{3.3}$	$C_{55.8}H_{81.6}AsB_2Cl_{1.6}F_3GeN_4O_3S$
Dcalc	1.187	1.228
μ/mm^{-1}	2.251	2.569
Formula Weight	2259.06	1171.36
Color	clear colorless	clear colorless
Shape	plate-shaped	block-shaped
Size/mm^3	0.17×0.08×0.02	0.17×0.09×0.03
T/K	100.00(10)	100.00(10)
Crystal System	monoclinic	monoclinic
Space Group	$P2_1/c$	$P2_1/c$
a/Å	35.1849(3)	35.2609(2)
b/Å	10.44010(10)	10.43718(8)
c/Å	35.7996(3)	35.8116(3)
α/°	90	90
β/°	105.9250(10)	105.9603(7)
γ/°	90	90
V/Å^3	12645.7(2)	12671.53(16)
Z	4	8
Z'	1	2
Wavelength/Å	1.54184	1.54184
Radiation type	Cu K_α	Cu K_α
θ_{min}/°	2.567	2.539
θ_{max}/°	70.072	75.046
Measured Refl's.	122947	130860
Indep't Refl's	23845	25685
Refl's I≥2 σ(I)	17054	21418
R_{int}	0.0655	0.0497
Parameters	1680	1756
Restraints	972	1150
Largest Peak	0.905	0.744
Deepest Hole	-1.283	-0.939
GooF	1.038	1.067
wR_2 (all data)	0.2096	0.1992
wR_2	0.1957	0.1925
R_1 (all data)	0.1081	0.0857
R_1	0.0762	0.0734

3.1 Crystal Structures

[IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3][OTf] (2a)

2a was crystallized from a THF solution layered with three times the amount of *n*-hexane at room temperature as clear colorless rods in the monoclinic space group $P2_1/c$. The structure of **2a** in the solid state is shown in Figure S53. The asymmetric unit contains one molecule of the cation [IDipp·$GeH_2BH_2PPh_2BH_2$·NMe_3]$^+$ and a [OTf]$^-$ anion. The hydrogen atom positions located on the Ge and B atoms were located from the difference Fourier map and refined freely.

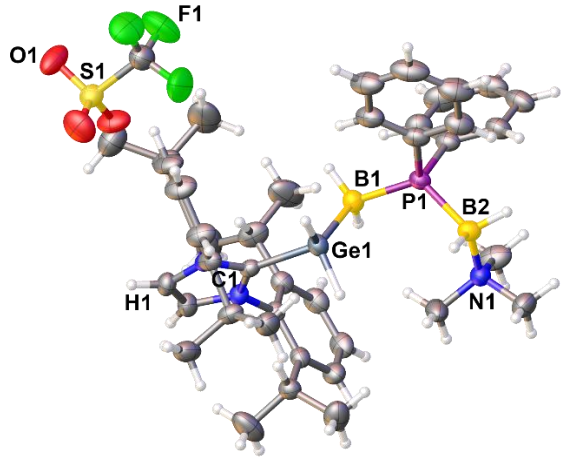


Figure S53: Molecular structure of **2a** in the solid state. Anisotropic displacement parameters are set to 50% probability level. Selected bond lengths [Å] and angles [°]: C1-Ge1 2.009(2), Ge1-B1 2.051(3), B1-P1 1.937(3), P1-B2 1.969(3), B2-N1 1.609(3); C1-Ge1-B1 111.86(10), Ge1-B1-P1 112.17(14), P1-B2-N1 116.50(18).

[IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3][OTf] (2b)

2b was crystallized from a THF solution layered with three times the amount of *n*-hexane at room temperature as clear colorless blocks in the monoclinic space group $P2_1/c$. The structure of **2b** in the solid state is shown in Figure S54. The asymmetric unit contains one molecule of the cation [IDipp·$GeH_2BH_2AsPh_2BH_2$·NMe_3]$^+$ and a [OTf]$^-$ anion. The hydrogen atom positions located on the Ge and B atoms were located from the difference Fourier map and refined freely.

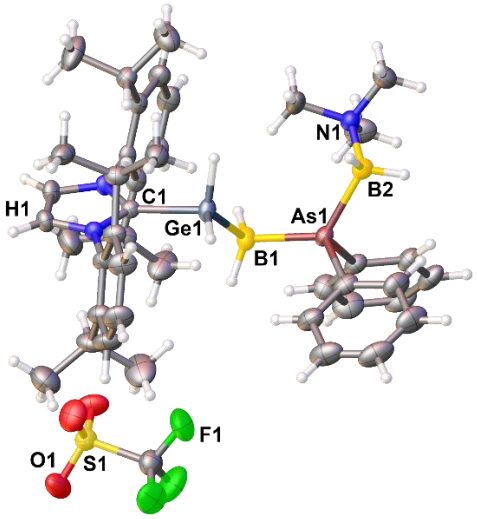


Figure S54: Molecular structure of **2b** in the solid state. Anisotropic displacement parameters are set to 50% probability level. Selected bond lengths [Å] and angles [°]: C1-Ge1 2.0075(18), Ge1-B1 2.054(2), B1-As1 2.047(2), As1-B2 2.072(2), B2-N1 1.599(3); C1-Ge1-B1 112.01(8), Ge1-B1-As1 111.19(10), As1-B2-N1 114.43(13).

[IDipp·$GeH_2BH_2PH_2BH_2$·IDipp][OTf] (5a) • 1.65 CH_2Cl_2

5a was crystallized from a CH_2Cl_2 solution layered with three times the amount of *n*-hexane at room temperature as clear colorless plates in the monoclinic space group $P2_1/c$. The structure of **5a** in the solid state is shown in Figure S55. The asymmetric unit contains two molecules of the cation [IDipp·$GeH_2BH_2PH_2BH_2$·IDipp]$^+$, two molecules of the anion [OTf]$^-$ and 1.65 CH_2Cl_2 solvent molecules. The $GeH_2BH_2PH_2BH_2$ chains of both cations are heavily disordered (left molecule: disordered over three positions (occupancies: 0.66:0.28:0.06); right molecule: disordered over four positions (occupancies: 0.45:0.25:0.15:0.15)). Further are four *i*Pr-Groups, one [OTf]$^-$ anion and the CH_2Cl_2 solvent molecule disordered over two positions. Additionally, was one CH_2Cl_2 molecule heavily disordered. Therefore, a solvent mask was calculated, and 172 electrons were found in a volume of 984 Å^3 in 3 voids per unit cell. This is consistent with the presence of one CH_2Cl_2 per asymmetric unit, which accounts for 168 electrons per unit cell. The EADP constraint and the DFIX, DANG, ISOR, SADI and SIMU restraints were applied to model these disorders.

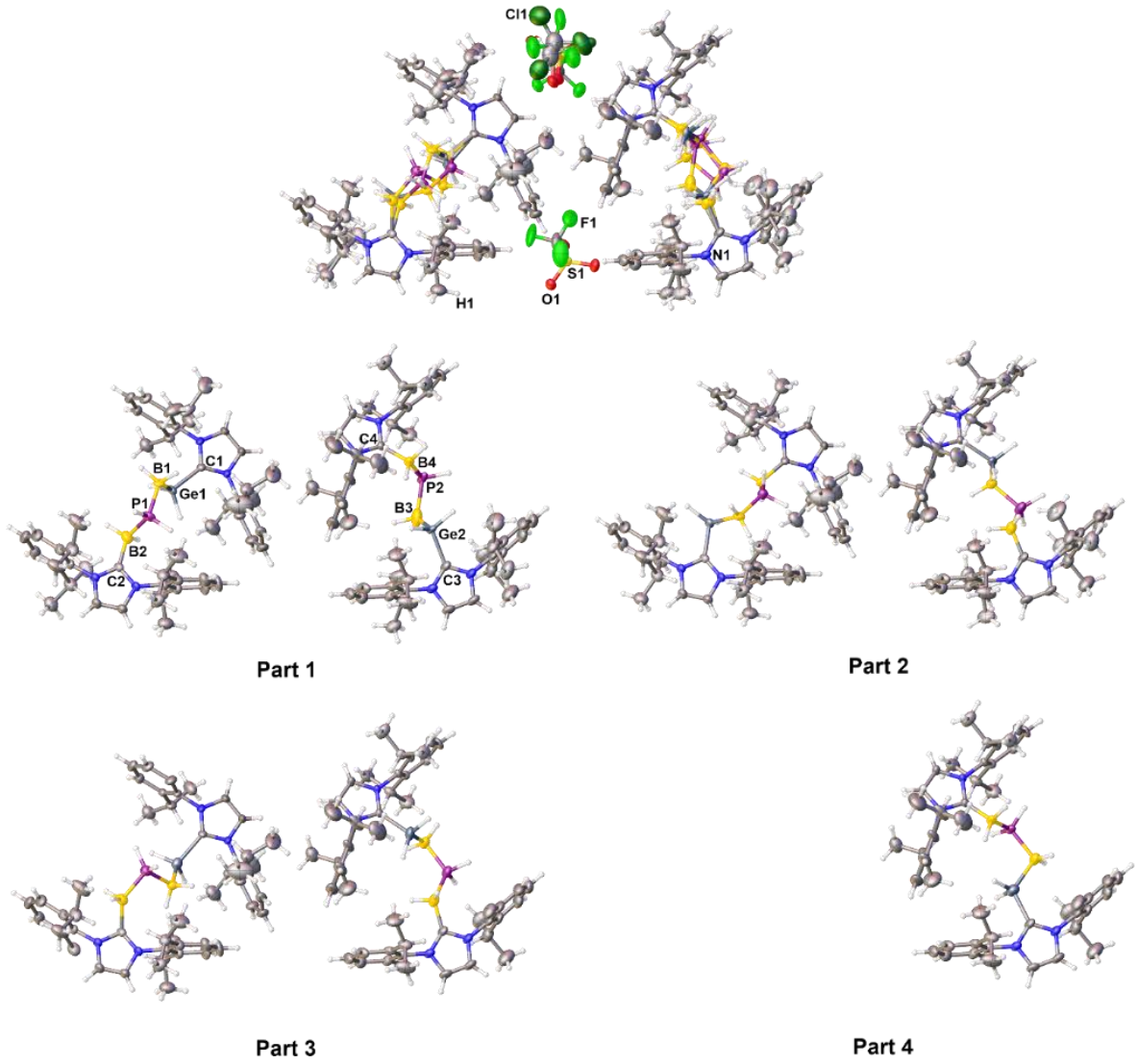


Figure S55: Molecular structure of **5a** in the solid state. Anisotropic displacement parameters are set to 50% probability level. Top: Combined disordered parts; middle left: part 1 of the cations (occupancy left molecule: 66%; occupancy right molecule: 45%) middle right: part 2 of the cations (occupancy left molecule: 28%; occupancy right molecule: 25%) bottom left: part 3 of the cations (occupancy left molecule: 6 %; occupancy right molecule: 15%) bottom right: part 4 of the cations (occupancy right molecule: 15%). Selected bond lengths [Å] and angles [°] for part 1, molecule A: C1-Ge1 1.955(3), Ge1-B1 2.014(7), B1-P1 1.934(6), P1-B2 1.922(13), B2-C2 1.665(11); C1-Ge1-B1 111.3(2), Ge1-B1-P1 105.7(3), B1-P1-B2 114.8(4), P1-B2-C2 116.1(8). Part 1, molecule B: C3-Ge2 1.998(5), Ge2-B3 1.942(12), B3-P2 2.028(8), P2-B4 1.957(18), B4-C4 1.656(14); C3-Ge2-B3 111.8(3), Ge2-B3-P2 103.4(6), B3-P2-B4 112.7(9), P2-B4-C4 111.0(11).

[IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp][OTf] (5b) • 0.8 CH_2Cl_2

5b was crystallized from a CH_2Cl_2 solution layered with three times the amount of *n*-hexane at room temperature as clear colorless blocks in the monoclinic space group $P2_1/c$. The structure of **5b** in the solid state is shown in Figure S56. The asymmetric unit contains two molecules of the cation [IDipp·$GeH_2BH_2AsH_2BH_2$·IDipp]$^+$, two molecules of the anion [OTf]$^-$ and 0.8 CH_2Cl_2 solvent molecules. The $GeH_2BH_2AsH_2BH_2$ chains of both cations are heavily disordered (left molecule: disordered over four positions (occupancies: 0.55:0.2:0.18:0.07); right molecule: disordered over three positions (occupancies: 0.55:0.37:0.08)). Further are five *i*Pr-Groups, one [OTf]$^-$ anion and two CH_2Cl_2 solvent molecule disordered over two or in case of the second CH_2Cl_2 molecule over three positions. The EADP constraint and the DFIX, DANG, ISOR, SADI and SIMU restraints were applied to model these disorders.

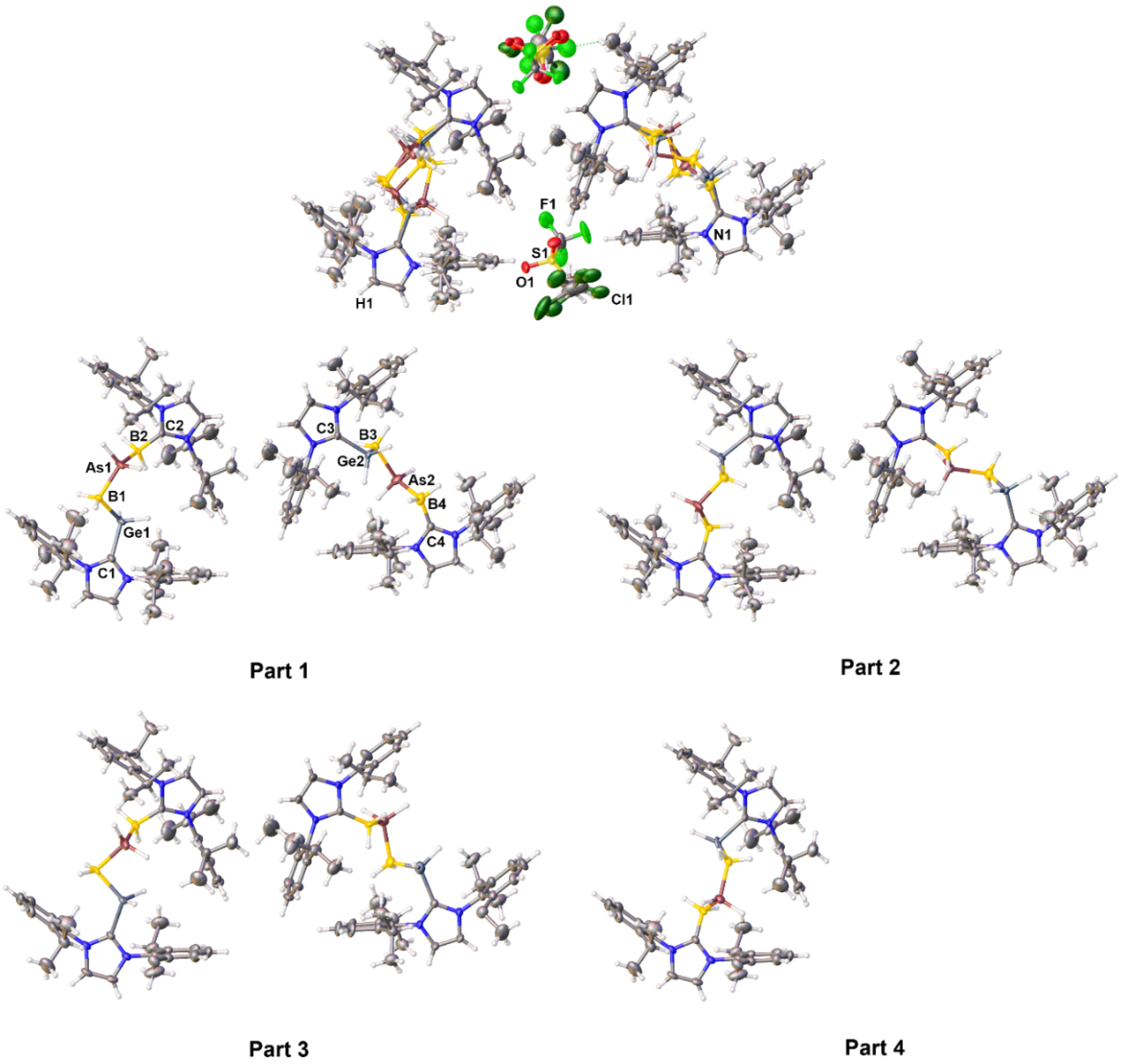


Figure S56: Molecular structure of **5b** in the solid state. Anisotropic displacement parameters are set to 50% probability level. Top: Combined disordered parts; middle left: part 1 of the cations (occupancy left molecule: 55%; occupancy right molecule: 55%) middle right: part 2 of the cations (occupancy left molecule: 20%; occupancy right molecule: 37%) bottom left: part 3 of the cations (occupancy left molecule: 18%; occupancy right molecule: 8%) bottom right: part 4 of the cations (occupancy left molecule: 7%). Selected bond lengths [Å] and angles [°] for part 1, molecule A: C1-Ge1 1.994(3), Ge1-B1 2.055(8), B1-As1 2.076(6), As1-B2 2.034(10), B2-C2 1.595(9); C1-Ge1-B1 112.1(2), Ge1-B1-As1 103.4(3), B1-As1-B2 119.0(4), As1-B2-C2 112.2(7). Part 1, molecule B: C3-Ge2 1.932(3), Ge2-B3 1.995(15), B3-As2 2.007(10), As2-B4 2.01(1), B4-C4 1.594(13); C3-Ge2-B3 113.3(3), Ge2-B3-As2 107.3(5), B3-As2-B4 114.5(6), As2-B4-C4 120.9(8).

4 Computational details

The geometries of the compounds have been fully optimized with gradient-corrected density functional theory (DFT) in form of Becke's three-parameter hybrid method B3LYP[14] with def2-TZVP all electron basis set.[15] Gaussian 09 program package[16] was used throughout. All structures correspond to minima on their respective potential energy surfaces as verified by computation of second derivatives. Basis sets were obtained from the EMSL basis set exchange database.[17] Computed thermodynamic characteristics are summarized in Table S3.

Table S3. Reaction energies $\Delta E°_0$, standard reaction enthalpies $\Delta H°_{298}$, Gibbs energies $\Delta G°_{298}$ (kJ mol^{-1}) and standard reaction entropies $\Delta S°_{298}$ (J mol^{-1} K^{-1}) for the processes in the gas phase. B3LYP/def2-TZVP level of theory.

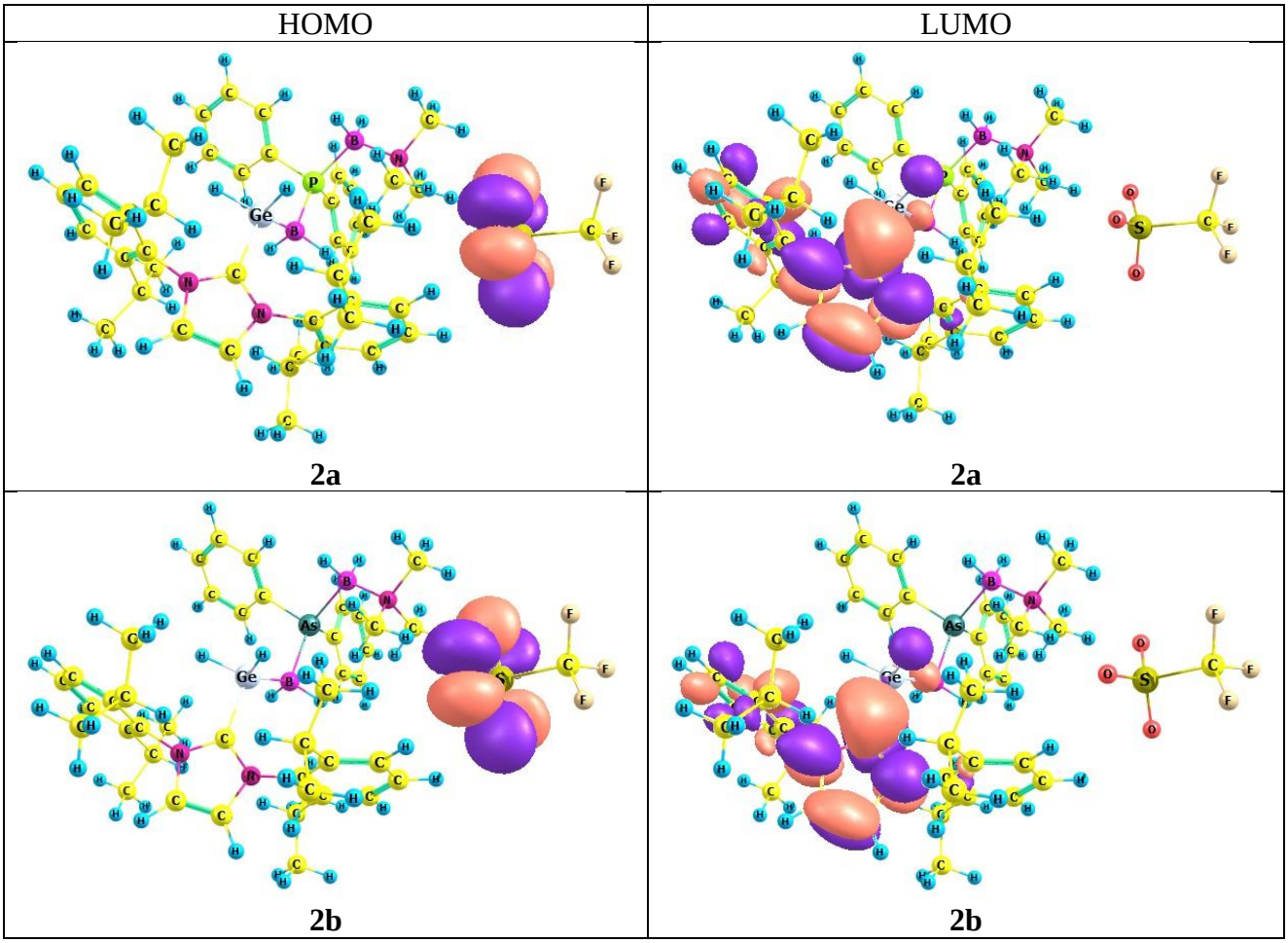
Process	$\Delta E°_0$	$\Delta H°_{298}$	$\Delta S°_{298}$	$\Delta G°_{298}$
IDipp·GeH_2BH_2OTf + $PPh_2BH_2·NMe_3$ = IDipp·$GeH_2BH_2PPh_2BH_2·NMe_3^+$…$OTf^-$	-77.9	-69.0	-183.6	-14.3
IDipp·GeH_2BH_2OTf + $PH_2BH_2·NMe_3$ = IDipp·$GeH_2BH_2PH_2BH_2·NMe_3^+$…$OTf^-$	-67.5	-58.1	-173.9	-6.2
IDipp·GeH_2BH_2OTf + PH_2BH_2·IDipp = IDipp·$GeH_2BH_2PH_2BH_2I·Dipp^+$…$OTf^-$	-122.8	-113.8	-151.0	-68.7
IDipp·GeH_2BH_2OTf + $AsPh_2BH_2·NMe_3$ = IDipp·$GeH_2BH_2AsPh_2BH_2·NMe_3^+$…$OTf^-$	-51.3	-43.8	-168.9	6.6
IDipp·GeH_2BH_2OTf + $AsH_2BH_2·NMe_3$ = IDipp·$GeH_2BH_2AsH_2BH_2·NMe_3^+$…$OTf^-$	-39.9	-31.8	-168.5	18.4
IDipp·GeH_2BH_2OTf + AsH_2BH_2·IDipp = IDipp·$GeH_2BH_2AsH_2BH_2·IDipp^+$…$OTf^-$	-88.1	-80.0	-146.7	-36.3
IDipp·$GeH_2BH_2PH_2BH_2·NMe_3^+$…$OTf^-$ + IDipp = IDipp·$GeH_2BH_2PH_2BH_2·IDipp^+$…$OTf^-$ + NMe_3	-79.4	-82.0	-33.7	-72.0
IDipp·$GeH_2BH_2AsH_2BH_2·NMe_3^+$…$OTf^-$ + IDipp = IDipp·$GeH_2BH_2AsH_2BH_2·IDipp^+$…$OTf^-$ + NMe_3	-75.8	-78.2	-35.4	-67.6

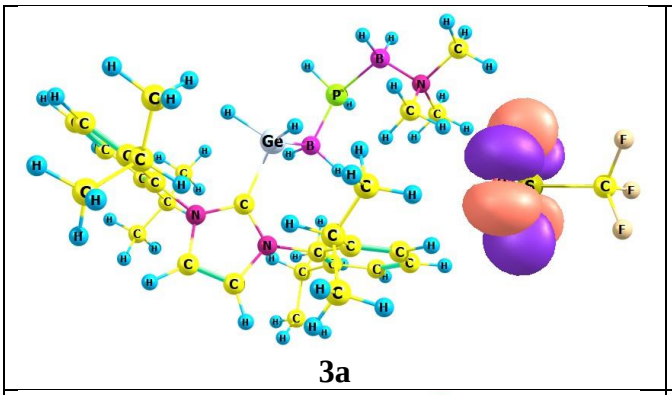
Table S4. Total energies E^o_0, sum of electronic and thermal enthalpies H^o_{298} (Hartree) and standard entropies S^o_{298} (cal $mol^{-1}K^{-1}$). B3LYP/def2-TZVP level of theory.

Compound	E^o_0	H^o_{298}	S^o_{298}
NMe_3	-174.5440634	-174.417903	68.894
IDipp	-1160.453853	-1159.85478	201.948
IDipp·GeH_2BH_2OTf (**1**)	-4226.5937589	-4225.911610	264.687
PH_2BH_2·IDipp	-1529.126212	-1528.480323	209.039
$PH_2BH_2·NMe_3$	-543.2072814	-543.033406	89.525
$PPh_2BH_2·NMe_3$	-1005.475369	-1005.126986	141.765
AsH_2BH_2·IDipp	-3423.662289	-3423.018066	212.05

$AsH_2BH_2{\cdot}NMe_3$	-2437.741976	-2437.569768	92.673
$AsPh_2BH_2{\cdot}NMe_3$	-2900.007591	-2899.660075	145.212
IDipp·GeH_2BH_2 $PPh_2BH_2{\cdot}NMe_3^+$…OTf^- (**2a**)	-5232.098816	-5231.064877	362.579
IDipp·GeH_2BH_2 $PH_2BH_2{\cdot}NMe_3^+$…OTf^- (**3a**)	-4769.826734	-4768.967143	312.646
IDipp·GeH_2BH_2 $PH_2BH_2{\cdot}IDipp^+$…OTf^- (**5a**)	-5755.766748	-5754.435266	437.634
IDipp·GeH_2BH_2 $AsPh_2BH_2{\cdot}NMe_3^+$…OTf^- (**2b**)	-7126.620875	-7125.588353	369.521
IDipp·GeH_2BH_2 $AsH_2BH_2{\cdot}NMe_3^+$…OTf^- (**3b**)	-6664.350945	-6663.493495	317.091
IDipp·GeH_2BH_2 $AsH_2BH_2{\cdot}IDipp^+$…OTf^- (**5b**)	-7650.289599	-7648.960151	441.675

Figure S57. HOMO and LUMO of computationally studied ion pairs.





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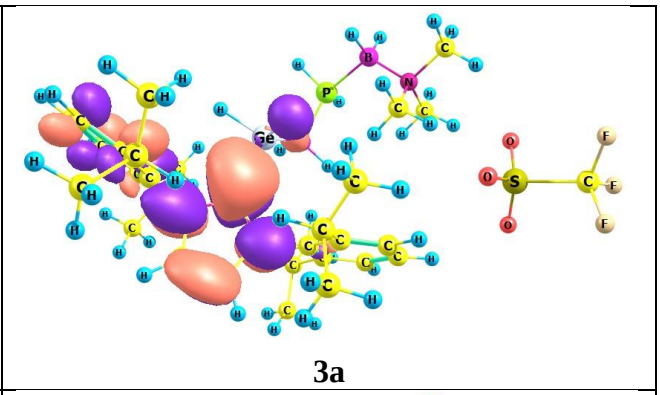

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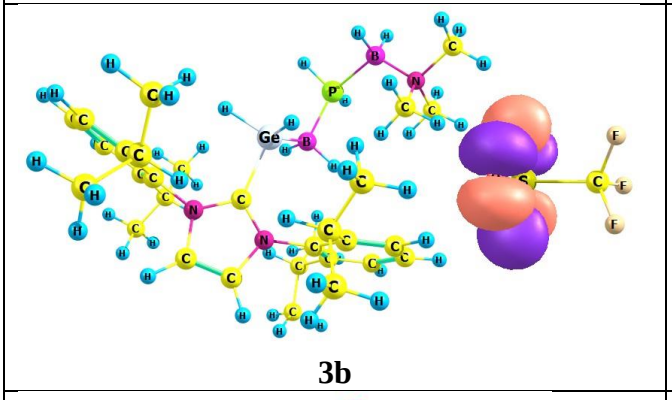

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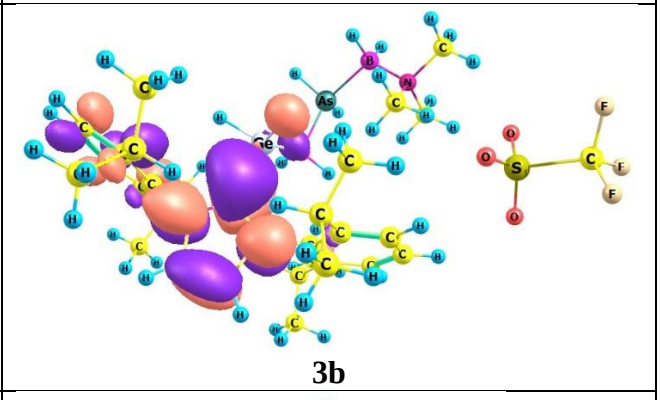

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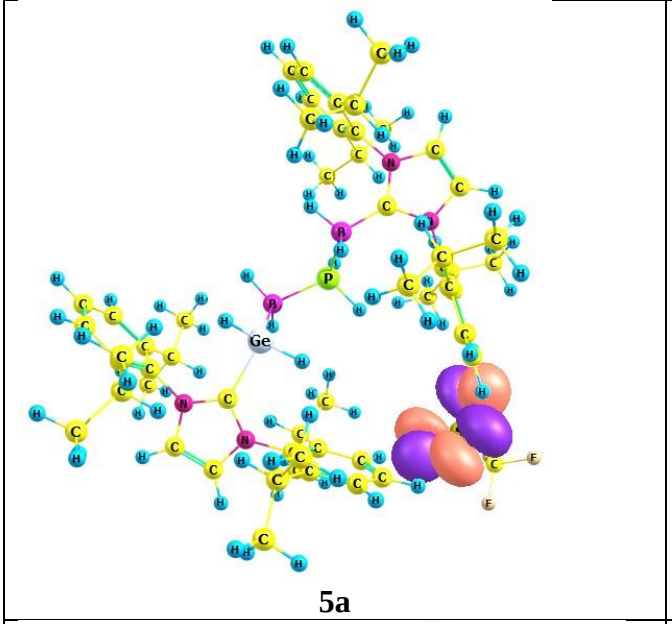

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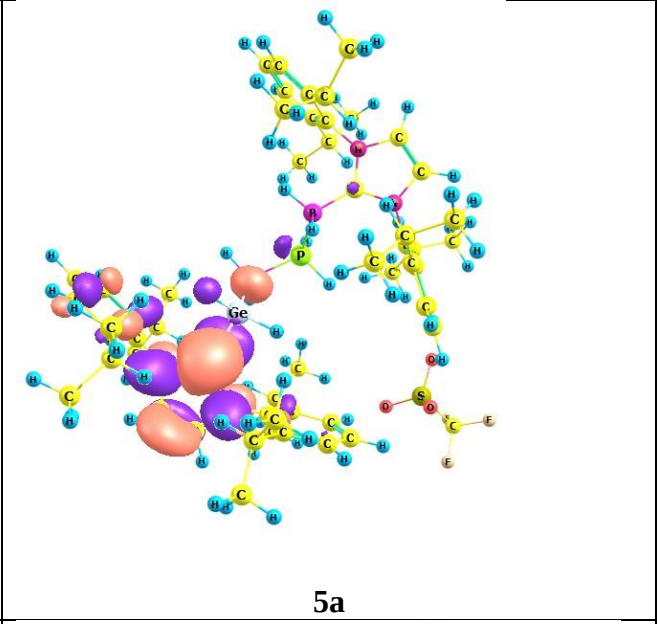

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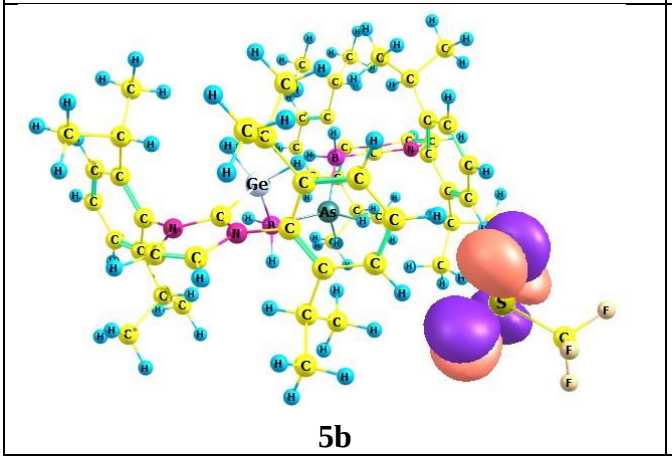

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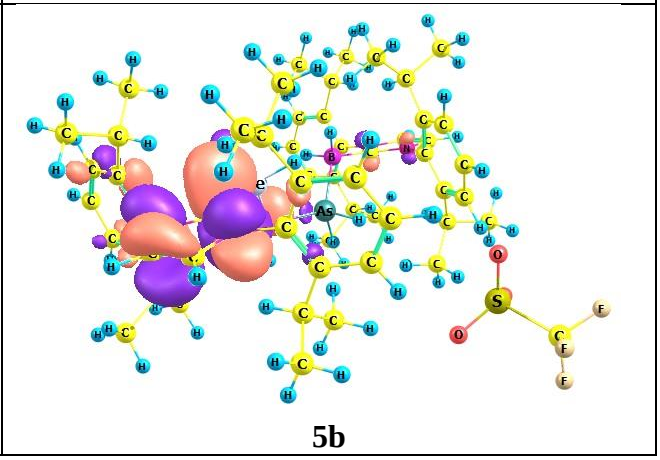

5b

Table S5. Optimized geometries of theoretically studied compounds. xyz coordinates in angstroms. B3LYP/def2-TZVP level of theory.

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6	0.000000000	1.388115000	-0.059243000
6	-1.202143000	-0.694058000	-0.059243000
6	1.202143000	-0.694058000	-0.059243000
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1	-1.199333000	-1.712780000	0.332167000
1	-1.302051000	-0.751740000	-1.158793000
1	-0.883645000	1.895043000	0.332167000
1	0.000000000	1.503479000	-1.158793000
1	0.883645000	1.895043000	0.332167000
1	2.082978000	-0.182263000	0.332167000
1	1.302051000	-0.751740000	-1.158793000
1	1.199333000	-1.712780000	0.332167000

IDipp

6	0.674960000	-0.000061000	1.853488000
6	-0.674915000	0.000151000	1.853504000
7	-1.062430000	0.000181000	0.517812000
6	-0.000003000	-0.000008000	-0.342280000
7	1.062444000	-0.000158000	0.517787000
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1	-1.379279000	0.000280000	2.666601000
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6	-4.416091000	-1.199400000	-0.527282000
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6	-2.167978000	-3.266026000	-1.273622000
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1	-1.600472000	-2.632523000	-1.955991000
1	-1.616794000	-4.198969000	-1.134232000
1	-3.244707000	-2.989116000	2.037209000
1	-2.553925000	-4.397197000	1.223016000
1	-4.109161000	-3.753816000	0.703698000
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1	1.394759000	2.364048000	0.492731000
6	3.118270000	3.475011000	1.067620000
6	2.167970000	3.265989000	-1.273791000
1	3.121097000	3.509298000	-1.749094000
1	1.600454000	2.632467000	-1.956135000
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1	1.598586000	-2.631124000	-1.957827000
1	1.614307000	-4.198275000	-1.137397000
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1	-6.110357000	0.000889000	-1.060192000
1	6.110332000	-0.000936000	-1.060341000

$PPh_2BH_2{\cdot}NMe_3$

15	0.055497000	-0.324539000	-0.666833000
6	0.252058000	1.463699000	-0.230465000
5	1.068851000	-1.347537000	0.700622000
6	-1.691728000	-0.686893000	-0.213038000
1	0.534056000	-2.413099000	0.865947000
1	1.255613000	-0.750838000	1.730309000
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6	2.523798000	-2.594925000	-1.055975000
6	3.300286000	-2.442216000	1.229564000
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1	2.730598000	-3.329842000	1.492660000
1	3.367911000	-1.795661000	2.100446000
1	4.301039000	-2.726052000	0.896102000
1	1.999683000	-3.510320000	-0.792051000
1	3.532998000	-2.831401000	-1.399328000
1	1.971265000	-2.080841000	-1.838616000
1	3.356559000	0.170758000	0.677365000
1	2.853824000	0.025670000	-1.014925000
1	4.369760000	-0.738864000	-0.477085000
6	0.600105000	4.205790000	0.288009000
6	0.285705000	1.949816000	1.081858000
6	0.395196000	2.383942000	-1.273766000
6	0.568246000	3.741990000	-1.020988000
6	0.456042000	3.304848000	1.339304000
1	0.176449000	1.260119000	1.908335000
1	0.367458000	2.027238000	-2.296731000
1	0.676013000	4.434976000	-1.846647000
1	0.476103000	3.659518000	2.362981000
1	0.734448000	5.261414000	0.489850000
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$AsPh_2BH_2{\cdot}NMe_3$

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6	-1.822871000	-0.623770000	-0.180355000
1	0.480670000	-2.506245000	0.820529000
1	1.096847000	-0.846952000	1.778936000
7	2.579832000	-1.768995000	0.300646000
6	2.633971000	-2.608536000	-0.927000000
6	3.204073000	-2.523359000	1.421659000
6	3.354132000	-0.518522000	0.075801000
1	2.625063000	-3.425085000	1.603380000
1	3.185235000	-1.905473000	2.315369000
1	4.234208000	-2.784960000	1.169210000
1	2.087143000	-3.530237000	-0.743968000
1	3.671847000	-2.836137000	-1.178109000
1	2.161458000	-2.072105000	-1.746051000
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1	2.937223000	0.014264000	-0.775061000
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6	0.283065000	1.972310000	1.129271000
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6	0.508862000	3.303588000	1.461747000
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1	0.601276000	2.196570000	-2.230895000
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1	0.475090000	3.612037000	2.500071000
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$PH_2BH_2{\cdot}NMe_3$

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1	-0.761529000	1.488601000	-1.483538000
1	0.029446000	1.905829000	0.048498000

$AsH_2BH_2{\cdot}NMe_3$

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1	2.074287000	0.687246000	-1.271125000
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1	-0.198595000	-1.952371000	0.033917000
1	-0.242631000	-0.968681000	-1.725955000
6	-1.441235000	0.071477000	1.476782000
6	-2.639699000	-0.701558000	-0.475918000
6	-1.379358000	1.360772000	-0.578401000
1	-2.318017000	0.635865000	1.800851000
1	-0.535218000	0.559612000	1.826869000
1	-1.479356000	-0.936904000	1.881365000
1	-3.526043000	-0.160254000	-0.136851000
1	-2.646811000	-1.713036000	-0.078130000
1	-2.624961000	-0.749966000	-1.561428000
1	-2.280556000	1.907107000	-0.292239000
1	-1.316985000	1.288115000	-1.661489000
1	-0.502995000	1.885370000	-0.204748000

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15	-1.350031000	-0.227991000	3.146333000
5	0.112378000	0.072902000	1.850412000
1	-2.417553000	0.558464000	2.638557000
1	-1.925684000	-1.443442000	2.683862000
1	0.573380000	1.167790000	2.100783000
6	-0.034177000	-0.004290000	0.247574000
1	0.967424000	-0.737342000	2.133130000
7	1.061465000	-0.092610000	-0.560900000
6	0.687296000	-0.177245000	-1.890955000
6	-0.658212000	-0.132799000	-1.921546000
7	-1.094673000	-0.014247000	-0.610160000
6	2.450816000	-0.033056000	-0.152510000
1	1.410648000	-0.252472000	-2.681884000
1	-1.345707000	-0.154004000	-2.745897000
6	-2.508050000	0.052408000	-0.283166000
6	5.138783000	0.092152000	0.483844000
6	3.148190000	-1.228368000	0.081938000
6	3.070381000	1.224570000	-0.070619000
6	4.426498000	1.256839000	0.252039000
6	4.502528000	-1.134910000	0.399273000
6	2.497049000	-2.598526000	-0.006414000
6	2.339537000	2.531154000	-0.338757000
1	4.931476000	2.211147000	0.323569000
1	5.065811000	-2.039548000	0.587234000
1	6.191246000	0.141150000	0.734114000
6	-5.207925000	0.163558000	0.359139000
6	-3.233866000	-1.148286000	-0.169613000
6	-3.128653000	1.313361000	-0.152647000
6	-4.484722000	1.328307000	0.178006000
6	-4.585553000	-1.054397000	0.171576000
6	-2.752524000	-2.575993000	-0.454220000
6	-2.490699000	2.695691000	-0.330557000
1	-4.977505000	2.284962000	0.298172000
1	-5.153891000	-1.968709000	0.290520000
1	-6.254658000	0.207075000	0.632375000
6	2.685993000	-3.413125000	1.281584000
6	3.001529000	-3.378695000	-1.231315000
1	1.427147000	-2.451027000	-0.129981000
1	2.320889000	-2.862756000	2.148618000
1	3.734806000	-3.664374000	1.452286000
1	2.130858000	-4.351257000	1.214599000
1	4.073452000	-3.576124000	-1.161218000
1	2.826196000	-2.829139000	-2.158422000
1	2.489277000	-4.340365000	-1.307266000
6	2.490136000	3.527838000	0.819428000
1	1.277117000	2.311306000	-0.427602000
6	2.792889000	3.158656000	-1.667337000
1	3.852489000	3.421714000	-1.638293000
1	2.227394000	4.070779000	-1.870160000
1	2.643821000	2.475812000	-2.506084000
1	3.523793000	3.859332000	0.936402000
1	2.164268000	3.085292000	1.760611000
1	1.881264000	4.414450000	0.630549000
6	-1.327723000	-2.975201000	-0.065226000
6	-3.033688000	-2.953160000	-1.921468000
1	-3.412211000	-3.200358000	0.154028000
6	-1.678049000	3.156724000	0.887293000
1	-3.352008000	3.366516000	-0.385177000
6	-1.726172000	2.924068000	-1.641618000
1	-1.063858000	-2.632375000	0.933466000
1	-0.591789000	-2.599970000	-0.774552000
1	-1.253547000	-4.064957000	-0.077413000
1	-2.396171000	-2.389700000	-2.605607000
1	-4.072445000	-2.760238000	-2.192997000
1	-2.831484000	-4.014704000	-2.081860000
1	-1.559989000	3.995268000	-1.775312000
1	-2.294090000	2.568470000	-2.504017000
1	-0.750890000	2.442143000	-1.655607000
1	-1.369915000	4.196268000	0.750110000
1	-0.785257000	2.555462000	1.044774000
1	-2.272749000	3.099181000	1.799586000

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33	-1.456016000	-0.379660000	2.927586000
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1	-2.600161000	0.440468000	2.332679000
1	-2.000896000	-1.673303000	2.316077000
1	0.510046000	1.157103000	1.945981000
6	0.067989000	0.023589000	0.018965000
1	1.000661000	-0.730518000	1.933808000
7	1.206240000	-0.050742000	-0.730967000
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6	-0.434903000	-0.009911000	-2.184846000
7	-0.942986000	0.062825000	-0.896585000
6	2.571800000	-0.022152000	-0.245959000
1	1.671415000	-0.131287000	-2.833975000
1	-1.075693000	0.010418000	-3.045964000
6	-2.372502000	0.127345000	-0.648580000
6	5.222784000	0.048972000	0.536799000
6	3.244823000	-1.233159000	-0.021293000
6	3.197227000	1.224523000	-0.082579000
6	4.534396000	1.229441000	0.312747000
6	4.580921000	-1.166899000	0.371214000
6	2.586207000	-2.591428000	-0.195270000
6	2.493666000	2.548453000	-0.338356000
1	5.043431000	2.174732000	0.447564000
1	5.125043000	-2.084274000	0.553953000
1	6.260760000	0.076781000	0.844265000
6	-5.103754000	0.230834000	-0.156870000
6	-3.109547000	-1.071874000	-0.629275000
6	-2.993556000	1.386164000	-0.501466000
6	-4.366114000	1.396923000	-0.248113000
6	-4.477813000	-0.982446000	-0.360992000
6	-2.622750000	-2.489814000	-0.952097000
6	-2.341685000	2.770773000	-0.586944000
1	-4.860474000	2.351237000	-0.116374000
1	-5.056450000	-1.896764000	-0.313312000
1	-6.163971000	0.270313000	0.058962000
6	2.690157000	-3.450652000	1.073362000
6	3.154414000	-3.336225000	-1.414198000
1	1.527076000	-2.427189000	-0.376829000
1	2.279218000	-2.925381000	1.935464000
1	3.724621000	-3.718869000	1.297499000
1	2.131299000	-4.379672000	0.941922000
1	4.218093000	-3.549572000	-1.287879000
1	3.040297000	-2.753458000	-2.330523000
1	2.637290000	-4.288153000	-1.553242000
6	2.588735000	3.497166000	0.865124000
1	1.435877000	2.344018000	-0.494001000
6	3.025167000	3.222442000	-1.614098000
1	4.083928000	3.472082000	-1.516769000
1	2.480035000	4.148115000	-1.811111000
1	2.916122000	2.574622000	-2.486105000
1	3.617233000	3.812349000	1.051879000
1	2.207343000	3.021568000	1.768565000
1	1.999059000	4.397131000	0.678608000
6	-1.219779000	-2.917875000	-0.517650000
6	-2.838853000	-2.800711000	-2.445832000
1	-3.312958000	-3.134425000	-0.401654000
6	-1.610936000	3.182473000	0.698416000
1	-3.195969000	3.447107000	-0.674236000
6	-1.490285000	3.043698000	-1.834231000
1	-1.002941000	-2.624700000	0.507754000
1	-0.449380000	-2.516251000	-1.174053000
1	-1.151915000	-4.006496000	-0.577695000
1	-2.166903000	-2.213392000	-3.074891000
1	-3.862654000	-2.587438000	-2.756067000
1	-2.636135000	-3.855937000	-2.643052000
1	-1.313306000	4.118338000	-1.916718000
1	-1.999150000	2.722629000	-2.745625000
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1	-1.297702000	4.226913000	0.624102000
1	-0.728592000	2.574998000	0.887277000
1	-2.262975000	3.086315000	1.567266000

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32	0.383125000	-0.303497000	-0.865870000
1	0.613011000	1.026251000	-1.620510000
1	-0.304536000	-1.241328000	-1.887035000
16	4.031879000	-0.234705000	-0.964603000
9	6.110626000	-1.674070000	-1.680756000
9	4.577327000	-2.823802000	-0.665242000
9	5.867243000	-1.500174000	0.469515000
8	3.167892000	-0.293934000	0.294043000
8	4.849261000	0.938134000	-0.928470000
8	3.288082000	-0.571877000	-2.146871000
7	-2.321823000	-0.524380000	0.571202000
7	-1.544502000	1.481590000	0.708059000
6	-1.288736000	0.260183000	0.181309000
6	-3.221390000	0.205275000	1.328073000
1	-4.115698000	-0.235578000	1.727948000
6	-2.733828000	1.461555000	1.414116000
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6	-2.524274000	-1.918769000	0.231315000
6	-3.212013000	-2.221803000	-0.954954000
6	-3.431952000	-3.568592000	-1.238542000
1	-3.954198000	-3.842298000	-2.145540000
6	-2.991140000	-4.563285000	-0.380938000
1	-3.169191000	-5.603300000	-0.623927000
6	-2.321607000	-4.232221000	0.785587000
1	-1.983110000	-5.019984000	1.444258000
6	-2.071712000	-2.902695000	1.125100000
6	-3.744975000	-1.156504000	-1.902715000
1	-3.326671000	-0.195172000	-1.603803000
6	-5.275288000	-1.043886000	-1.795331000
1	-5.644931000	-0.247512000	-2.444717000
1	-5.759382000	-1.974607000	-2.098228000
1	-5.592716000	-0.822050000	-0.774694000
6	-3.315490000	-1.395402000	-3.357349000
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1	-2.231932000	-1.477701000	-3.441980000
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6	-1.379377000	-2.572262000	2.440158000
1	-1.021188000	-1.543692000	2.385794000
6	-2.373096000	-2.660027000	3.612366000

1	-1.881508000	-2.382672000	4.547028000
1	-3.229531000	-1.997688000	3.473572000
1	-2.755110000	-3.677300000	3.722620000
6	-0.152432000	-3.453877000	2.708016000
1	0.363434000	-3.101750000	3.602906000
1	-0.430697000	-4.495167000	2.881692000
1	0.555468000	-3.415357000	1.881409000
6	-0.749982000	2.682457000	0.535171000
6	-1.037553000	3.515719000	-0.557523000
6	-0.288875000	4.684589000	-0.682901000
1	-0.476869000	5.349605000	-1.515363000
6	0.697284000	5.005939000	0.235185000
1	1.273009000	5.914701000	0.113307000
6	0.954234000	4.165229000	1.305647000
1	1.731003000	4.427207000	2.010346000
6	0.237130000	2.982981000	1.487289000
6	-2.126718000	3.209162000	-1.575784000
1	-2.498839000	2.202277000	-1.384644000
6	-3.315523000	4.172074000	-1.419190000
1	-3.732619000	4.136325000	-0.410933000
1	-3.015480000	5.203081000	-1.616987000
1	-4.109671000	3.914311000	-2.123129000
6	-1.596782000	3.222433000	-3.017212000
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1	-0.756341000	2.538711000	-3.136757000
6	0.511312000	2.106691000	2.701460000
1	0.104801000	1.114688000	2.501813000
6	-0.204736000	2.664548000	3.944685000
1	-0.034674000	2.012450000	4.803879000
1	0.172886000	3.657868000	4.197022000
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6	2.008877000	1.921945000	2.980599000
1	2.144218000	1.189649000	3.778328000
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1	2.477414000	2.851229000	3.310570000
5	1.854989000	-1.080134000	0.459153000
1	1.490964000	-0.882769000	1.587096000
1	1.985659000	-2.241179000	0.185343000

2a

32	1.472290000	-0.022787000	-0.628244000
1	2.814603000	0.298852000	-1.323320000
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15	0.084304000	3.016166000	-0.416084000
7	-2.630637000	2.127915000	-1.553138000
7	3.273875000	-2.286225000	0.348232000
7	1.299787000	-2.479635000	1.197226000
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1	-1.785041000	0.460192000	-0.563682000
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1	-2.698417000	2.390036000	0.547177000
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6	-3.561059000	2.347671000	-2.707448000
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1	-4.476689000	1.784066000	-2.532367000
6	2.054857000	-1.694968000	0.395053000
6	3.275721000	-3.435549000	1.115411000
1	4.150743000	-4.051979000	1.209531000
6	2.037633000	-3.556022000	1.643476000
1	1.613591000	-4.302295000	2.289373000
6	-0.445580000	4.294627000	0.796062000
6	-0.651309000	3.980774000	2.139683000
1	-0.473865000	2.973703000	2.489841000
6	-1.090182000	4.952204000	3.034446000
1	-1.249956000	4.690450000	4.072938000
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1	-1.663097000	7.005700000	3.294566000
6	-1.115225000	6.574131000	1.260716000
1	-1.293902000	7.583822000	0.912558000
6	-0.684447000	5.604334000	0.366131000
1	-0.532319000	5.868653000	-0.672473000
6	1.576356000	3.773346000	-1.179011000
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1	0.935635000	3.600390000	-3.224664000
6	2.884578000	4.475422000	-3.090488000
1	2.981718000	4.582779000	-4.163663000
6	3.907506000	4.896768000	-2.252200000
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6	3.767911000	4.759267000	-0.874180000
1	4.558257000	5.090091000	-0.211802000
6	2.613773000	4.201626000	-0.342962000
1	2.514121000	4.105692000	0.730666000
6	4.438588000	-1.849054000	-0.393882000
6	5.354782000	-0.995728000	0.238453000
6	6.491487000	-0.634496000	-0.484077000
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6	6.704066000	-1.103931000	-1.770051000
1	7.593855000	-0.809233000	-2.312008000
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1	5.959448000	-2.307024000	-3.370413000
6	4.624879000	-2.343633000	-1.693791000
6	5.162027000	-0.468840000	1.652946000
1	4.187748000	-0.801074000	2.012473000
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1	4.936935000	1.410834000	2.708631000
1	4.396742000	1.480239000	1.028981000
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6	6.219015000	-1.042107000	2.610762000
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6	3.641163000	-3.284489000	-2.374682000
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1	2.401903000	-3.398044000	-4.148789000
1	3.989767000	-2.701746000	-4.455062000
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6	-1.094309000	-2.712026000	0.691028000
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1	1.689012000	-1.287521000	3.275006000
6	0.569825000	0.166066000	4.344204000
1	1.409163000	0.401260000	5.002530000
1	-0.343353000	0.272068000	4.931976000
1	0.548934000	0.901220000	3.541361000
6	0.782564000	-2.275868000	4.939090000
1	1.596075000	-2.033074000	5.626439000
1	0.939009000	-3.292907000	4.575202000
1	-0.150112000	-2.271925000	5.506645000
6	-0.806126000	-3.550216000	-0.548763000
1	0.258466000	-3.474564000	-0.780601000
6	-1.105212000	-5.032218000	-0.255452000
1	-0.844655000	-5.650880000	-1.117155000
1	-2.166112000	-5.177526000	-0.045190000
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6	-1.574462000	-3.085171000	-1.792555000
1	-1.325753000	-3.727681000	-2.640235000
1	-1.307345000	-2.063092000	-2.059650000
1	-2.654603000	-3.119521000	-1.651090000
5	-1.261049000	2.904818000	-1.877569000
1	-0.348443000	0.978269000	1.121972000
1	1.474248000	1.767372000	1.379186000
5	0.627283000	1.433123000	0.589874000
1	-0.730066000	2.318073000	-2.784418000
1	-1.524668000	4.044338000	-2.160964000
16	-5.797013000	-0.937056000	-0.329335000
9	-7.736598000	-2.757623000	-0.384082000
9	-8.448182000	-0.714115000	-0.227245000
9	-7.696506000	-1.458340000	-2.121234000
8	-5.776732000	-1.034672000	1.117932000
8	-4.935320000	-1.883149000	-1.027369000
8	-5.739266000	0.422411000	-0.859012000
6	-7.514342000	-1.496844000	-0.790162000

2b

33	0.071472000	2.959706000	-0.372774000
32	1.482910000	-0.159881000	-0.573615000
1	0.589628000	-0.796254000	-1.666106000
1	2.815687000	0.147524000	-1.292435000
7	1.274595000	-2.662692000	1.177326000
7	3.252363000	-2.475835000	0.334982000
7	-2.766703000	2.103578000	-1.410213000
6	2.041725000	-1.869521000	0.395675000
6	1.996731000	-3.760484000	1.596607000
1	1.561483000	-4.516543000	2.223379000
6	3.237148000	-3.644066000	1.072926000
1	4.103196000	-4.275111000	1.152342000
6	-0.112547000	-2.433068000	1.546432000
6	-0.377951000	-1.842412000	2.792471000
6	-1.716345000	-1.627029000	3.116531000
1	-1.965160000	-1.168733000	4.064672000
6	-2.735906000	-1.976108000	2.243860000
1	-3.772299000	-1.772986000	2.482652000
6	-2.439647000	-2.589299000	1.036168000
1	-3.255554000	-2.845814000	0.374250000
6	-1.121468000	-2.851169000	0.663035000
6	0.713879000	-1.493508000	3.796636000
1	1.675052000	-1.514737000	3.279446000
6	0.563136000	-0.086312000	4.389692000
1	1.408266000	0.131972000	5.046391000
1	-0.344940000	0.005184000	4.987740000
1	0.534769000	0.668753000	3.605791000
6	0.771917000	-2.543388000	4.920702000
1	1.587421000	-2.319301000	5.611992000
1	0.926341000	-3.550959000	4.530577000
1	-0.159273000	-2.552859000	5.490617000
6	-0.841899000	-3.642919000	-0.608619000
1	0.222396000	-3.564713000	-0.840950000
6	-1.610641000	-3.122753000	-1.830376000
1	-1.339016000	-2.091567000	-2.055088000
1	-2.690540000	-3.156287000	-1.687783000
1	-1.367174000	-3.730886000	-2.704511000
6	-1.150105000	-5.133475000	-0.374180000
1	-0.585026000	-5.537158000	0.468888000
1	-0.898716000	-5.717897000	-1.262094000
1	-2.210898000	-5.280061000	-0.164215000
6	4.421519000	-2.036463000	-0.398788000
6	5.344966000	-1.201580000	0.247528000

6	6.484207000	-0.837542000	-0.469588000
1	7.218960000	-0.191859000	-0.006920000
6	6.692193000	-1.286446000	-1.763616000
1	7.584049000	-0.989700000	-2.301021000
6	5.761714000	-2.113129000	-2.372763000
1	5.936372000	-2.454947000	-3.384286000
6	4.602854000	-2.509861000	-1.707327000
6	5.158205000	-0.699025000	1.671667000
1	4.177583000	-1.021497000	2.022858000
6	5.176814000	0.835042000	1.746614000
1	4.966060000	1.161258000	2.766795000
1	4.426898000	1.276616000	1.089905000
1	6.151396000	1.238586000	1.465574000
6	6.203395000	-1.310112000	2.619146000
1	6.023871000	-0.979948000	3.644239000
1	7.214841000	-1.005258000	2.343066000
1	6.169788000	-2.401116000	2.604537000
6	3.610194000	-3.429450000	-2.404151000
1	2.726111000	-3.520012000	-1.772699000
6	3.139883000	-2.857767000	-3.749981000
1	2.364325000	-3.496607000	-4.176246000
1	3.956200000	-2.805103000	-4.472635000
1	2.726807000	-1.855481000	-3.633362000
6	4.190745000	-4.842418000	-2.579459000
1	3.452037000	-5.501264000	-3.039922000
1	4.482006000	-5.279335000	-1.622384000
1	5.074152000	-4.830182000	-3.220991000
6	1.620324000	3.756703000	-1.273572000
6	1.691637000	3.854780000	-2.662254000
1	0.869520000	3.512613000	-3.275245000
6	2.819587000	4.399939000	-3.270388000
1	2.861722000	4.473935000	-4.350035000
6	3.881503000	4.852261000	-2.498314000
1	4.756035000	5.279803000	-2.972593000
6	3.814821000	4.757805000	-1.111582000
1	4.637218000	5.112317000	-0.502444000
6	2.692010000	4.211880000	-0.502731000
1	2.648975000	4.148280000	0.577468000
6	-0.350026000	4.336773000	0.960881000
6	-0.601778000	5.646461000	0.548562000
1	-0.542043000	5.908073000	-0.500494000
6	-0.929698000	6.624349000	1.479406000
1	-1.120672000	7.637820000	1.148871000
6	-1.018118000	6.302165000	2.830328000
1	-1.278407000	7.064030000	3.554331000
6	-0.773089000	4.999574000	3.245405000
1	-0.841260000	4.741279000	4.294910000
6	-0.437177000	4.020052000	2.314593000
1	-0.245017000	3.008948000	2.647401000
6	-3.805618000	2.326278000	-2.469040000
1	-3.392299000	2.028663000	-3.429952000
1	-4.055251000	3.384132000	-2.497306000
1	-4.684873000	1.729785000	-2.228468000
6	-2.466731000	0.638364000	-1.369900000
1	-2.005908000	0.359318000	-2.314166000
1	-3.383813000	0.073667000	-1.223429000
1	-1.776126000	0.441959000	-0.554745000
6	-3.354947000	2.516255000	-0.097049000
1	-3.539751000	3.587924000	-0.119663000
1	-2.646886000	2.289874000	0.696416000
1	-4.280796000	1.967016000	0.069131000
5	0.699897000	1.288457000	0.687511000
1	-0.266753000	0.856789000	1.251821000
1	1.572321000	1.651816000	1.431758000
5	-1.473580000	2.957153000	-1.813475000
1	-1.006251000	2.474497000	-2.808892000
1	-1.781986000	4.110900000	-1.938361000
16	-5.829580000	-1.057120000	-0.257473000
9	-7.671589000	-2.918802000	-0.728065000
9	-7.631029000	-1.325022000	-2.199702000
9	-8.490083000	-0.969781000	-0.239513000
8	-5.815752000	0.374973000	-0.541216000
8	-5.860906000	-1.409155000	1.148629000
8	-4.895689000	-1.828861000	-1.069890000
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32	1.562779000	1.199611000	-0.558382000
1	2.814799000	1.738639000	-1.288663000
1	0.676754000	0.612116000	-1.683005000
15	-0.130082000	3.995731000	0.219009000
7	-2.852439000	3.133742000	-0.814295000
7	3.594948000	-1.007756000	-0.016361000
7	1.682162000	-1.509947000	0.848443000
6	-2.463577000	1.708984000	-1.057269000
1	-2.026336000	1.640983000	-2.050260000
1	-3.336662000	1.065171000	-0.988596000
1	-1.729693000	1.411550000	-0.313805000
6	-3.402875000	3.259321000	0.571968000
1	-3.661434000	4.301467000	0.749052000
1	-2.643554000	2.944837000	1.285715000
1	-4.281086000	2.622342000	0.669769000
6	-3.945553000	3.479598000	-1.779392000
1	-3.555998000	3.392679000	-2.791089000
1	-4.257601000	4.506036000	-1.602402000
1	-4.778134000	2.793559000	-1.628489000
6	2.334336000	-0.544545000	0.162569000
6	3.725677000	-2.260742000	0.551319000
1	4.652212000	-2.803805000	0.517469000
6	2.525798000	-2.574260000	1.088961000
1	2.194205000	-3.449398000	1.616252000
6	4.686609000	-0.342319000	-0.697665000
6	5.538258000	0.482952000	0.051813000
6	6.605552000	1.075233000	-0.622443000
1	7.283337000	1.720879000	-0.080095000
6	6.814286000	0.851569000	-1.973775000
1	7.649471000	1.322992000	-2.476253000
6	5.957289000	0.026470000	-2.684399000
1	6.132402000	-0.138722000	-3.739286000
6	4.871947000	-0.592547000	-2.065936000
6	5.354279000	0.737154000	1.541327000
1	4.421841000	0.268066000	1.856524000
6	5.231913000	2.234752000	1.860166000
1	5.036270000	2.375297000	2.924753000
1	4.414276000	2.695493000	1.305333000
1	6.150385000	2.773277000	1.619443000
6	6.486105000	0.091256000	2.357343000
1	6.313349000	0.236128000	3.425517000
1	7.453318000	0.534681000	2.112622000
1	6.555590000	-0.981734000	2.168976000
6	3.960546000	-1.502839000	-2.876249000
1	3.119009000	-1.792919000	-2.246568000
6	4.687798000	-2.793819000	-3.286600000
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1	5.069539000	-3.333978000	-2.418121000
1	5.534102000	-2.579844000	-3.942458000
6	3.373687000	-0.788885000	-4.103169000
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1	4.149284000	-0.522114000	-4.823394000
1	2.849020000	0.123697000	-3.818990000
6	0.299163000	-1.470328000	1.296909000
6	0.042218000	-1.057888000	2.614855000
6	-1.292425000	-1.024130000	3.014958000
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6	-2.316250000	-1.374914000	2.147755000
1	-3.353684000	-1.308670000	2.450512000
6	-2.024394000	-1.808487000	0.863827000
1	-2.844415000	-2.068407000	0.208278000
6	-0.707647000	-1.885143000	0.409841000
6	1.145709000	-0.712617000	3.607753000
1	2.066423000	-0.535656000	3.048004000
6	0.864390000	0.565346000	4.409781000
1	1.724966000	0.803404000	5.038830000
1	0.004266000	0.446627000	5.070673000
1	0.676562000	1.412546000	3.752142000
6	1.403982000	-1.892851000	4.561787000
1	2.225620000	-1.661168000	5.243242000
1	1.659905000	-2.806646000	4.022751000
1	0.517530000	-2.104445000	5.162995000
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6	-0.581907000	-4.013928000	-0.907635000
1	-0.320484000	-4.459019000	-1.870172000
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1	0.054514000	-4.463045000	-0.141972000
6	-1.283905000	-1.888650000	-2.078359000
1	-1.026313000	-2.354003000	-3.032388000
1	-1.118932000	-0.815641000	-2.175027000
1	-2.348488000	-2.044338000	-1.905454000
5	-1.624361000	4.129020000	-1.076445000
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16	-5.607681000	-0.380550000	-0.034266000
9	-7.323977000	-2.317651000	-0.647865000
9	-8.261359000	-0.517525000	0.118946000
9	-7.490325000	-0.559420000	-1.908411000
8	-5.531237000	-0.904535000	1.315538000
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1	0.825058000	4.847309000	-0.366360000
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33	-0.154467000	3.911405000	0.110238000
32	1.596472000	1.028181000	-0.554964000
1	0.686493000	0.448682000	-1.665180000
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1	2.214640000	-3.626498000	1.608798000
6	3.749218000	-2.442047000	0.543480000
1	4.673850000	-2.988268000	0.508280000
6	0.327109000	-1.638798000	1.295251000
6	0.076007000	-1.225824000	2.614194000
6	-1.256938000	-1.190941000	3.019811000
1	-1.496851000	-0.872978000	4.025569000
6	-2.284450000	-1.541902000	2.157114000
1	-3.320517000	-1.479596000	2.465302000
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6	-0.683806000	-2.050297000	0.411404000
6	1.183764000	-0.882608000	3.603034000
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6	0.910272000	0.399315000	4.401502000
1	1.772800000	0.634677000	5.028882000
1	0.050191000	0.287265000	5.063618000
1	0.726065000	1.245703000	3.741714000

6	1.439391000	-2.061135000	4.559837000
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1	1.689548000	-2.977627000	4.022638000
1	0.553782000	-2.266966000	5.164267000
6	-0.400255000	-2.644576000	-0.962466000
1	0.641306000	-2.441620000	-1.220788000
6	-1.269616000	-2.041226000	-2.073813000
1	-1.104108000	-0.967573000	-2.163515000
1	-2.333747000	-2.197868000	-1.898925000
1	-1.014843000	-2.500125000	-3.031726000
6	-0.569432000	-4.174220000	-0.915920000
1	0.069087000	-4.628842000	-0.155262000
1	-0.313643000	-4.615556000	-1.881697000
1	-1.602088000	-4.441775000	-0.686118000
6	4.715889000	-0.524028000	-0.702408000
6	5.569258000	0.297714000	0.049026000
6	6.637971000	0.889031000	-0.623840000
1	7.317080000	1.532038000	-0.080041000
6	6.846373000	0.667791000	-1.975619000
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1	4.454679000	2.511933000	1.308896000
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1	6.579924000	-1.177336000	2.161910000
6	3.987250000	-1.678034000	-2.883458000
1	3.146348000	-1.969567000	-2.253577000
6	3.399486000	-0.958594000	-4.106766000
1	2.688236000	-1.610379000	-4.617277000
1	4.174552000	-0.689790000	-4.826805000
1	2.876287000	-0.046522000	-3.818223000
6	4.712250000	-2.968360000	-3.299777000
1	4.030547000	-3.628915000	-3.838903000
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1	5.557869000	-2.753122000	-3.956091000
6	-4.136710000	3.255914000	-1.752650000
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6	-2.527246000	1.569187000	-1.098558000
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1	-3.361756000	0.879945000	-0.996453000
1	-1.749982000	1.311018000	-0.384526000
6	-3.471815000	3.073694000	0.571505000
1	-3.772888000	4.102176000	0.759780000
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1	-4.312622000	2.395201000	0.709058000
5	0.779655000	2.239184000	0.915956000
1	-0.086696000	1.651007000	1.498888000
1	1.659211000	2.645496000	1.626019000
5	-1.832569000	4.033745000	-1.166153000
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1	-2.254147000	5.145468000	-1.006310000
16	-5.603600000	-0.625058000	-0.007984000
9	-7.270497000	-2.584068000	-0.684444000
9	-7.485602000	-0.788531000	-1.883659000
9	-8.252370000	-0.836401000	0.145240000
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32	1.450508000	-1.792693000	0.353719000
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