Appendix H

Supplemental Data for Table 13-2. Selected 8- to 11-Vertex Transition Element Metallacarboranes

Compound[a]	Information[b]	References
Synthesis and Characterization		
Vanadium		
11-vertex VC$_3$B$_7$ clusters		
(2,3,4-MeC$_3$B$_7$H$_9$)**V**(2,3,5-MeC$_3$B$_7$H$_9$) 2 isomers	S, X, MS, IR	[347]
Ansa-**V**(2,3,4-C$_3$B$_7$H$_9$)(2,3,*n*-C$_3$B$_7$H$_9$)(CH$_2$)$_4$ *n*=4,5	S, X, B, MS	[1407]
Molydenum		
11-vertex MoCB$_9$ clusters		
1,2-(CO)$_3$**Mo**[PhCB$_9$H$_9$]-µ-Mo(CO)$_3{}^{3-}$	Cage expansion with HBF$_4$→2,1,8-(CO)$_3$l**Mo** [Ph(OH)C$_2$B$_9$H$_9$]$^-$	[353]
1,2-(CO)$_3$**Mo**[PhCB$_9$H$_9$]-µ-Mn(CO)$_3{}^{2-}$	S, H, B, C, IR	[352]
(CO)$_4$Mo(µ-SPh)$_2$-1,2-**Mo**(PhCB$_9$H$_9$)$^-$	S, X, H, B, C	[353]
Manganese		
10-vertex MnC$_2$B$_7$ clusters		
2,1,10-(CO)(NO)L**Mn**[(HO)C$_2$B$_7$H$_8$] L=CO, PEt$_3$	S, X(CO), H, B, C, IR	[357]
2,1,10-(CO)$_2$L**Mn**[(RC$_2$B$_7$H$_8$) L=CO, SMe$_2$, R=SMe$_2$, S(CH$_2$)$_4$, S(CH$_2$CH=CH$_2$)$_2$	S, X(SMe$_2$, SMe$_2$), H, B, C, IR	[357]
2,1,10-(CO)$_3$**Mn**[(HO)HC$_2$B$_7$H$_7$-6-S(CH$_2$)$_4$]	S, X, H, B, C, IR	[357]
2,1,10-(CO)$_3$**Mn**[(HO)C$_2$B$_7$H$_7$-6-I]$^-$	S, X, H, B, C, IR	[357]
11-vertex MnCB$_9$ clusters		
(CO)$_3$**Mn**(CB$_9$H$_9$)$^-$	H	[359]
(CO)$_3$**Mn**(CB$_9$H$_9$)-[µ(M,B)-M'PPh$_3$]$_2$ M=Re, Mn; M'=Cu, Au	S, H, B, C, P	[359]
(CO)$_3$**Mn**(CB$_9$H$_9$)-µ(M,B)-M'[Ph$_2$(CH$_2$)$_2$PPh$_2$] M=Re, Mn; M'=Ni, Pd	S, H, B, C, P	[359]
11-vertex MnC$_3$B$_7$ clusters		
1,2,3,4-(CO)$_3$**Mn**(2-MeC$_3$B$_7$H$_9$)	S, H, B, C, IR	[360]

Continued

Compound	Information	References
1,2,3,4-$(CO)_2(Ph_3P)$**Mn**$(PhC_3B_7H_9)$	S, X, H, B, IR, MS	[361]
	E	[1388]
Nido-8,7,9,10-$(CO)_3(Me_3CNC)$**Mn**$(PhC_3B_7H_9)$	S, X, H, B, IR, MS	[361]
Rhenium		
10-vertex ReCB$_8$ clusters		
6,1-$(NO)(CO)_2$**Re**$(CB_8H_9)^-$	S, X, H, B, C, P, IR	[363]
6,1-$(NO)(CO)[Ir(PPh_2)Ph(CO)(PPh_3)]$**Re**$(CB_8H_9)$	S, X, H, B, C, P, IR	[363]
6,1-$(NO)(CO)[Ir(PPh_2)(H)(CO)(PPh_3)]$**Re**$(CB_8H_9)$	S, X, H, B, C, P, IR	[363]
11-vertex ReCB$_9$ clusters		
$[(CO)_3Ir][Ph_3PCu](CO)_2$**Re**$(PhCB_9H_9)$	S, H, B, C, P, IR	[366]
$[1,2$-$(CO)_3$**Re**$(PhCB_9H_9)$-μ-$(Re$-H-$B)$-$M(CO)_3]^-$ M=Mn, Re	S, H, B, C, P, IR	[367]
1,2-$(CO)_3$**Re**$(PhCB_9H_9)$-$[\mu(Re$-H-$B)$-$ML]_2$ M=Cu, Au; L=PPh$_3$, NCMe	S, H, B, C, P, IR	[359], [367]
1,2-$(CO)_3$**Re**$(PhCB_9H_9)$-$[\mu(Re$—H—$B)$-$CuL]_2$ L=PPh$_3$, NCMe	X	[367]
11-vertex ReC$_3$B$_7$ clusters		
1,2,3,4-$(CO)_2(Me_3CNC)$**Re**$(2$-$PhC_3B_7H_9)$	S, X, H, B, IR, MS	[361]
1,2,3,4-$(CO)_2(Me_3P)$**Re**$(2$-$PhC_3B_7H_9)$	S, X, H, B, IR, MS	[361]
Nido-8,7,9,10-$(CO)_2(Me_3P)_2$**Re**$(2$-$PhC_3B_7H_9)$	S, X, H, B, IR, MS	[361]
Iron		
8-vertex Fe(2,3-C$_2$B$_4$)M clusters		
Fe-wedged-(tmeda)**Fe**$_2[2,3$-$(Me_3Si)_2C_2B_4H_4]_2$	S, X, IR	[90]
Fe-wedged-$(C_4H_8O)_2$**Fe**$_2(Et_2C_2B_4H_4)_2$	S, H, IR, UV	[89]
Co-wedged-Cp**CoFe**$(Me_2C_2B_4H_4)_2$	S, H, B, IR, MS	[105]
B-wedged-Cp**CoFe**$[(PhCH_2)_2C_2B_4H_4]_2$	S, H, B, IR, MS	[74]
B-wedged–$(Et_3P)_2$**PtFe**$(Me_2C_2B_4H_4)_2$	S, X, H, B, P, IR	[91]
B-wedged-Cp**Fe**$_2(Me_2C_2B_4H_4)_2$	S, B, IR	[91]
8-vertex Fe$_2$C$_4$B$_2$ clusters		
1,8,2,3,5,6-Cp$_2$**Fe**$_2(Et_2C_4B_2Me_2C_4H_4)$ − $Fe(CO)_3$ triple-decker sandwich	S, H, C	[369]
1,8,2,3,5,6-Cp$_2$**Fe**$_2(H_2R_2C_4B_2Me_2)$ R=Me, Et triple-decker sandwich	S, H, B, C, MS	[370]
1,8,2,3,5,6-Cp$_2$**Fe**$_2[(C_4H_4)_2C_4B_2Me_2]$ triple-decker sandwich	S, X, H, B, C, MS	[371]
10-vertex FeCB$_8$ clusters		
6,1-$(CO)_3$**Fe**(CB_8H_7)-$\mu(4,7)$-$IrH(CO)(PPh_3)_2PPh_2$	S, X, H, B, C, P, IR	[379]
6,1-$(CO)_3$**Fe**(CB_8H_8)-$\mu(6,7)$-$Ph_2PCH_2PPh_2$	S, X, H, B, C, P, IR	[379]
6,1-$(CO)_3$**Fe**(CB_8H_8)-$\mu(6,7)$-$Ph_2PCH_2NMe_2$	S, X, H, B, C, P, IR	[379]
6.1-$(Et_3P)L(CO)$**Fe**$(CB_8H_8)^-$ L=PEt$_3$, CN	S, H, B, C, P, IR	[380]
6.1-$(Et_3P)_2(CO))$**Fe**(CB_8H_9)	S, H, B, C, P, IR, ESR	[380]
6.1-$[(CO)Ir(PPh_3)_2NC](CO)(Et_3P)$**Fe**$(CB_8H_9)$	S, H, B, C, P, IR, ESR	[380]
Arachno-9,6-$[(CO)_4Fe](\mu$-$H)(CO)_3$**Fe**(CB_8H_{11})	S, X, H, B, C, IR	[381]

Compound	Information	References
Arachno-9,6-[(Ph$_3$P)M][(CO)$_4$Fe](CO)$_3$**Fe**(CB$_8$H$_{11}$) M=Cu, Ag	S, X, H, B, C, IR	[381]
10-vertex Fe$_2$CB$_7$ clusters		
6,10,1-(CO)$_5$[Ir(PPh$_2$)(CN)Ph(PPh$_2$)]**Fe**$_2$(CB$_7$H$_8$)$^-$	S, H, B, C, P, IR	[382]
6,10,1-(CO)$_6$**Fe**$_2$(CB$_7$H$_7$)-μ(7,10)-CuPPh$_3$	S, X, H, B, C, P, IR	[374]
6,10,1-(CO)$_5$(NO)**Fe**$_2$(CB$_7$H$_5$)-7,8,9-F$_3$$^-$	S, H, B, C, P, F, IR	[375]
6,10,1-(CO)$_5$(Et$_3$P)**Fe**$_2$(CB$_7$H$_5$)-7,8,9-F$_3$$^-$	S, H, B, C, P, F, IR	[375]
6,10,1-(CO)$_3$(Me$_3$CNC)(NO)(Et$_3$P)**Fe**$_2$(CB$_7$H$_5$)-7,8,9-F$_3$$^-$	S, X, H, B, C, P, F, IR	[375]
10-vertex FeC$_2$B$_7$ clusters		
(Me$_2$C$_2$B$_4$H$_4$)**Fe**H$_2$(Me$_2$C$_2$B$_7$H$_7$)	S, MS	[93]
(MeC$_6$H$_5$)**Fe**(Me$_2$C$_2$B$_7$H$_7$)	S, MS	[59]
2,1,10-(CO)$_3$**Fe**[(HO)C$_2$B$_7$H$_7$]	S, H, B, C, P, IR	[384]
2,1,10-(Et$_3$P)(CO)$_2$**Fe**[(RO)C$_2$B$_7$H$_7$] R=H, Me, CH$_2$CH=CH$_2$, CH$_2$-C=CH, CH$_2$C≡CMe	S, H, B, C, P, IR	[384]
2,1,10-(Et$_3$P)(CNxyl)$_2$**Fe**[(CH$_2$=CHCH$_2$)C$_2$B$_7$H$_7$]	S, X, H, B, C, P, IR	[384]
2,1,10-(CO)(Et$_3$P)**Fe**{[OCH$_2$C=CR(PEt$_3$)]C$_2$B$_7$H$_6$]	S, X, H, B, C, P, IR	[384]
[2,1,10-(CO)$_2$**Fe**(HC$_2$B$_7$H$_7$)-μ(2,1)—HN=CO—C$_6$H$_4$—C$_2$Co$_2$(CO)$_6$—]$_2$	S, X, H, B, C, IR	[385]
{2,1,10-(CO)$_2$**Fe**(C$_2$B$_7$H$_8$)-1,2-*cyclo*-[(OC(C$_6$H$_4$-*p*-C≡C-)NH]}$_2$	S, H, B, C	[386]
{2,1,10-(CO)$_2$**Fe**(C$_2$B$_7$H$_8$)-1,2-*cyclo*-[(OC(C$_6$H$_4$-*p*-(CO)$_6$Co$_2$C$_2$—)]}$_2$	S, H, B, C	[386]
{-(CH$_2$)$_2$(PPh$_2$)(CO)-2,1,10-(CO)**Fe**(C$_2$B$_7$H$_8$)-1,2-*cyclo*-[(OC-(C$_6$H$_4$Br)=NH—)]}$_2$	S, H, B, C	[386]
2,1,10-(CO)$_2$[(CO)MeI-NC]**Fe**(C$_2$B$_7$H$_7$)-1-OH	S, X, H, B, C	[386]
11-vertex FeC$_3$B$_7$ clusters		
(10-Me-2,3,10-C$_3$B$_7$H$_9$)$_2$**Fe** ^{13}C labeled	S, H, C	[398]
(5-Me-2,3,3-C$_3$B$_7$H$_9$)**Fe**(4-Me-2,3,4-C$_3$B$_7$H$_9$) ^{13}C labeled	S, H, C	[398]
1,2,3,4-Cp**Fe**[(Me$_3$SiC≡CC$_6$H$_4$)C$_3$B$_7$H$_9$	S, X, H, B, C, MS	[1391]
1,2,3,4-Cp**Fe**(HSiC≡CC$_6$H$_4$)C$_3$B$_7$H$_9$	S, X, H, B, C, MS	[1391]
1,2,3,4-Cp**Fe**(PhCH$_2$N$_3$C$_2$H-C$_6$H$_4$)C$_3$B$_7$H$_9$	S, H, B, C, MS	[1391]
1,2,3,4-Cp**Fe**[RC(O)CH$_2$N$_3$C$_2$H-C$_6$H$_4$]C$_3$B$_7$H$_9$	S, H, B, C, MS	[1391]
1,2,3,4-Cp**Fe**[(*p*-RC$_6$H$_4$)C$_3$B$_7$H$_9$] R=Ph, PhCH$_2$CH=CH, Me(CH$_2$)$_2$CH=CH, CH$_2$=CH, CH$_2$=CHCH$_2$	S, X(Ph,CH$_2$=CH), H, B, MS	[1393]
Ansa-(CH$_2$)$_2$-1-**Fe**(2,3,4-C$_3$B$_7$H$_9$)$_2$ (3 isomers)	S, X, H, B, IR, MS	[1398]
1,2,3,4-(MeOC$_6$H$_4$CH$_2$-C$_5$H$_4$)**Fe**[(6-R)C$_3$B$_7$H$_9$] R=Ph, C$_3$H$_2$N$_2$Me	S, X, H, B, IR, MS, anticancer activity)/(cell growth inhibition	[1399]
1,2,3,4-Cp*****Fe**(PhC$_3$B$_7$H$_9$)	S, X, H, B	[401]
1,2,3,4-Cp**Fe**(PhC$_3$B$_7$H$_8$)-6-X X=Cl, Br, I, C≡CPh, C≡CCH$_2$OC(O)Et, C≡C(C$_5$H$_4$)FeCp, C≡CH	S, X, H, B, IR, MS	[402]
1,2,3,4-Cp**Fe**(PhC$_3$B$_7$H$_8$)-11-I	S, X, H, B, IR, MS	[402]
1,2,3,4-Cp**Fe**(PhC$_3$B$_7$H$_7$)-6,11-I$_2$	S, X, H, B, IR, MS	[402]
1,2,3,4-Cp**Fe**(C$_3$B$_7$H$_9$)-2-CH$_2$-*arachno*-C$_4$NB$_7$H$_{10}$-5-CH$_2$CN	S, X, H, B, MS	[395]
1,2,3,4-Cp**Fe**(NCCH$_2$-C$_3$B$_7$H$_9$) 2 isomers	S, H, B, MS	[395]
1,2,3,4-Cp**Fe**(*n*-MeC$_3$B$_7$H$_9$) *n*=2, 4; ^{13}C labeled	S, H, C	[398]
1,2,3,10-Cp**Fe**(C$_3$B$_7$H$_9$)-10-NHCMe$_3$	S, X, H, B, MS	[404]

Compound	Information	References
(5-Me-2,3,4-$C_3B_7H_9$)**Fe**(4-Me-2,3,4-$C_3B_7H_9$)	S, X, H, B, IR, UV	[405]
(5-Me-2,3,4-$C_3B_7H_9$)**Fe**(2-Me-2,3,4-$C_3B_7H_9$)	S, X, IR, UV	[405]
Ruthenium		
10-vertex $RuCB_8$ clusters		
Arachno-9,6-CpH(PPh$_3$)**Ru**(CB$_8$H$_{12}$)	S, X, H, B, P, IR	[409]
Hypercloso-2,1-(Ph$_3$P)HCl**Ru**[(CB$_8$H$_7$-3,9-(OMe)$_2$-5-PPh$_3$]	S, X, H, B, C, P, IR, MS	[406]
10-vertex RuC_2B_7 clusters		
2,1,10-(CO)$_3$**Ru**[(HO)C$_2$B$_7$H$_8$]	S, X, H, B, C, IR	[356]
6,2,3-(Ph$_3$P)$_2$**Ru**(RC$_2$B$_7$H$_8$) R=H, Ph	S, H, B, P, MS	[411]
6,2,3-(Ph$_3$P)(CO)$_2$**Ru**(C$_2$B$_7$H$_9$)	S, H, B, P, IR	[411]
6,2,3-(Ph$_3$P)$_2$(CO)**Ru**(C$_2$B$_7$H$_9$)	S, H, B, P, IR	[411]
6,2,3-(LPh$_2$P)(CO)$_2$**Ru**(C$_2$B$_7$H$_9$) L=3-butenyl, *o*-allylphenyl	S, H, B, P, IR	[412]
11-vertex RuC_2B_8 clusters		
1,2,3-(MeC$_6$H$_4$-CHMe$_2$)**Ru**(Me$_2$C$_2$B$_8$H$_8$)	S, X, H, B, MS	[418]
1,2,3-(Me$_2$C$_6$H$_4$)**Ru**(C$_2$B$_8$H$_9$-*n*-Cl) *n*=8,10	S, X, H, B	[1400]
1,2,4-(C$_6$Me$_6$)**Ru**(MeC$_2$B$_8$H$_8$-3-X X=H, Cl	S, H, B, MS	[418]
1,2,4-(C$_6$Me$_6$)**Ru**(Me$_2$C$_2$B$_8$H$_8$)	S, H, B, MS	[418]
	S, B(2d)	[419]
1,2,4-(MeC$_6$H$_4$-CHMe$_2$)**Ru**(Me$_2$C$_2$B$_8$H$_8$)	S, X, H, B, MS	[418]
1,2,4-(Ph$_3$P)$_2$H**Ru**(C$_2$B$_8$H$_9$-3-PPh$_3$)	S, H, B, C, P, IR	[420]
1,2,4-(C$_6$H$_6$)**Ru**(C$_2$B$_8$H$_9$-3/6-Cl)	S, X(*n*=6), H, B, C, IR	[124]
1,2,4-L**Ru**(C$_2$B$_8$H$_9$)-3-OCH$_2$C$_7$H$_9$ L=benzene, toluene, mesitylene	S	[422]
Isonido-1,2,4-(Me$_2$C$_6$H$_4$)**Ru**(C$_2$B$_8$H$_9$-*n*-Cl) *n*=3,5	Thermal isomerization	[1400]
11-vertex RuC_3B_7 clusters		
1,2,3,4-Cp***Ru**(PhC$_3$B$_7$H$_9$)	S, X, H, B	[401]
1,2,3,4-Cp**Ru**(PhCH$_2$N$_3$C$_2$H-C$_6$H$_4$)C$_3$B$_7$H$_9$	S, X, H, B, C, MS	[1391]
1,2,3,4-Cp**Ru**[(Me$_3$SiC≡CC$_6$H$_4$)C$_3$B$_7$H$_9$	S, H, B, C, MS	[1391]
1,2,3,4-Cp**Ru**[RC(O)CH$_2$N$_3$C$_2$H-C$_6$H$_4$]C$_3$B$_7$H$_9$	S, H, B, C, MS	[1391]
1,2,3,4-Cp**Ru**[(*p*-XC$_6$H$_4$)C$_3$B$_7$H$_9$]	S, H, B, MS	[1393]
1,2,3,4-Cp***Ru**((2-PhC$_3$B$_7$H$_7$-6,11-I2)	S, X, H, B, MS, IR	[1396]
1,2,3,4-Cp**Ru**(2-PhC$_3$B$_7$H$_8$-6-MeCH$_2$C(O)OCH$_2$C≡C)	S, X, H, B, MS, IR	[1396]
1,2,3,4-Cp**Ru**(2-PhC$_3$B$_7$H$_8$-6-C≡CSiMe$_3$)	S, X, H, B, MS, IR	[1396]
1,2,3,10-Cp***Ru**(10-RC$_3$B$_7$H$_9$) R=H, NHCMe$_3$	S, H, B, C, MS	[423]
Cobalt		
8-vertex CoC_2B_5 clusters		
5,1,8-Cp**Co**[(Me$_3$Si)$_2$C$_2$B$_5$H$_5$]	S, H, B, MS	[198]
Cp**Co**(Et$_2$MeC$_3$B$_2$Et$_2$)**Co**(C$_2$B$_5$H$_7$)	S, H, B, MS	[226]
8-vertex $Co_2C_2B_4$ clusters		
B-wedged-Cp**CoFe**[(PhCH$_2$)$_2$C$_2$B$_4$H$_4$]$_2$	S, H, B, IR, MS	[74]
B-wedged-(Et$_3$P)$_2$**CoFe**(Me$_2$C$_2$B$_4$H$_4$)$_2$	S, X, H, B, P, IR	[91]

Compound	Information	References
9-vertex CoC$_2$B$_6$ clusters		
1,4,*n*-Cp**Co**(C$_2$B$_6$H$_8$) *n*=5, 6	S, H, B, IR, E, UV	[307]
[1,4,5-Cp**Co**(C$_2$B$_6$H$_8$)]$^-$	S, H, B, IR, UV, E	[307]
2,4,5/2,4,6-Cp**Co**(C$_2$B$_6$H$_8$) 2 isomers	E	[431]
9-vertex Co$_2$C$_2$B$_5$ clusters		
[1,*n*,5,6-Cp$_2$**Co**$_2$(C$_2$B$_5$H$_6$)]$_2$ *n*=7, 8	S, B, MS	[145]
1,8,5,6/1,7,5,6-Cp$_2$**Co**$_2$(C$_2$B$_5$H$_7$)	Thermal interconversion equilibrium constant	[208]
1,7,5,6-Cp$_2$**Co**$_2$(C$_2$B$_5$H$_6$)-1-(2,4-C$_2$B$_5$H$_6$)	S, H, B, MS	[145]
10-vertex CoC$_2$B$_7$ clusters		
2,1,6-Cp**Co**(C$_2$B$_7$H$_7$Br$_2$)	S, H	[441]
2,1,10-[Cp**Co**(C$_2$B$_7$H$_9$)]$^-$	B	[377]
11-vertex CoC$_2$B$_8$ clusters		
1,2,3-Cp**Co**(C$_2$B$_8$H$_5$Br$_5$)	S	[455]
1,2,3-Cp**Co**(C$_2$B$_8$H$_9$)-(1,10-C$_2$B$_8$H$_9$)	S, H, B, IR, MS, UV, E	[307]
[1,2,3-Cp**Co**(C$_2$B$_8$H$_{10}$)]$^-$	S, B, ESR	[377]
[1,2,3-(C$_2$B$_8$H$_{10}$)$_2$**Co**]$^-$	S, H, B, IR, UV, E	[307]
1,2,3-Cp**Co**(Me$_2$C$_2$B$_8$H$_8$)	S, H, B, IR, UV, E	[454]
1,2,4-Cp**Co**(C$_2$B$_8$H$_{10}$)	S, B	[454]
1,2,4-Cp**Co**(C$_2$B$_8$H$_9$)-7-R R=NC$_5$H$_5$$^+$, NC$_5H_{10}$	S, H, B, IR, UV	[456]
1,2,4-Cp**Co**(C$_2$B$_8$H$_8$)-6,9-Br$_2$	S, H, B(2d)	[457]
[*nido*-9,7,8-Cp**Co**(C$_2$B$_8$H$_{12}$)]$^-$	S, H, B, IR, UV	[456]
Nido-9,7,8-Cp**Co**(C$_2$B$_8$H$_{10}$)-11-R R=NC$_5$H$_5$, NHC$_5$H$_{10}$	S, H, B, IR, UV, MS	[456]
[2,3-C$_2$B$_8$H$_9$-7-C$_5$H$_5$N]**Co**[1,2-C$_2$B$_9$H$_{11}$]	S, H, B, IR, UV	[456]
(2,4-C$_2$B$_8$H$_{10}$)(3-**Co**H)(*nido*-7,8-C$_2$B$_8$H$_{11}$)$^-$	S, X, H, B, C, IR	[1406]
11-vertex CoC$_3$B$_7$ clusters		
1,2,3,4-(OC)$_2$**Co**(2-PhC$_3$B$_7$H$_9$)	S, B, IR, MS	[1404]
Cp**Co**[(NCCH$_2$)C$_3$B$_7$H$_9$]	S, MS, MAG	[395]
Nido-8,7,9,10-(Me$_3$CNC)$_3$**Co**(9-PhC$_3$B$_7$H$_9$)	S, X, H, B, P, IR	[1404]
Rhodium		
8-vertex Rh$_2$C$_4$B$_2$ clusters		
1,8,2,3,5,6-L$_2$**Rh**$_2$(H$_2$Me$_2$C$_4$B$_2$Me$_2$) L=C$_8$H$_{12}$, 2C$_2$H$_4$ triple-decker sandwich	S, H, B, IR, MS	[463]
1,8,2,3,4,5-(C$_6$H$_8$)$_2$**Rh**$_2$[H$_4$C$_4$B$_2$(NMe$_2$)$_2$] triple-decker sandwich	S, H, B, C, MS	[465]
11-vertex RhCB$_9$ clusters		
1,2-(CO)$_2$**Rh**(PhCB$_9$H$_9$)-*exo*-Re(CO)$_3$(PEt$_3$)	S, H, B, C, IR	[470]
1,2-(CO)$_2$**Rh**(PhCB$_9$H$_9$)-*exo*-Re(CO)$_3$-*exo*-Cu(PPh$_3$)	S, H, B, C, P, IR	[471]
1,2-(CO)$_2$**Rh**(PhCB$_9$H$_9$)-*exo*-Au$_3$(PPh$_3$)$_3$	S, X, H, B, C, P, IR	[471]
1,2-(CO)$_2$**Rh**(PhCB$_9$H$_9$)-*exo*-Au$_2$(PPh$_3$)$_2$Re(CO)$_3$	S, X, H, B, C, P, IR	[471]
11-vertex RhC$_2$B$_8$ clusters		
Isonido-1-**Rh**(2,4-C$_2$B$_8$H$_{10}$)(2,4-C$_2$B$_8$H$_9$-7-OMe)$^-$	S, X, H, B	[1405]

Compound	Information	References
1-**Rh**(2,3-$C_2B_8H_{10}$)(2,3-$C_2B_8H_9$-OMe)$^-$	S, X, H, B	[1405]
Nido-9,7,8-[(p-MeC_6H_4)$_3$P]$_2$(CO)**Rh**($C_2B_8H_{11}$)	S, H, B, C, IR	[420]
Nido-9,7,8-(Et_3P)$_2$**Rh**($C_2B_8H_{11}$)	S, H, B, P	[420]
Nido-9,7,8-(Et_3P)$_3$**Rh**($C_2B_8H_{11}$)	S, H, B, P, IR	[420]
Nido-9,7,8-(Ph_3As)$_3$**Rh**($C_2B_8H_{11}$)	S, H	[420]
Nido-9,7,8-(Ph_3Sb)$_3$**Rh**($C_2B_8H_{11}$)	S, H, B, IR	[420]
Nido-9,7,8-($PhMe_2$P)$_3$**Rh**($C_2B_8H_{11}$)	S, H, B	[420]
Nido-9,7,8-($PhMe_2$As)$_3$**Rh**($C_2B_8H_{11}$)	S, H, B, C, IR	[420]
Nido-9,7,8-($Ph_2PCH_2PPh_2BH_3$)**Rh**($C_2B_8H_{11}$)	S, X, H, B, P, MS	[475]
Nido-9,7,8-(MeC_6H_4-$CHMe_2$)Ru(η^2-$Ph_2PCH_2PPh_2$)(μ-Cl)$_2$**Rh** ($C_2B_8H_{11}$)	S, X, H, B, P, MS	[476]
Nido-9,7,8-(η^1-dppe)(η^2-dppe)**Rh**($C_2B_8H_{11}$)	S, H, B, P, MS	[476]
Iridium		
10-vertex IrCB$_8$ clusters		
1,4-(Ph_3P)($Ph_2C_6H_4$)**Ir**[(HO)CB_8H_6]-B-OMe	S, X, H, B, P, IR	[481]
Nido-9,6-(Ph_3P)$_2$H**Ir**(CB_8H_{10})-7-PPh_3	S, X, H	[482]
Arachno-9,6-(CO)(Ph_3P)$_2$H**Ir**(CB_8H_{12}) symmetric and asymmetric isomers	S, X(asymmetric isomer), H(2d), B, P, MS	[484]
11-vertex IrCB$_9$ clusters		
1,2-(CO)$_2$**Ir**($PhCB_9H_9$)-*exo*-Re(CO)$_3$($NH_2C_6H_4$Me)	S, X, H, B, C, P, IR	[470]
1,2-(CO)$_2$**Ir**($PhCB_9H_9$)-*exo*-Re(CO)$_3$-*exo*-Cu(PPh_3)	S, X, H, B, C, P, IR	[471]
1,2-(CO)$_2$**Ir**($PhCB_9H_9$)-*exo*-Au$_3$(PPh_3)$_3$	S, H, B, C, P, IR	[471]
1,2-(CO)$_2$**Ir**($PhCB_9H_9$)-*exo*-Au$_2$(PPh_3)$_2$Re(CO)$_3$	S, H, B, C, P, IR	[471]
11-vertex IrC$_2$B$_8$ clusters		
1,2,4-(PMe_3)$_2$H**Ir**($C_2B_8H_9$-6-Cl)	S, X	[487]
1,2,4-($PhMe_2$As)$_2$H**Ir**($C_2B_8H_{10}$)	S, H, B, IR	[420]
Nido-9,7,8-(PMe_3)$_2$(CO)**Ir**[(CH_2=CMe)$C_2B_8H_{10}$]	S, X, H, B, P	[483]
Nido-(PMe_3)$_2$(CO)**Ir**($C_2B_8H_{10}$-C_5H_{11})	S, H, B(2d), P, IR, MS	[488]
11-vertex IrC$_3$B$_7$ clusters		
Nido-8,7,9,10-(OC)$_3$**Ir**(9-$PhC_3B_7H_9$)	S, H, B, IR	[1404]
Nido-8,7,9,10-(C_8H_{10})(Me_3CNC)**Ir**(9-$PhC_3B_7H_9$)	S, X, H, B, P, IR	[1404]
Nido-8,7,9,10-(C_8H_{10})(Me_3CNC)**Ir**(9-$PhC_3B_7H_8$-11-I)	S, X, H, B, P, IR	[1404]
Nickel		
8-vertex NiMC$_2$B$_4$ clusters		
Cp**Co**($Et_2MeC_3B_2Et_2$)**Ni**($Et_2C_2B_4H_4$)**Fe**(η^5-C_9H_7)	S, H, B, IR, MS, E	[54]
Cp**Co**($Et_2HC_3B_2Et_2$)**Ni**($Et_2C_2B_4H_4$)**Fe**Cp*	S, H, B, IR, MS, E	[54]
8-vertex Ni$_2$C$_4$B$_2$ clusters		
Cp$_2$**Ni**$_2$(1,4-$H_2Me_2C_4B_2Me_2$) triple-decker sandwich	S, H, B, MS, E	[490]
(C_3H_5)$_2$**Ni**$_2$[$Et_2C_4B_2Me_2$(C_4H_4)] triple-decker sandwich	S, H, B, C, MS	[491]
Nido, closo-{(C_3H_5)**Ni**[$Et_2C_4B_2Me_2$(C_4H_4)]}$_2$**Ni** tetradecker sandwich	S, X, H, C, MS	[491]

Compound	Information	References
9-vertex Ni₃CB₅ clusters		
Nido-7,8,9,6-Cp₃**Ni**₃(CB₅H₅)-2-Me	S, H, B, IR, UV, E	[492]
Nido-6,7,8,2-Cp₃**Ni**₃(CB₅H₆)	S, H, B(2d)	[493]
11-vertex nido-NiC₃B₇ clusters		
Cp**Co**(MeEt₂C₃B₂Et₂)**Ni**(8-Me-2,3,5-C₃B₇H₉)	S, X, H, B, MS	[99]
(2,3,4-MeC₃B₇H₉)**Ni**(7,8,10-MeC₃B₇H₈-PMe₃)	S, X,IR, MS	[500]
Palladium		
11-vertex PdC₃B₇ clusters		
Pd(7,8,10/7,9,10-MeC₃B₇H₉)₂	S, X(7,8,10)H, B, IR, MS	[500]
Platinum		
9-vertex PtC₂B₆ clusters		
n,4,5-(Et₃P)₂**Pt**(Me₂C₂B₆H₆) *n*=6, 7	S, H, IR	[494]
7,6,8-(PMe₂Ph)₂**Pt**(PhC₂B₆H₇)	S[PhC≡CH+(PMe₂Ph)₂PtB₈H₁₂], X, H, B, MS	[505]
10-vertex PtCB₈ clusters		
Arachno-9,6-(PMe₂Ph)₂**Pt**(CB₈H₁₂)	S	[506]
Arachno-9,6-LL′**Pt**(H₂CB₈H₁₀) L, L′=Me₃CNC, PPh₃; Ph₂PCH₂CH₂PPh₂	S, H, B, C, IR	[511]
Arachno-9,6-(Me₃CNC)₂I₂**Pt**(RHCB₈H₁₀) R=H, Ph	S, X(Ph), H, B, C, IR	[511]
Arachno-9,6-(Ph₂PCH₂CH₂PPh₂)**Pt**(H₂CB₈H₈)-4-X-8-I X=I, O(CH₂)₄I	S, X(O(CH₂)₄I), H, B, C, IR	[511]
10-vertex PtC₂B₇ clusters		
Nido-(Et₃P)₂**Pt**(R₂C₂B₇H₁₁)	S, B, IR, MS	[494]
Nido-6,5,9-(R₃P)₂**Pt**(R₂C₂B₇H₉) R=Me, Et, Ph	S, H	[498]
Arachno-9,5,6-(Me₂PhP)₂**Pt**(C₂B₇H₁₁)	S, H, B	[516]
11-vertex PtC₂B₈ clusters		
1,2,3-[P(OMe)₃]₂**Pt**(C₂B₈H₉-2-R) R=H, Ph	X, H, B	[519]
nido-10,7,9-(Me₃P)₂**Pt**(C₂B₈H₁₀)	S, H, B, P, Pt	[494]
	X	[523]
9,7,8-(Et₃P)₂H**Pt**(C₂B₈H₉-10-PEt₃)	S, X, H, B, P, IR	[524], [525]
Theoretical Studies		
Molecular and Electronic Structure Calculations		
8-vertex clusters		
B-wedged-Cp**CoFe**(Me₂C₂B₄H₄)₂	Extended Hückel	[287]
1,8,2,3,5,6-Cp₂**Fe**₂[(H₄C₄)H₂C₄B₂H₂] triple-decker sandwich	Extended Hückel	[527]
10-vertex clusters		
Cp₂**Fe**₂(C₂B₆H₈)	Electron-counting	[529]
Closo/hypercloso-(Et₃P)ₙ**Ru**(C₂B₇H₉) *n*=2, 3	Electron-counting	[530]
Cp₂**Rh**₂(C₂B₆H₈)	DFT: molecular structure	[1397]
Cp₂**Ir**₂(C₂B₆H₈)	DFT: molecular structure	[1397]

[a]Transition metals and other heteroatoms (excluding carbon) incorporated into the cluster framework are in **boldface**.
[b]S, synthesis; X, X-ray diffraction; H, ¹H NMR; B, ¹¹B NMR; C, ¹³C NMR; P, ³¹P NMR; Pt, ¹⁹⁵Pt NMR; 2d, two-dimensional (COSY) NMR; IR, infrared data; MS, mass spectroscopic data; UV, UV-visible data; E, electrochemical data; ESR, electron spin resonance data; MAG, magnetic susceptibility; OR, optical rotation.