Electronic Supplementary Material (ESI) for Dalton Transactions


# A Novel Decanuclear Co(II) Cluster with Adamantane-like Metallic Skeleton Supported by 8-Hydroxyquinoline and *In-situ* Formed $CO_3^{2-}$ Anions

Lei Wang, Yi Li, Yu Peng, Zhiqiang Liang,* Jihong Yu and Ruren Xu

State Key Lab of Inorganic Synthesis and Preparative Chemistry, Jilin University,

Changchun, 130012, P. R. China

Email: liangzq@jlu.edu.cn

Tel: +86-431-85168609, Fax: +86-431-85168609

**Contents**:

Figure S1. The Optical micrographs of $[Co_{10}(Q)_{12}(\mu_6\text{-}CO_3)_4]\cdot 2.5DMF$ (**1**).

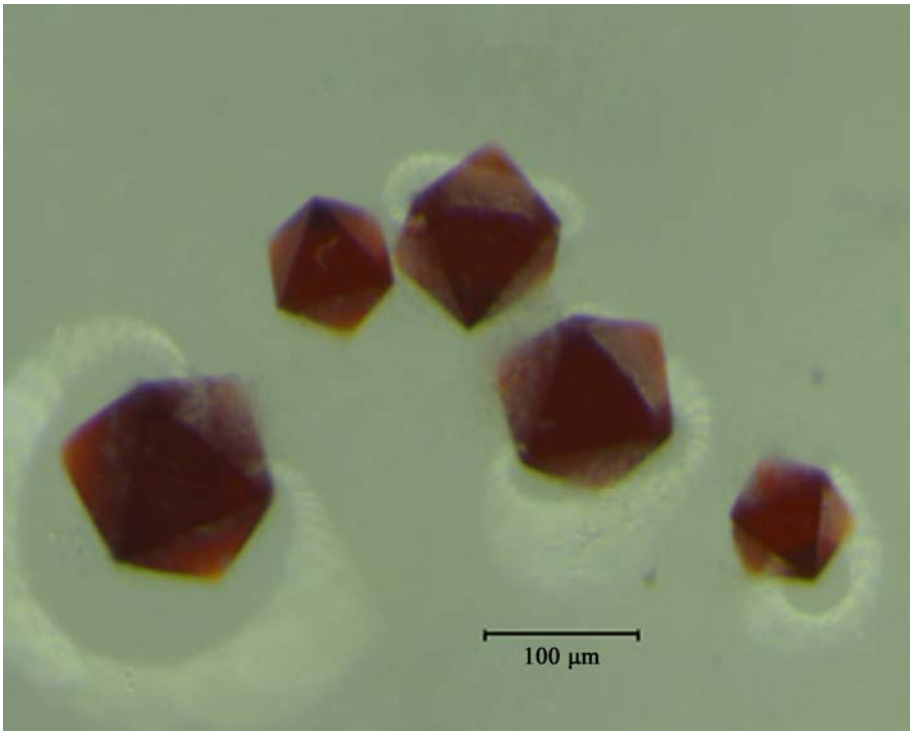

Figure S2. Experimental polycrystalline (black) and calculated from the single-crystal data X-ray powder diffraction (red) of **1**.

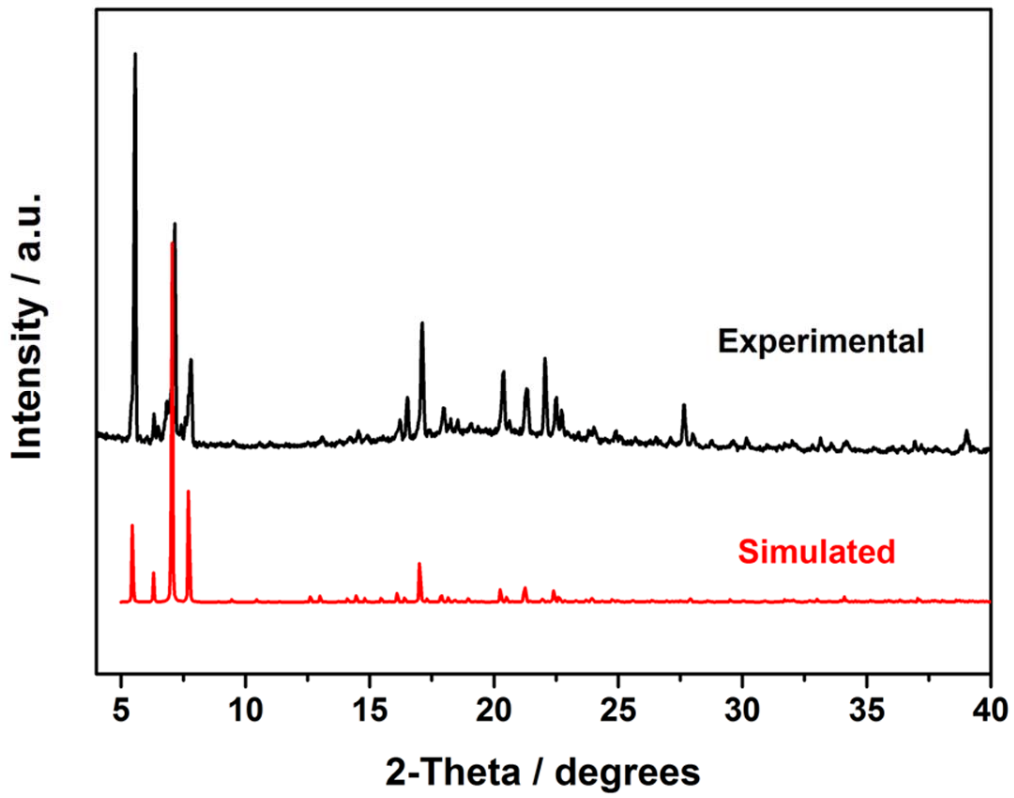

Figure S3. FT-IR spectrum of **1**.

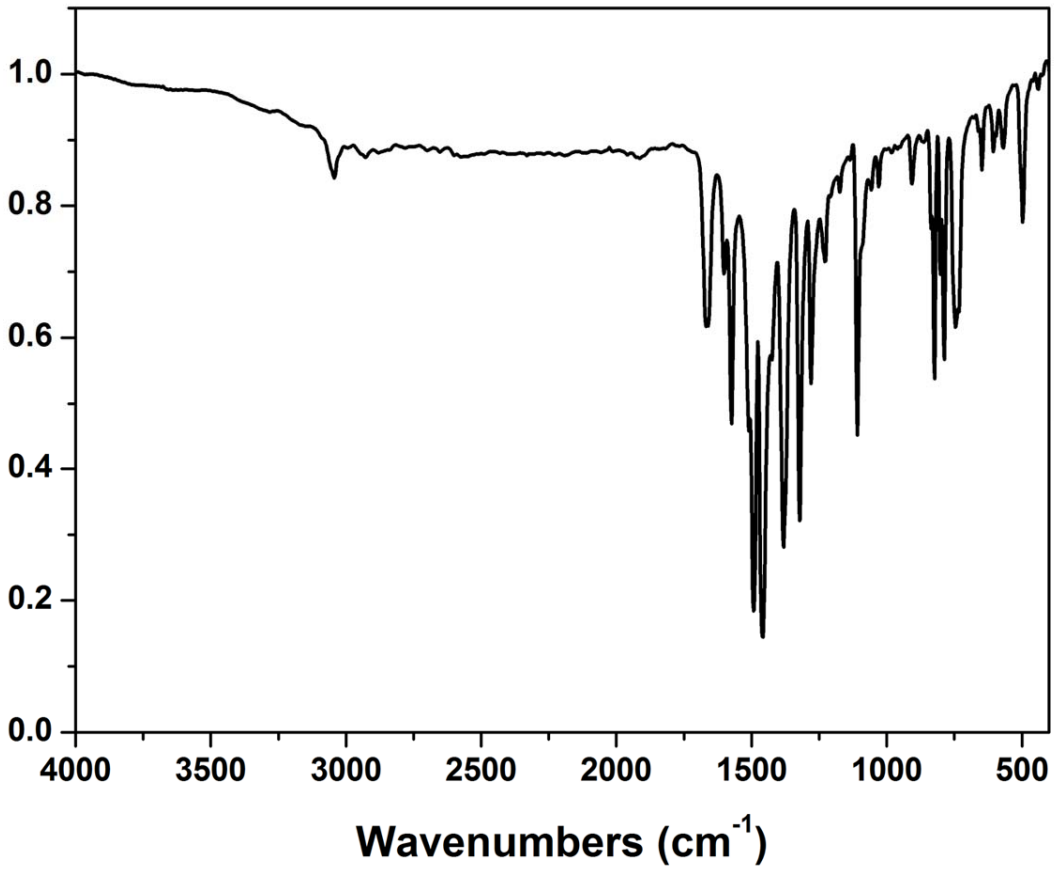

Figure S4. TG analysis of **1** under Air atmosphere.

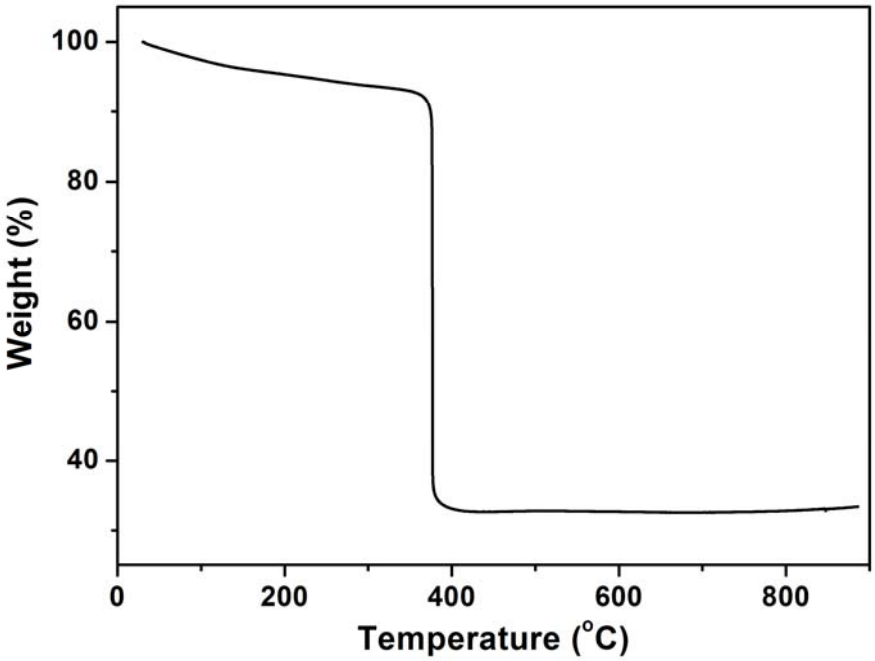

Table S1. Selected Bond Lengths [Å] and Angles [°] for **1**.

| | | | |
|---|---|---|---|
| Co(1)-O(5) | 2.085(3) | Co(3)-O(4)#2 | 2.054(3) |
| Co(1)-N(1) | 2.086(5) | Co(3)-O(4) | 2.054(3) |
| Co(1)-O(7) | 2.108(3) | Co(3)-O(4)#1 | 2.054(3) |
| Co(1)-N(2) | 2.116(4) | Co(3)-O(6)#2 | 2.158(3) |
| Co(1)-O(1) | 2.116(3) | Co(3)-O(6)#1 | 2.158(3) |
| Co(1)-O(2) | 2.127(3) | Co(3)-O(6) | 2.158(3) |
| Co(2)-O(8) | 2.079(3) | Co(4)-O(1) | 2.049(3) |
| Co(2)-O(4) | 2.080(4) | Co(4)-O(3) | 2.055(3) |
| Co(2)-N(3) | 2.083(3) | Co(4)-O(2)#1 | 2.079(3) |
| Co(2)-O(3) | 2.088(3) | Co(4)-O(7)#1 | 2.129(3) |
| Co(2)-N(4) | 2.099(4) | Co(4)-O(5) | 2.138(3) |
| Co(2)-O(6)#1 | 2.115(3) | Co(4)-O(8) | 2.188(3) |
| O(5)-Co(1)-N(1) | 152.71(18) | O(4)#2-Co(3)-O(4) | 104.55(10) |
| O(5)-Co(1)-O(7) | 84.33(12) | O(4)#2-Co(3)-O(4)#1 | 104.55(10) |
| N(1)-Co(1)-O(7) | 97.84(16) | O(4)-Co(3)-O(4)#1 | 104.55(10) |
| O(5)-Co(1)-N(2) | 89.44(15) | O(4)#2-Co(3)-O(6)#2 | 77.48(12) |
| N(1)-Co(1)-N(2) | 101.70(17) | O(4)-Co(3)-O(6)#2 | 85.37(12) |
| O(7)-Co(1)-N(2) | 148.27(16) | O(4)#1-Co(3)-O(6)#2 | 168.76(12) |
| O(5)-Co(1)-O(1) | 74.62(13) | O(4)#2-Co(3)-O(6)#1 | 168.76(12) |
| N(1)-Co(1)-O(1) | 78.60(18) | O(4)-Co(3)-O(6)#1 | 77.48(12) |
| O(7)-Co(1)-O(1) | 105.16(13) | O(4)#1-Co(3)-O(6)#1 | 85.37(12) |

| | | | |
|---|---|---|---|
| N(2)-Co(1)-O(1) | 103.06(16) | O(6)#2-Co(3)-O(6)#1 | 91.77(12) |
| O(5)-Co(1)-O(2) | 110.92(13) | O(4)#2-Co(3)-O(6) | 85.37(12) |
| N(1)-Co(1)-O(2) | 95.81(18) | O(4)-Co(3)-O(6) | 168.76(12) |
| O(7)-Co(1)-O(2) | 75.09(13) | O(4)#1-Co(3)-O(6) | 77.48(12) |
| N(2)-Co(1)-O(2) | 78.25(16) | O(6)#2-Co(3)-O(6) | 91.77(12) |
| O(1)-Co(1)-O(2) | 174.40(14) | O(6)#1-Co(3)-O(6) | 91.77(12) |
| O(8)-Co(2)-O(4) | 156.22(16) | O(1)-Co(4)-O(3) | 107.11(13) |
| O(8)-Co(2)-N(3) | 105.86(12) | O(1)-Co(4)-O(2)#1 | 103.72(13) |
| O(4)-Co(2)-N(3) | 97.61(15) | O(3)-Co(4)-O(2)#1 | 106.03(13) |
| O(8)-Co(2)-O(3) | 77.34(13) | O(1)-Co(4)-O(7)#1 | 165.13(13) |
| O(4)-Co(2)-O(3) | 79.13(16) | O(3)-Co(4)-O(7)#1 | 87.10(13) |
| N(3)-Co(2)-O(3) | 176.64(13) | O(2)#1-Co(4)-O(7)#1 | 75.66(12) |
| O(8)-Co(2)-N(4) | 94.20(15) | O(1)-Co(4)-O(5) | 74.86(13) |
| O(4)-Co(2)-N(4) | 93.89(17) | O(3)-Co(4)-O(5) | 165.32(13) |
| N(3)-Co(2)-N(4) | 79.29(15) | O(2)#1-Co(4)-O(5) | 87.25(13) |
| O(3)-Co(2)-N(4) | 101.65(15) | O(7)#1-Co(4)-O(5) | 90.28(12) |
| O(8)-Co(2)-O(6)#1 | 83.09(12) | O(1)-Co(4)-O(8) | 86.25(12) |
| O(4)-Co(2)-O(6)#1 | 98.40(15) | O(3)-Co(4)-O(8) | 75.64(13) |
| N(3)-Co(2)-O(6)#1 | 77.82(12) | O(2)#1-Co(4)-O(8) | 168.60(13) |
| O(3)-Co(2)-O(6)#1 | 101.76(13) | O(7)#1-Co(4)-O(8) | 93.28(12) |
| N(4)-Co(2)-O(6)#1) | 155.22(15) | O(5)-Co(4)-O(8) | 90.11(12) |
| Co(4)-O(1)-Co(1) | 99.59(14) | Co(1)-O(5)-Co(4) | 97.74(13) |

| | | | |
|---|---|---|---|
| Co(4)#2-O(2)-Co(1) | 96.64(13) | Co(2)#2-O(6)-Co(3) | 94.03(12) |
| Co(4)-O(3)-Co(2) | 99.37(14) | Co(1)-O(7)-Co(4)#2 | 95.70(13) |
| Co(3)-O(4)-Co(2) | 98.15(13) | Co(2)-O(8)-Co(4) | 95.51(13) |

Symmetry transformations used to generate equivalent atoms: #1 -y+3/2, -z+1, x-1/2, #2 z+1/2, -x+3/2, -y+1.