

Supporting Information for

Phosphonates As Ligands In Co-Cr Heterometallic Clusters

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Table S1 Bond distances M-O donor ligand for 3.

Atoms	Distance / Å	Atoms	Distance / Å
Co(1)-O(1)	1.956(3)	Co(4)-O(20)	2.036(4)
Co(1)-O(3)	1.984(3)	Co(4)-O(22)	2.075(4)
Co(1)-O(5)	1.992(3)	Co(4)-O(24)	2.156(3)
Co(1)-O(7)	1.998(3)	Co(4)-O(6)	2.670(3)
Co(2)-O(11)	2.028(3)	Cr(1)-O(2)	1.945(3)
Co(2)-O(9)	2.031(4)	Cr(1)-O(1)	1.947(3)
Co(2)-O(1)	2.034(3)	Cr(1)-O(15)	1.988(3)
Co(2)-O(4)	2.069(3)	Cr(1)-O(10)	2.003(3)
Co(2)-O(23)	2.187(3)	Cr(1)-O(6)	2.003(3)
Co(2)-O(13)	2.472(4)	Cr(1)-O(13)	2.017(3)
Co(3)-O(2)	1.958(3)	Cr(2)-O(1)	1.943(3)
Co(3)-O(14)	1.994(3)	Cr(2)-O(2)	1.944(3)
Co(3)-O(21)	1.997(3)	Cr(2)-O(12)	1.989(3)
Co(3)-O(18)	2.009(3)	Cr(2)-O(8)	1.994(3)
Co(4)-O(2)	2.009(3)	Cr(2)-O(19)	1.997(3)
Co(4)-O(16)	2.022(4)	Cr(2)-O(17)	2.005(3)

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Table S2 Bond distances M-O donor ligand for 4.

Atoms	Distance / Å	Atoms	Distance / Å
Cr(1) – O(1)	2.043(4)	Co(3) – O(2)	2.141(3)
Cr(1) – O(20)	1.956(4)	Co(3) – O(10)	2.118(3)
Cr(1) – O(40)	1.982(4)	Co(3) – O(11)	2.082(3)
Cr(1) – O(50)	1.982(4)	Co(3) – O(30)	2.272(4)
Cr(1) – O(70)	1.995(5)	Co(3) – O(61)	2.033(4)
Cr(1) – O(80)	2.003(5)	Co(3) – O(90)	2.022(4)
Cr(2) – O(1)	2.032(4)	Co(4) – O(1)	2.105(4)
Cr(2) – O(2)	1.994(3)	Co(4) – O(2)	2.153(3)
Cr(2) – O(12)	1.939(4)	Co(4) – O(10)	2.168(3)

Cr(2) – O(20)	1.953(4)	Co(4) – O(11)	2.065(3)
Cr(2) – O(41)	1.988(4)	Co(4) – O(30)	2.184(4)
Cr(2) – O(60)	1.945(4)	Co(4) – O(51)	2.046(4)

Table S3 Bond distances M-O donor ligand for 5.

Atoms	Distance / Å	Atoms	Distance / Å
Co(1) – O(111)	2.060(3)	Co(7) – O(8)	1.992(3)
Co(1) – O(121)	2.062(3)	Co(7) – O(15)	2.102(4)
Co(1) – O(131)	2.20(2)	Co(7) – O(122)	2.154(3)
Co(1) – O(134)	2.13(2)	Co(7) – O(131)	2.03(2)
Co(1) – O(132)	2.25(2)	Co(7) – O(134)	2.29(2)
Co(1) – O(135)	2.08(2)	Co(7) – O(142)	2.27(2)
Co(1) – O(141)	2.12(4)	Co(7) – O(145)	2.06(3)
Co(1) – O(144)	2.22(5)	Co(7) – O(190)	2.047(4)
Co(1) – O(142)	2.14(3)	Cr(8) – O(2)	2.001(4)
Co(1) – O(145)	2.16(4)	Cr(8) – O(8)	1.940(4)
Co(2) – O(111)	2.077(3)	Cr(8) – O(9)	1.968(4)
Co(2) – O(121)	2.047(3)	Cr(8) – O(10)	1.927(4)
Co(2) – O(151)	2.170(11)	Cr(8) – O(122)	2.044(3)
Co(1) – O(154)	2.13(3)	Cr(8) – O(191)	1.968(4)
Co(2) – O(152)	2.215(11)	Cr(9) – O(2)	1.994(3)
Co(2) – O(155)	2.05(3)	Cr(9) – O(9)	1.973(3)
Co(2) – O(161)	2.07(5)	Cr(9) – O(11)	1.931(3)
Co(2) – O(164)	2.20(2)	Cr(9) – O(12)	1.929(3)
Co(2) – O(162)	2.22(9)	Cr(9) – O(123)	2.038(3)
Co(2) – O(165)	2.15(5)	Cr(9) – O(200)	1.976(3)
Co(3) – O(3)	1.981(3)	Co(10) – O(11)	1.976(3)
Co(3) – O(13)	2.110(4)	Co(10) – O(16)	2.109(3)
Co(3) – O(112)	2.156(3)	Co(10) – O(123)	2.161(3)
Co(3) – O(151)	2.037(10)	Co(10) – O(162)	2.25(9)
Co(3) – O(154)	2.33(2)	Co(10) – O(165)	2.20(5)
Co(3) – O(161)	2.37(5)	Co(10) – O(152)	2.047(10)
Co(3) – O(164)	2.18(3)	Co(10) – O(155)	2.32(3)
Co(3) – O(170)	2.055(3)	Co(10) – O(201)	2.052(3)
Cr(4) – O(1)	1.994(3)	Co(11) – O(1)	2.240(3)
Cr(4) – O(3)	1.935(3)	Co(11) – O(5)	1.987(4)
Cr(4) – O(4)	1.972(3)	Co(11) – O(7)	1.980(4)
Cr(4) – O(5)	1.948(4)		
Cr(4) – O(112)	2.050(3)		
Cr(4) – O(171)	1.970(4)		
Cr(5) – O(1)	1.988(3)		
Cr(5) – O(4)	1.965(3)		
Cr(5) – O(6)	1.932(3)		

Cr(5) – O(7)	1.933(3)	Co(11) – O(17)	2.115(4)
Cr(5) – O(113)	2.040(3)	Co(11) – O(210)	2.118(5)
Cr(5) – O(180)	1.976(3)	Co(11) – O(211)	2.25(2)
Co(6) – O(6)	1.982(3)	Co(12) – O(2)	2.210(3)
Co(6) – O(14)	2.105(4)	Co(12) – O(10)	2.008(4)
Co(6) – O(113)	2.170(3)	Co(12) – O(12)	1.984(4)
Co(6) – O(132)	2.05(2)	Co(12) – O(18)	2.095(4)
Co(6) – O(135)	2.27(2)		
Co(6) – O(141)	2.21(6)	Co(12) – O(220)	2.231(6)
Co(6) – O(144)	2.12(7)	Co(12) – O(221)	2.306(13)
Co(6) – O(181)	2.044(3)	Co(12) – O(222)	1.99(2)
